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UNIVERSITY OF ALASKA FAIRBANKS

1995-1996 GRADUATE CATALOG SUPPLEMENT

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Office of the Graduate School  
305 Signers' Hall  
P.O. Box 757560  
University of Alaska Fairbanks  
Fairbanks, Alaska 99775-7560  
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The University of Alaska Fairbanks is a major unit of the University of Alaska Statewide System of higher education. Under the direction of the Board of Regents, the University of Alaska System serves the people of America's largest state through facilities in Fairbanks, Anchorage, Bethel, Juneau, Kenai-Soldotna, Ketchikan, Kodiak, Kotzebue, Nome, Palmer, Sitka, and Valdez. Information about the programs of each unit in the system may be obtained from that unit.

It is the policy of the University of Alaska to provide equal education and employment opportunities and to provide services and benefits to all students and employees without regard to race, color, religion, national origin, sex, age, disability, status as a Vietnam era or disabled veteran, marital status, changes in marital status, pregnancy or parenthood, pursuant to laws enforced by the Department of Education and the Department of Labor, including Presidential Executive Order 11246, as amended, Title VI and Title VII of the 1964 Civil Rights Act, Title IX of the Education Amendments of 1978, the Public Health Service Act of 1971, the Veteran's Readjustment Assistance Act of 1974, the Vocational Rehabilitation Act of 1976, the Age Discrimination in Employment Act of 1967, the Equal Pay Act of 1963, the 14th Amendment, EEOC's Sex Discrimination Guidelines, and Alaska Statutes 18.80.010 et. seq., and 14.18.010, et. seq., and 36.30.010, et. seq. Inquiries regarding application of these and other regulations should be directed either to the University of Alaska Fairbanks, Director of Employee Relations; the Office of Civil Rights, Department of Education, Washington, DC; or to the Office of Federal Contract Compliance Programs, Department of Labor, Washington, DC.

The University of Alaska Fairbanks is committed to equal opportunity for the disabled. Students with disabilities are encouraged to contact the Disabled Student Services Advisor at the Center for Health and Counseling (474-7043) or the Section 504 Coordinator at Personnel Services, Administrative Services Building (474-7700) as early as possible to get assistance. If students are not satisfied with actions taken by the University of Alaska Fairbanks in response to requests for assistance or accommodation, they may obtain a copy of the University's grievance procedures from either the Disabled Student Services Advisor or the Section 504 Coordinator.

#### **NOTICE**

This catalog and its contents shall not be construed as a contract between the University of Alaska Fairbanks and prospective or enrolled students. The catalog is merely a vehicle of information. Although every effort is made to ensure its correctness, regulations of the University and its program requirements change from time to time during the period any student is attending the University of Alaska Fairbanks.

Accordingly, if regulations or program requirements of the University in any way conflict with information contained in this catalog, the current regulations and program requirements govern. The University reserves the right to initiate changes in any of its regulations or program requirements; such changes shall become effective upon whatever time periods are required by applicable statutes, university regulations or program requirements.



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## **ACADEMIC CALENDAR**

### **Fall Semester 1995**

|   |                      |
|---|----------------------|
| Application for admission deadline for fall semester..... | Tues., Aug. 1, 1995  |
| Labor Day.....  | Mon., Sept. 4, 1995  |
| Residence Halls Open, 9 a.m.....                          | Mon., Sept. 4, 1995  |
| Graduate Student Orientation.....                         | Tues., Sept. 5, 1995 |
| Registration Materials and Advisors available.....        | Tues.-Wed,Sept.5-6   |
| Registration: Course selection.....                       | Tues-Wed.,Sept.5-6   |
| Last day for residence halls check in.....                | Wed., Sept. 6        |
| Registration: Fee Payment.....                            | Thu-Wed,Sept7-13     |
| First day of instruction.....                             | Thurs., Sept. 7      |
| Last day of late registration.....                        | Wed., Sept 13        |
| Last day of student initiated withdrawals.....            | Fri, Sept. 29        |
| Last day to apply for fall graduation.....                | Mon., Oct. 16        |
| Priority registration for 1996 Spring semester.....       | Begins Nov. 13       |
| Thanksgiving Holidays.....                                | Thu-Sun,Nov23-26     |
| Thesis Submission Deadline.....                           | Mon,Nov27@ 5pm       |
| Last day of instruction.....                              | Fri., Dec. 15        |
| Final Examinations.....                                   | Mon-Thu,Dec18-21     |
| Residence Halls close, noon.....                          | Fri, Dec. 22         |

### **Spring Semester 1996**

|   |                    |
|---|--------------------|
| Application for admission to deadline for spring semester | Fri., Dec. 1,1995  |
| Residence Halls open, 9 a.m.....                          | Sun., Jan. 14      |
| Alaska Civil Rights Day.....                              | Mon., Jan. 15      |
| Registration materials and advisors available.....        | Mon-Wed,Jan15-17   |
| Registration: course selection.....                       | Tues-Wed,Jan16-17  |
| Last day for residence hall check in.....                 | Wed., Jan. 17      |
| Registration: Fee Payment.....                            | Thu-Wed,Jan18-24   |
| First day of instruction.....                             | Thurs, Jan. 18     |
| Last day of late registration.....                        | Wed., Jan. 24      |
| Last day of student initiated withdrawals.....            | Fri., Feb. 9       |
| Last day to apply for Spring Graduation .....             | Thurs., Feb. 15    |
| Spring Recess.....  | Mon-Sun,Mar11-17   |
| Priority registration for 1996 Fall semester.....         | Begins Apr. 2      |
| Thesis Submission Deadline.....                           | Fri, Apr. 12 @ 5pm |
| All Campus Day (no classes).....                          | Fri., Apr. 26      |
| Last day of instruction.....                              | Fri., May 2        |
| Final Examinations.....                                   | Mon-Thu., May 6-9  |
| Residence Halls close, noon.....                          | Fri., May 10       |
| Commencement.....   | Sun., May 12       |

## **GENERAL INFORMATION**

### **Accreditation/Memberships**

The University of Alaska Fairbanks is accredited as an institution of higher learning by the Northwest Association of Schools and Colleges. UAF holds official designation as a land-grant (1917), sea-grant (1980), and space-grant (1990) institution.

In addition, UAF has received the accreditation for certain programs extended by specialized national agencies, including the American Chemical Society, American Assembly of Collegiate Schools of Business, Accreditation Board for Engineering and Technology, American Association of Museums, Accreditation Council on Education in Journalism and Mass Communication, National Association of Schools of Music, National Council for Accreditation of Teacher Education, and the Alaska State Board of Education (in accordance with standards set by the National Association of State Directors of Teacher Education and Certification), and, for the baccalaureate degree, the Council on Social Work Education.

UAF is affiliated with the National Association of State Universities and Land-Grant Colleges and holds institutional membership in the American Council on Education, American Association of State Colleges and Universities, Council of Graduate Schools, Western Association of Graduate Schools, and Western Interstate Commission for Higher Education.

### **UAF Governance**

Students, faculty, and staff are represented by the individual governance structures which address their concerns (Associated Students of UAF or ASUAF, Faculty Senate, Staff Council).

ASUAF is responsible for those issues which are uniquely student affairs issues. The Faculty Senate is responsible for those issues which are of faculty concern. The Staff Council is responsible for those issues which are uniquely staff affairs issues.

Actions by each governance body are forwarded for consideration to the Chancellor's office, which shares in the responsibility for campus governance. All governance activities are subject to Board of Regents policy.

### **Student Rights Under Title IX**

Title IX of the Federal Education Amendments of 1972 was enacted to ensure that complete equality of education is afforded to both male and female students. This means that there will be no discrimination on the basis of sex in any program, policy or practice of the University of Alaska Fairbanks. Areas covered by this law include: admissions, financial aid, counseling, health services, student activities and programs, and access to course offerings. All concerns that relate to Title IX are to be directed to the Fairbanks campus Title IX coordinator in the Personnel Services office, Administrative Services Building.

## **THE GRADUATE SCHOOL**

### **Organization**

Graduate study at the University of Alaska Fairbanks is administered by the Office of the Graduate School located in 305 Signers' Hall. The Graduate School coordinates graduate programs, courses, admissions standards, and degree requirements; enforces regulations and policy; recommends changes in graduate policy with the Graduate School Advisory Committee; and acts on requests for changes from existing regulations.

### **Graduate School Advisory Committee**

The Graduate School Advisory Committee includes three full-time faculty members appointed by the Faculty Senate President, three full-time faculty members appointed by the Provost, and one graduate student selected by the Provost from nominations submitted by the Graduate Faculty and Student Senate. The graduate student must have completed a minimum of one full year of attendance at UAF. Each department with a graduate program is limited to no more than one member. The Dean of the Graduate School and the President of the Faculty Senate are ex-officio non-voting members. The Dean of the Graduate School will convene regular meetings, and must convene additional meetings if requested by two members of the committee. The committee will advise the Dean of the Graduate School and the Provost on administrative matters pertinent to the



operation and growth of graduate studies at UAF, including financial and tax-related issues and dealings with other universities. All recommendations regarding curricular matters will go to the Graduate Curricular Affairs Committee and the Faculty Senate for approval.

#### **Graduate Curricular Affairs Committee**

The Graduate Curricular Affairs Committee includes five members and is responsible for the review and approval of graduate courses, curriculum and graduate degree requirements, and other academic matters related to instruction and mentoring of graduate students. The Dean of the Graduate School, and the Directors of the library, and the Admissions and Records Office, and one graduate student, are non-voting, ex-officio members.

#### **Thesis Preparation**

The Graduate School has a Thesis Workbook available to give instructions and guidelines to students preparing a thesis. Please refer to the Workbook for specific information.

## **GRADUATE DEGREES**

|                                     |                       |                                      |                     |
|-------------------------------------|-----------------------|--------------------------------------|---------------------|
| Anthropology.....                   | M.A., Ph.D.           | Marine Biology.....                  | M.S.                |
| Arctic Engineering.....             | M.S.                  | Mathematical Engineering.....        | Ph.D.**             |
| Atmospheric Science.....            | M.S., Ph.D.           | Mathematics.....                     | M.A.T., M.S., Ph.D. |
| Behavioral Modification.....        | Ph.D.**               | Mechanical Engineering.....          | M.S., Ph.D.**       |
| Biochemistry.....                   | M.S., Ph.D.           | Mining Engineering.....              | M.S.                |
| Biology.....                        | M.S., M.A.T., Ph.D.   | Mining Reclamation.....              | M.S.**              |
| Bio-Geophysics.....                 | Ph.D.**               | Mineral Preparation Engineering..... | M.S.                |
| Botany.....                         | M.S., Ph.D.           | Molecular Genetics.....              | Ph.D.**             |
| Business Administration.....        | M.B.A.                | Music.....                           | M.A.                |
| Chemistry.....                      | M.A., M.S.            | Natural Resources Management.....    | M.S.                |
| Civil Engineering.....              | M.C.E., M.S., Ph.D.** | Neuroscience.....                    | Ph.D.**             |
| Climatology.....                    | Ph.D.**               | Northern Studies.....                | M.A.                |
| Clinical Psychology.....            | Ph.D.**               | Oceanography.....                    | M.S., Ph.D.         |
| Coastal Engineering.....            | Ph.D.**               | Outdoor Recreation.....              | Ph.D.**             |
| Community Psychology.....           | M.A.                  | Petroleum Engineering.....           | M.S., Ph.D.**       |
| Computation Mechanics.....          | Ph.D.**               | Physics.....                         | M.A.T., M.S., Ph.D. |
| Computer Science.....               | M.S.                  | Professional Communications.....     | M.A.                |
| Creative Writing.....               | M.F.A.                | Psychology.....                      | Ph.D.**             |
| Education.....                      | ED.S., M.ED., Ph.D.** | Quaternary Science.....              | M.S.**              |
| Electrical Engineering.....         | M.E.E., M.S., Ph.D.** | Recreation Management.....           | Ph.D.**             |
| Engineering Management.....         | M.S.                  | Resource Economics.....              | M.S.                |
| English.....                        | M.A.                  | Science Education.....               | Ph.D.**             |
| Environmental Chemistry.....        | M.S., Ph.D.**         | Science Management.....              | M.S.                |
| Environmental Hydrology.....        | Ph.D.**               | Space Physics.....                   | M.S., Ph.D.         |
| Environ. Policy and Management..... | Ph.D.**               | Soil Microbiology.....               | M.S.**              |
| Environ. Quality Science.....       | M.S., Ph.D.**         | Statistical Quality Control.....     | Ph.D.**             |
| Environ. Quality Engineering.....   | M.S., Ph.D.**         | Water Research Engineering.....      | Ph.D.**             |
| Fisheries.....                      | M.S., Ph.D.           | Wildlife Biology.....                | M.S., Ph.D.         |
| Forest Ecology.....                 | Ph.D.**               | Zoology.....                         | M.S., Ph.D.         |
| Geological Engineering.....         | M.S., Ph.D.**         |                                      |                     |
| Geology.....                        | M.A.T., M.S., Ph.D.   |                                      |                     |
| Geophysics.....                     | M.S., Ph.D.           |                                      |                     |
| Human Nutrition.....                | Ph.D.**               |                                      |                     |
| Hydrology.....                      | M.S., Ph.D.**         |                                      |                     |

**\*\* - Interdisciplinary Degree**

## **UNIVERSITY OF ALASKA FAIRBANKS ADMINISTRATION**

The address for all departments is:

*University of Alaska Fairbanks  
Fairbanks, Alaska 99775*

Campus Information -- (907) 474-7211

Chancellor, Joan K. Wadlow

Provost, John P. Keating

Vice Chancellor for Administrative Services, Michael L. Rice

Dean of the Graduate School, Joe R. Kan

Dean of Student Services, Carla A. Kirts

Associate Vice Chancellor for Univ. Relations and Institutional Advancement, Karen L. Cedzo

Alaska Cooperative Extension Services, Hollis D. Hall, Director

College of Liberal Arts, Gordon O. Hedahl, Dean

Alaska Native Language Center, Michael Krauss, Director

Honors Program, Patricia Andresen, Director

College of Natural Sciences, Paul B. Reichardt, Dean

University of Alaska Museum, Aldona Jonaitis, Director

College of Rural Alaska, Ralph B. Gabrielli, Acting Executive Dean

Bristol Bay Campus, Peggy Wood, Director

Chukchi Campus, Lynn Johnson, Director

Interior Campus, Clara Johnson, Director

Kuskokwim Campus, David Williams, Director

Northwest Campus, Nancy Mendenhall, Director

School of Agriculture and Land Resources Management, James V. Drew, Dean

Agricultural and Forestry Experimental Station, James V. Drew, Director

School of Career and Continuing Education, Ruth Lister, Dean

School of Engineering, Frank Williams, Dean

Institute of Northern Engineering, Frank Williams, Acting Director

School of Fisheries and Ocean Sciences, Vera Alexander, Dean

Alaska Sea Grant College Program, Ronald Dearborn, Director

Fishery Industrial Technology Center, John S. French, Director

Institute of Marine Science, Donald M. Schell, Director

Juneau Center for Fisheries and Ocean Sciences, William W. Smoker, Faculty Chair

Marine Advisory Program, Donald Kramer, Chair

School of Management, David O. Porter, Dean

School of Mineral Engineering, Robert H. Trent, Dean

Mineral Industry Research Laboratory, Robert H. Trent, Acting Director

Petroleum Development Laboratory, Robert H. Trent, Acting Director



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| Accounting and Business Operations, Cary M. Lu, Director     | 474-7301    |
| Admissions and Records, Ann Tremarello, Director             | 474-7521    |
|  | or 474-7821 |
| Alumni Relations, Cathy Persinger, Director                  | 474-7081    |
| Athletics, Kelly Higgins, Director                           | 474-7205    |
| Budget and Cost Records, Betty Hoch, Director                | 474-6425    |
| Conferences and Special Events, Deborah Wells, Director      | 474-7800    |
| Faculty Senate, Eric Heyne, President                        | 474-7964    |
| Fire Department, Vern Long, Chief                            | 474-7721    |
| Graduate School, Joe Kan, Dean                               | 474-7464    |
| Grant and Contract Services, Cary M. Lu, Director            | 474-7301    |
| International Programs, Stephen McLean, Director             | 474-5327    |
| Libraries, Sharon B. West, Director                          | 474-7224    |
| Office of Arctic Research, Ted DeLaca, Director              | 474-7314    |
| Personnel Services, Jeannie Freeman, Director                | 474-7349    |
| Physical Plant, John Phillips, Director                      | 474-7617    |
| Police Department, Dale Florian, Director                    | 474-7721    |
| Purchasing, Terry Kelly, Director                            | 474-7315    |
| Risk Management, Joe Adams, Director                         | 474-7340    |
| Student Services   | 474-7317    |
| Kimberly Dempsey, Graduate Student Services                  | 474-7464    |
| Debbie Flodin, Career Planning & Placement                   | 474-7596    |
| Dan Foley, Residence Life                                    | 474-7317    |
| William Connor, Health & Counseling Center                   | 474-7043    |
| Eric Jozwiak, Housing  | 474-7247    |
| Ron Keyes, Wood Center                                       | 474-7037    |
| Nancy Kuhn, International Student Advisor                    | 474-7317    |
| Summer Sessions, Jaclyn Hendrix, Coordinator                 | 474-7021    |
| University Relations, Karen L. Cedzo, Assoc. Vice Chancellor | 474-7581    |
| Utilities Operation, Gerald England, Director                | 474-7351    |

#### **UNIVERSITY OF ALASKA BOARD OF REGENTS**

Sharon Gagnon, President, Anchorage, 1991-1999  
 Virginia Breeze, Vice President, Anchorage, 1989-1997  
 Susan A. Stitham, Secretary, Fairbanks, 1987-1995  
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 Jerome B. Komisar, President of the University of Alaska, Ex-Officio Member

## UNIVERSITY OF ALASKA FAIRBANKS DEGREE REQUIREMENTS

To receive a degree from the University of Alaska Fairbanks, a student must satisfy three sets of requirements: general university requirements, graduate degree requirements, and program (major) requirements. General university requirements and graduate degree requirements are described in this section of the catalog; specific requirements of the major are given in the Programs section.

### GENERAL UNIVERSITY REQUIREMENTS

To receive a graduate degree at UAF, a graduate student must apply and be admitted to a specific degree program and must later be advanced to candidacy for that degree and discipline major.

Credits earned at UAF while a special student or a student without class standing may be applied toward a graduate degree only with approval of the student's advisory committee, to a maximum of one half of all credits used to meet the degree requirements. Up to 9 credits may be approved for transfer to UAF from another institution. Credits taken at the University of Alaska Anchorage and the University of Alaska Southeast are considered transfer credits.

Correspondence courses, credit-by-examination, audited courses, 500 level courses, or courses taken under the credit/no-credit option may not be used in fulfilling the basic course requirements of any degree program. No more than 6 credits of "special topics courses" (693 and/or 697) may be used toward a graduate degree. Requests for exceptions to the limit must be sent to the Dean of the Graduate School.

A cumulative GPA of 3.00 (B) is required for good standing. An A or B grade (no P grades) must be earned in 300-400 level courses; a "C" will be accepted in 600 level courses provided the student maintains a B average. For the purposes of graduate good standing and meeting degree requirements, all grades, including those generated from retaking a course, will be included in the GPA before advancement to candidacy. After advancement to candidacy, courses listed on the Advancement to Candidacy form, including repeats, are included in calculation of the GPA.

A graduate student must be registered for a total of 6 graduate credits per year (Fall, Spring, Summer) when actively working toward a degree. A student wishing temporarily to suspend studies should obtain an approved leave of absence. A student failing to either register or to obtain a leave of absence will be dropped from graduate study and will be required to reapply for admission and be readmitted before resuming graduate studies.

### GRADUATE DEGREE REQUIREMENTS

#### English Proficiency

All graduate students are expected to have proficiency in written and oral English. If deficiencies are apparent, then the student's advisory committee will determine requirements to remove the deficiencies. Such requirements may not be used in fulfilling the language/research tool requirement that some departments require.

#### Catalog and Time Limits for Degrees

A student enrolled in a graduate degree program may elect to graduate under the degree requirements of the UAF catalog in effect in the first semester of enrollment in the degree program, or the catalog in effect at graduation. Students who do not meet continuous registration requirements will use either the catalog in effect during the semester of their reentry or the catalog in effect during the semester of graduation. Students not meeting continuous registration requirements waive their right to use the catalog of entry.

All nonacademic policies and regulations will be listed in the current catalog and will apply to ALL graduate students. Questions regarding nonacademic policies and regulations should be sent to the Office of the Graduate School.

All course work listed on the student's advancement to candidacy form and all other degree requirements must be satisfactorily completed within seven years for a Master's Degree and ten years for a Ph.D.



### **Catalog of Record**

A student may elect to graduate under the requirements of the UAF catalog in effect in the first semester of enrollment in the degree program, or the catalog in effect at graduation, provided that the student has met continuous registration requirements and the time limit for coursework and all degree requirements has not been exceeded.

### **Transfer Credit**

A maximum of 9 semester credits from another institution may be transferred to the University of Alaska Fairbanks and applied toward a degree, if approved by the student's advisory committee and by the dean of the college/school in which the student is enrolled. These credits may be at either the upper-division, undergraduate level or at the graduate level, but they must have been taken after completing the baccalaureate degree and cannot have been used toward a previously earned graduate degree. All transfer courses must have been taken within the appropriate time limit for the degree. University of Alaska Anchorage (UAA) and University of Alaska Southeast (UAS) credits are considered transfer credits when used in UAF graduate programs.

### **Cooperative Programs**

In some cases, cooperative programs using utilizing specific courses from other universities may be developed before a student has been admitted to graduate study at UAF. Part of the application process must include an approved graduate study plan which includes the cooperative program. A minimum of 12 semester credits, however, in addition to thesis and research, must be completed in residence at UAF.

### **Reserved Credit**

Students who received their baccalaureate degree from UAF may, with graduate advisory committee approval, include credits which they reserved for graduate study during the final year of their undergraduate program. The courses must be reserved in the senior year at UAF in accordance with the policy as stated in the UAF Undergraduate Catalog.

### **Correspondence, 500 level, and other types of course offerings**

Correspondence courses, 500 level courses, audited, courses, credit-by-examination, or courses taken under the credit/no-credit option may not be used in fulfilling the basic course requirements of any degree program. However, with the permission of the advisory committee, these course options may be used to satisfy certain deficiencies.

### **Deficiencies**

A student's advisory committee may require that certain deficiencies be corrected. The advisory committee will determine early in the student's program the method of remedying the deficiencies and the minimum level of performance to be required of the student. Such courses may be taken under the credit/no-credit option, audit, or through credit-by-examination.

Deficiency requirements are considered to be a part of the student's overall graduate study program and must be included on the Graduate Study Plan and the Advancement to Candidacy forms. If satisfied through coursework, these deficiencies, though listed on the Advancement to Candidacy, are not included in the minimum number of credits required for the specific master's degree nor are they included in calculation of the GPA after Advancement to Candidacy.

## **MASTER'S DEGREE**

The University of Alaska Fairbanks offers research-oriented (thesis or project) and practice-oriented (non-thesis) master's degrees. The objective of research-oriented programs is to prepare graduate students for scholarly or research activity directed mainly toward the acquisition of new knowledge, while that of practice-oriented graduate programs is to prepare graduate students for professional practice directed mainly toward application or transmission of existing knowledge. All degree requirements must be completed within a seven-year time period. The minimum requirements for a master's degree at the University of Alaska Fairbanks are as follows (departments may have additional requirements):

### **Degree Requirements:**

1. Formulate a unified degree program, in cooperation with the student's graduate advisory committee, as best fits the needs of the individual student. Degree programs must be composed of courses in the discipline or clearly related to and/or supportive of that discipline. All courses to be applied toward the degree must be approved by the advisory committee and follow the requirements set forth by the department which sponsors the degree.
2. Specific requirements for the master's degree are:
  - a. Submit a Graduate Study Plan (GSP), Appointment of Committed Form, and annual Report of Committee form to the Graduate School. It is suggested that the GSP and Appointment of Committee forms be submitted by the end of the first year of study.
  - b. Be registered for at least 6 credits per year or have an approved leave of absence on file.
  - c. Pass a comprehensive examination, written and/or oral. This examination may be combined with the thesis or project defense. Presently, the M.B.A. program is the only program which does not require a comprehensive examination.
  - d. Submit an Advancement to Candidacy form to the Graduate School.
  - d. If a thesis or project is required, pass an oral defense of the thesis/project.
  - e. Submit an application for graduation and be registered for at least 3 graduate credits in the semester in which the degree is to be awarded.
  - f. Complete all degree requirements within the 7-year time limit allowed.

### **Course/Credit Requirements:**

Complete satisfactorily a minimum of 30 semester credits.

- a. At least 24 semester credits, including those earned for thesis and research/project, must be at the 600-level. The rest may be made up of 300-400 level credits.
- b. No 100-200 or 500 level credits may be applied toward degree requirements.
- c. A minimum of 6 and a maximum of 12 semester credits of thesis (699) and/or research (698) may be applied toward degree requirements. Students may enroll in more than 12 thesis and/or research credits, but only 12 may be applied toward the degree. When a thesis is required, it must carry 6 or more credits. In non-thesis programs, a maximum of 6 credits may be devoted to research.

### **SECOND MASTER'S DEGREE**

At the discretion of the student's advisory committee, admitting department, and dean, up to 20% of the total minimum number of credits required for a UAF master's degree may be transferred from a previously earned master's degree. Transferred credit may not be research, project or thesis credit. The transferred credit must be for completed graduate level courses and not portions of a course. For a 30-credit master's degree, therefore, up to 6 graduate credits may be transferred; for a 45-credit master's degree, up to 9 graduate credits may be transferred. The following procedures are required for students who wish to pursue a second master's degree:

1. A new application is required. All procedures required for application are necessary, including the application processing fee, updated transcripts and three new letters of reference.
2. GRE scores accepted for a previously earned degree may be accepted for a second master's degree.
3. Students must fulfill all general university requirements for the second master's degree, including taking a comprehensive exam (if required), completing a minimum of 30 semester credits (including thesis, research and transfer credits) and passing an oral defense of a thesis or project.
4. All of the work used to fulfill degree requirements for a second master's degree must be complete within 7 years.

## **MASTER OF ARTS IN TEACHING**

The Master of Arts in Teaching program is designed to serve baccalaureate graduates who qualify for the Alaska secondary school certificate, who intend to make secondary school classroom teaching their career and who wish to take additional work in their teaching major and/or minor as well as Education. A bachelor's degree and teaching credentials are required for admission to an M.A.T. program. NOTE: Students enroll in a department which offers an approved M.A.T. program. The M.A.T. degree at UAF has been approved for the following subject areas: biology, English, geosciences, mathematics, and physics. M.A.T. candidates must complete general university master's degree requirements, with specific requirements as follows:

1. Complete 36 credits, of which at least 24 credits, including research, must be at the 600 level.
2. Each candidate must pass a written comprehensive exam given by the student's advisory committee. There is no thesis requirement for the M.A.T. degree.

## **EDUCATIONAL SPECIALIST DEGREE**

The Educational Specialist (Ed.S.) degree program is designed for teachers and other educators who wish 1) to undertake graduate study beyond the master's degree; 2) to qualify for an intermediate degree between the master's and the doctorate; and 3) to develop further competence in the area of cross-cultural education. Minimum requirements for the Ed.S. degree are completion of 36 credits after receiving a master's degree, and completion of general university requirements and master's degree requirements.

## **ENGINEER OF MINES DEGREE**

The Engineer of Mines degree is a professional degree which is awarded to engineering graduates who have a minimum of five years of responsible engineering experience and who compose and submit an acceptable thesis. For specific degree requirements contact the School of Mineral Engineering.

## **DOCTOR OF PHILOSOPHY DEGREE**

The Doctor of Philosophy Degree is granted in recognition of scholarly attainment and proven ability. University of Alaska Fairbanks staff holding rank of assistant professor (or equivalent) or above are not eligible to become candidates for the Ph.D. at the University of Alaska Fairbanks.

### **Degree Requirements:**

1. Work toward the Ph.D. degree includes at least three full years of study beyond the baccalaureate degree, including up to 9 credits of applicable and acceptable work transferred from other institutions. A minimum of one and one-half years (three semesters) must be spent in residence at UAF.
2. In addition to satisfactory completion of a plan of study developed in accordance with the guidelines described above, specific requirements for the Ph.D. degree are:
  - a) maintain enrollment of at least 6 graduate credits throughout a year or have an approved leave of absence on file.
  - b) Pass a written comprehensive examination.
  - c) Complete a minimum of 18 thesis credits and satisfactorily complete a thesis which is a substantial contribution to the body of knowledge in the area.
  - d) Pass an oral defense of thesis examination.
  - e) Apply for graduation and be registered for at least 3 graduate credits in the semester in which the degree is awarded.
  - f) Complete all degree requirements within the 10-year time limit allowed.



**Course Requirements:**

There are no fixed course work or credit requirements for the Ph.D. degree other than the requirement of a minimum of 18 credit hours of thesis. The student chooses a major line of study and, with the advice of the advisory committee, supportive lines of study in related fields as are necessary for a thorough and scholarly knowledge of the chosen subject. The advisory committee, together with the student, will work out a coherent and meaningful program, shaped to the needs of the individual student and developed in terms of the student's experience, academic background, and aspirations.

**FEES****Tuition: 1995-96 Academic Year**

Tuition for graduate credits in 1995-96: \$150 per graduate credit per semester for residents, and \$300 per graduate credit per semester for non-residents.

Tuition for upper division undergraduate credits in 1995-96: \$75 per credit per semester for residents, and \$225 per credit per semester for non-residents.

**Definition of Residency**

Alaska residents, members of the United States military on active duty and their dependents, members of the Alaskan National Guard and their dependents, as well as residents of the Yukon Territory and the Northwest Territories are exempt from a non-resident tuition fee. For purposes of non-resident tuition a resident is any person who has been physically present in Alaska for one year (excepting only vacations or other absence for temporary purposes with intent to return) and who declares intention to remain in Alaska indefinitely. However, any persons who, within one year, have declared themselves to be residents of another state, have voted in another state, or have done any act inconsistent with Alaska residence shall be deemed non-resident for purposes of non-resident tuition.

This definition of Alaska residency status is solely for the purposes of tuition payment at the University of Alaska Fairbanks. The requirements of the university may or may not be the same as requirements of other agencies of the state of Alaska. The issuance of an F-1 visa to international students requires affirmation that one does not intend to make the United States a permanent residence, therefore an international student will not be considered a resident for tuition purposes during any semester at UAF.

Persons wishing to apply for resident status should complete an Application for Residency Status form (the form may be obtained from the Office of Admissions and Records, Signers' Hall.) Applicants should attach a copy of documentary proof of residency in Alaska for the past 12 months. Records presented in support of residency application cannot be returned. Therefore it is suggested that photocopies of such records be made to turn in with the application. The completed form and the proof of residency should be returned to the Office of Admissions and Records prior to the date of registration.

Acceptable examples of Proof of Residency are rent receipts, checks written to local merchants throughout the year, statement from an Alaskan employer, current military I.D., Alaskan high school or college transcripts, or Postal Service verification of Alaskan address. Contact Admissions and Records for more information.

**Senior Citizen Tuition Waiver**

Tuition charges are waived for all persons at least 60 years of age. They must, however, pay activity and material fees for any credit or audit courses in which they enroll. Such students may enroll in any class for which they are properly qualified, if space is available.

## **Veteran's Benefits**

Veterans wishing to be certified for VA benefits should apply for certification as far in advance of the semester of their acceptance as possible. Only veterans who have been accepted as students of the University of Alaska Fairbanks may be certified. For certification requirements contact the Veterans' Certification Clerk, Office of Admissions and Records, or phone (907)474-7821.

## **WICHE and WRGP**

The Western Interstate Commission for Higher Education (WICHE) has selected UAF programs in arctic, circumpolar, and cold regions studies as part of the unique or specialized graduate programs it coordinates in the western states - the Western Regional Graduate Programs (WRGP). Residents of Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, Washington, and Wyoming, who major in one of the following programs pay resident tuition at UAF. The programs included are: atmospheric sciences, biology, botany, fisheries, geology, geophysics, marine biology, mining engineering, natural resources management, oceanography, space physics, wildlife management, and zoology. Contact the Office of the Graduate School for more information. UAF applicants should indicate eligibility for WRGP on the Graduate Application for Admission form; there is no special or formal application required for the reduced tuition.

## **Fee Definitions**

### **Admission Processing Fee**

A non-refundable application fee of \$35.00 is required when an application for admission is submitted. If paid by check, the check must be written in U.S. funds.

### **Reinstatement Fee**

If a student does not meet registration requirements and fails to have an approved leave of absence on file, the student may request to the Dean of the Graduate School that reinstatement is given. There will be a \$35.00 fee assessed for all reinstatements granted.

### **Student Activity Fee**

Students carrying eight or more credit hours will be charged \$100 for the Student Activity Fee. Students living in university housing will be charged the \$100 fee regardless of the number of credit hours taken. Students taking one to seven credit hours will be charged a \$25 fee and have the option of paying the \$100 dollar fee to increase their accessibility to campus facilities and activities.

Those paying the \$100 student activity fee are entitled to the use of the Patty Center and the Student Recreation Center and all activities listed below.

Those paying the \$25 fee are entitled to participate in all student-managed social, educational, and governmental activities, including receipt of the student paper, ASUA book exchange, free legal advice, intramural sports, movies, scheduled social events, student elections, use of Wood Center facilities and a summer campground, and administration of student government.

### **Student Health Insurance Fee**

The University requires that all students with full-time status, and students living in University housing, be covered by a health insurance plan. For the purpose of this fee payment, full-time students are undergraduate students taking 12 or more credits and graduate students taking 9 or more credits or registered for active extended registration.

At the time of fee payment the student will purchase the Student Health Insurance Plan through the university or, if covered by an alternate health insurance plan, may waive the Student Health Insurance Fee. The Student Health Insurance Waiver Form is obtained by presenting indication of the alternate coverage at the time of fee payment. Waiver forms are available at the Center for Health & Counseling as well as at fee payment locations. Students enrolled in 6 through 11 credits have the option of purchasing the Student Health Insurance Plan if they also pay the Health Center Fee.

The Student Health Insurance Fee is approximately \$230 per semester. The actual rate will be quoted at the time of fee payment. The plan provides basic coverage for accidents and illness that

are not pre-existing. Health Insurance Coverage for spouse and/or dependents is also available. Questions regarding the Student Health Insurance Plan can be directed to the Insurance Coordinator at the Center for Health and Counseling.

#### Health Center Fee

The Health Center Fee provides basic medical and counseling services at the Center for Health and Counseling. All full-time students, students living in university housing, and students purchasing the Student Health Insurance Plan pay the Health Center Fee. For the purposes of this fee payment, full-time students are undergraduate students taking 12 or more credits and graduate students taking 9 or more credits. Active duty military students have the option of paying the fee. The Health Center Fee is approximately \$65; the actual rate will be quoted at the time of fee payment. A waiver of the Health Center Fee is available for full-time students only if: none of their courses meet on the main campus; and they do not live in university housing; and they are not enrolled in the Student Health Insurance Plan. A Health Center Fee Waiver Form may be obtained during the fee payment period at the beginning of Fall and Spring semesters.

#### International Student Health Insurance Plan

The International Student Health Insurance Plan provides the same benefits as the domestic plan. In addition, it provides coverage for medical evacuation or repatriation. The cost for International Student Insurance is approximately \$542 for the year. In general, waivers are not available. Students seeking waivers must present evidence, in English, of equivalent coverage, to the Insurance Coordinator at the Center for Health and Counseling. Waivers will not be granted unless requested in advance of the fee payment period.

### **Other Fees**

#### Laboratory Use/Material Use Fees

A laboratory or material use fee may be charged for certain courses which require the use of special materials, supplies or services.

#### Music Course Fees

Fees are charged for the following services or facilities: private instruction (per each applied music course), \$145 (fee for music major is \$75); class instruction (class lesson course), \$70 (fee for music major is \$35); class instruction (functional piano course), \$70 (fee for music major is \$35). Music majors carrying less than 12 credits must pay full fees. Full-time music majors (12 credits or more) will not have to pay more than \$105 for any combination of the above fees. Practice room use by students not enrolled in one of the above music courses, on a space available basis, is \$70.

#### Late Registration Fee

Students paying registration fees later than the day designated for that purpose shall pay a late registration fee of \$40 for the first working day, plus \$10 for each succeeding working day, to a maximum of \$100. This fee is refundable only in the event that all classes for which the student registered are canceled. Extended registration is also subject to the late fee charge.

#### Parking Fee

For 1995-96, the on-campus parking decals are \$200 annually or \$5 per credit hour for each semester. Reserved "Gold Spaces" may be purchased for \$600 annually. Anyone who parks on campus must have a parking decal

#### Late Placement and Guidance Test Fee

A charge of \$5 shall be made for a placement and guidance test taken at a time other than the scheduled time.

#### Official Transcript Fee

Official transcripts of UAF academic records are prepared for a fee of \$5 for each copy. Normal processing time is two weeks; however, at the end of a semester or at other times during the year, processing time is extended to four weeks. For \$10 dollars, a transcript will be prepared 36 hours after the request is made and paid for. For each additional copy the charge is \$5.

All requests for transcripts must be submitted in writing. Information to be included in the request includes dates and places of attendance, social security number and date of birth.

#### Unofficial Transcript/Counseling Report Fee

Unofficial copies of academic records in either a transcript of counseling report format are available free of charge at the Admissions and Records window, 1st floor Signers Hall. This report is available through pick up only. There is a \$2 charge per copy for immediate service, \$1 per copy for overnight service. These unofficial records are printed on plain paper and are used for academic advising.

#### Records Duplication Charge

Copies of documents on file in a student's folder (excluding transcripts from other universities) in the Admissions and Records Office may be obtained by that student, if time permits, upon written request at a cost of \$5 per document. These copies are unofficial and will bear a statement to that effect. Mailing copies of documents through this service is not available.

#### Thesis Binding Fee

A \$16- \$22 fee is charged for each copy of the thesis which will be hard bound, including the two copies which go to the Rasmuson Library. This fee is paid at the time the thesis is submitted to the Graduate School. Fees may also be assessed to cover microfilming, copyright, map pockets, or postage. See the thesis workbook for more specific information.

### **PAYMENT OF FEES**

At the announced time of registration, each student is expected to pay all charges due for the entire semester. This includes tuition and fees, room rent, meal ticket costs, student activity fees, health fee and deposits. In addition, any charges unpaid at the end of previous semesters are due and must be paid prior to re-enrollment at the university. Registration is not complete until all fees have been paid.

Any student may apply at the Financial Aid Office for a payment plan for up to one-half of their tuition. All other costs including housing and meals must be paid at registration. Requests for the payment plan should be made on the appropriate form prior to the registration process. Applications submitted on the date of enrollment will be processed on a time-available basis and students run the risk of delayed registration resulting in late fees as well as closed classes.

### **FINANCIAL OBLIGATIONS**

The University of Alaska Fairbanks reserves the right to withhold transcripts, diplomas or final grade reports from students who have not paid all financial obligations to the institution. If a student is delinquent in payment of any amount due the university, registration for succeeding semesters may be withheld.

Registration of any student may be canceled at any time for failure to meet installment contract payments or financial obligations. The registration process is not completed until all fees and charges due the university have been paid.

### **REFUND OF GENERAL UNIVERSITY TUITION AND FEES**

A student who withdraws from courses or cancels enrollment must complete an official withdrawal form and turn it in to the Office of Admissions and Records. Full or partial refund of credit hour fees, and non-resident tuition and fees will be made under the following circumstances:

1. In the event the courses for which the student is registered are canceled by UAF, tuition and fees will be refunded in full.



2. If the student formally withdraws from a course, refunds will be made according to the following schedule as determined by the date of the formal withdrawal action.

A. For semester length courses:

- 1) 100 percent refund of tuition and fees -- withdrawal prior to and during the first five days of instruction for the semester.
- 2) 50 percent refund of tuition only -- withdrawal on or after the sixth day through the tenth day of instruction for the semester.
- 3) No refund -- withdrawal on or after the eleventh day of instruction for the semester.
- 4) For the purpose of the refund policy in A(1), (2), and (3) the first day of instruction is the date as indicated in the official semester academic calendar.

B. For courses meeting more than one week but less than a semester:

- 1) 100 percent refund of tuition and fees -- withdrawal prior to and during the first seven calendar days of the course.
- 2) 50 percent refund of tuition only -- withdrawal on or after the eighth calendar day through the fourteenth calendar day of the course.
- 3) No refund -- withdrawal on or after the fifteenth calendar day of the course or after 60 percent of the course has passed.
- 4) For the purpose of the refund policy in B (1), (2), and (3), the first day of instruction in the course start date as indicated in the semester class schedule. Student-initiated withdrawals are permitted only during the first 60 percent of the course. Therefore, no refunds will be issued after the withdrawal deadline for any course.

3. Claim for a refund must be made in writing to the business office at the time of withdrawal. The certified date of withdrawal, as indicated on the official withdrawal form, will determine the student's eligibility for a refund.

4. Students whose registration is canceled as a result of disciplinary action forfeit all rights to a refund of any portion of their tuition and fees.

5. Vocational/technical course fees shall be subject to this refund schedule.

6. In case the operations of UAF are adversely affected by war, riot, natural act, action of civil authority, strike or other emergency or condition, the university reserves the right to take action to curtail part or all of its operations, including action to cancel classes and action to discontinue services. In any case in which a significant curtailment is judged proper by UAF, the university's liability shall be limited to (at most) a refund of tuition and fees paid.

#### Housing and Meal Refunds

Students who move off campus or withdraw from the university are eligible for room refunds under the following guidelines:

| Withdrawal Period | Refund Amount                      |
|-------------------|------------------------------------|
| Class days 1-5    | 75% of the semester housing charge |
| Class days 6-15   | 50% of the semester housing charge |
| Class days 16-30  | 25% of the semester housing charge |
| Beyond 30 days    | No refund will be issued           |

Any refund of meal plan charges will be calculated based upon the days remaining in the semester. A service charge of \$75 will be subtracted from each refund of meal charges, regardless of the date of withdrawal from the meal plan. No refunds will be available after the twelfth week of the semester.

## FINANCIAL AID

Financial aid can help pay for tuition and fees, books and supplies and living expenses. Students can get information about the types of financial aid available and receive assistance in completing the necessary applications and forms at the Financial Aid Office, located on the first floor of the Eielson Building. Office hours are from 8:00 a.m. to 5:00 p.m., Monday through Friday. The telephone number is (907) 474-7256.

### ELIGIBILITY FOR AID

Most full-time graduate students receive some type of financial aid. To be eligible for graduate financial aid, including graduate fellowships and assistantships, a student must:

1. Be formally accepted as a graduate student at UAF,
2. Be in good standing throughout the tenure of the support
3. Be registered throughout the tenure of the assistantship, fellowship or award, and
4. Demonstrate satisfactory progress toward a degree.

In order to remain in good standing, a graduate student must maintain a cumulative GPA of 3.00 in courses identified on the student's Advancement to Candidacy (including repeats) or, if not advanced, a cumulative grade point average of 3.00 on all courses taken since admission to graduate study, including repeats. Students are also expected to complete their degree within the required timelines.

### WHO MAY APPLY FOR FINANCIAL AID?

Citizens and eligible noncitizens of the United States of America can apply for federal and state financial aid. Students apply for federal aid by completing the Free Application for Federal Student Aid (FAFSA). By definition, graduate students are considered independent in the application for federal aid. A separate application is required for each loan program. Students may be required to submit other documents before aid is received. The forms needed to apply for federal and state financial aid are available at the Financial Aid Office at UAF. Although students holding a F1 or J1 visa are not eligible to apply for federal or state financial assistance, they may apply for UAF scholarships, fellowships and assistantships and some work programs.

### TYPES OF FINANCIAL AID AVAILABLE

#### Scholarships and Fellowships

Scholarships and fellowships are available for graduate students through the University of Alaska Foundation, the Graduate School, and private organizations. There are limited number of these awards granted each year and the amount of the award varies. Contact the UA Foundation or UAF Office of the Graduate School for information.

#### Loans

Loans are the primary source of support for graduate students. Educational loans generally have long term repayment schedules, offer low interest rates and often have provisions for deferring payments. State loans are based on residency in Alaska and federal loans are based on financial need.

The Federal Stafford Loan Program provides student loans from a participating lender such as a bank or savings and loan association. The yearly loan limit for graduate students is \$18,500, of which \$8,500 can be a subsidized loan. Subsidized means that the federal government will pay the interest on the loan during the time before repayment begins. Unsubsidized means that the federal government does not pay interest to the lender on your behalf at any time. The interest rate, or finance charge, is a variable rate, not to exceed 9 percent, that is determined each year.

The Alaska Student Loan Program is administered by the State of Alaska to provide student loans to eligible Alaska residents. Eligibility is based on residency and physical presence in the state of Alaska for at least one year before applying. Full time graduate students can borrow up to \$6,500 each year. The finance charge is nine percent a year on the outstanding balance and begins immediately after the student ceases full time study. Repayment begins no later than six months after the borrower ceases full time study. Additional information about loans, including sample repayment schedules, is available in the Financial Aid Office.

University and Emergency loans are short term loans for enrolled students who have unanticipated or emergency financial needs. Applicants must be in good standing and have no outstanding debt with UAF. Information on these loans can be obtained at the Financial Aid Office.

### Work

Campus work is an important part of helping to pay for college costs for UAF students. Approximately 1000 students, graduate and undergraduate, are employed in campus jobs. Graduate students must be enrolled in 9 credit hours to be eligible for these positions.

Student employees can work up to 20 hours each week while classes are in session and up to 40 hours when classes are not in session. Pay rates are based on the job classification and the average pay can vary from \$150 to \$400 each month. Since there is not a "pool" for workers, student applicants need to apply directly to the department which announces a position vacancy.

Some jobs are funded by the Federal Work Study Program which is a federal financial aid program designed to provide jobs for students with an established financial need. Job placement and working conditions are the same as the regular student employment, except that a work study award is required to be eligible for a Federal Work Study job. Eligibility will be determined by the Financial Aid Office.

### Financial Aid Deadlines

|         |   |
|---------|---|
| March 1 | Applications for UAF Scholarships Due   |
| May 15  | Priority due date for Free Application for Federal Financial Aid.<br>(Forms available in January) |
| May 15  | Priority due date for Alaska Student Loan application.  |

### Special Circumstances

Although the process of determining a student's eligibility for federal student aid is basically the same for all applicants, there is some flexibility. For instance, the financial aid advisor can adjust the cost of attendance of the Expected Family Contribution to take into account circumstances that affect your ability to pay for college. Students should contact a financial aid Advisor if there are any circumstances which they believe are good reasons to reevaluate their financial aid application.

## **RESEARCH AND TEACHING ASSISTANTSHIPS**

Research and Teaching assistantships are awarded to qualified graduate students through each graduate program or department. For application information, students should contact the head of the department in which they are applying or enrolled.

To be eligible for graduate assistantships a student must be: 1) formally accepted as a graduate student at the University of Alaska Fairbanks, 2) be in good academic standing throughout the tenure of the support, 3) meet the registration requirement described below throughout the tenure of the assistantship, and 4) demonstrate continuing satisfactory progress toward the degree.

### Assistantship Stipends

Graduate teaching and research assistants generally receive stipends of up to \$8,000 to \$10,500 for the academic year, calculated at rates of \$10.50-\$14.00 per hour. This includes the four minimum pay ranges - for master's students, doctoral students without an earned masters, doctoral students before advancement to candidacy, and doctoral students after advancement to candidacy. Graduate assistants will be paid for a maximum of 20 hours per week while school is in session in the fall, spring, and summer semesters. Students with assistantships must be registered for a least 9 credits during the fall and spring semesters, and 6 credits during the summer.

A tuition supplement may be added to the assistantship under the following conditions:

- all criteria for an "assistantship" are met;
- 50% tuition is provided for 10 -14 hour/week assistantship. The remaining 50% of the tuition may be picked up by departments or funding units;
- 100% tuition is provided for 15-20 hour/week assistantships;
- Assistantships for under 10 hours/week are not eligible for tuition supplements;
- the assistantship starts on or before the beginning of the semester and runs for at least 16 weeks during the semester;

- the approved contract letter containing tuition supplement information is presented at the time of fee payment. (No reimbursements are made to students who pay their own tuition .)

Tuition supplements may be used for tuition fees only. All other fees are the responsibility of the student unless the department or grant makes other arrangements with the UAF Business Office PRIOR TO REGISTRATION.

Students who have a research or teaching assistantship during the summer semester may apply for a Summer Tuition Scholarship. Students must have been registered for 9 credits (3 of which must be at the graduate level) during the preceding Fall and Spring semesters and be registered for 6 credits of research or thesis during the summer to eligible for this scholarship. Please see the Graduate School for further information or an application.

A graduate student with a GPA less than 3.0 for one semester will be allowed to petition to continue as a graduate assistant for the next semester. A maximum one semester exception will be allowed per student. The petition by the student must be approved by the student's advisory committee chair, the department head, and dean.

## **RESIDENCE LIFE INFORMATION**

On-campus housing information is described in the sections RESIDENCE HALLS and FAMILY HOUSING below.

### **HOUSING DEADLINES**

Residence Halls: Housing applications are sent out to new students once they have been accepted to UAF. You must request this on your application for admission to the University. Housing applications are due June 1st for the following fall semester. Applications received after this date are placed on a waiting list and assignments are made as space allows. Applications for Spring semester are given assignments on a space available basis.

Student Family Housing: While there is no application deadline for family housing. UAF currently has a substantial waiting list. Waiting periods of twelve months or more are common for two and three bedroom apartments. Lists for efficiency and one bedroom apartments are usually shorter. Please contact the Office of Residence Life at (907) 474-7247 for information on availability of student family housing.

### **ELIGIBILITY**

Students must maintain full-time status (nine credits for graduate students) to qualify for student housing. Active extended registration is also considered full-time registration for purposes of housing allocation. Masters' degree students and Doctoral candidates may reside in campus housing for a period not to exceed three years.

### **RESIDENCE HALLS**

Each residence hall is typically staffed with a Residence Hall Director or senior member of Residence Life staff and several resident assistants. The Hall Director is responsible for the administration, programming and advising within the hall. The resident assistants are full-time students who work with the Hall Director in planning and administering a comprehensive wellness program for all hall residents.

#### Rooms

Student rooms are equipped with a bed, desk, chair, mirror and bureau for each resident. The university does not provide bedding (sheets, pillows, blankets), towels or face cloths. Each hall has a recreation-lounge, laundry and kitchen facilities. Regular custodial service is provided in common areas such as corridors, lounges and bathrooms.



### Room Assignment

Hall reservations are made on a first-come, first-served basis provided application and deposit requirements have been completed. Graduate students are given preference over other students in single room assignments if applications are complete at the time of assignment. Be sure to request a separate single room application.

UAF reserves the right to reassign individuals to different rooms, halls or apartments at any time in the event such reassignments are determined to be necessary.

The Residence Hall Contracts period includes the Thanksgiving and Spring break vacation periods. Students may stay on campus during these times at no additional charge. The contract does not cover the Winter Break between Fall and Spring semesters. If a student wishes to remain on campus during this period they must apply for a contract extension and pay the Winter Break fee, which is currently \$100. Only Bartlett, Moore and the Student Apartment Complex will remain open during the break. Students not living in these buildings will be required to move temporarily if they wish to remain on campus during the break.

### Restrictions

Guns, other weapons, ammunition and flammable or volatile materials are not permitted in residence hall rooms. Students bringing these items to campus will be required to keep them in a supervised storage room. THERE IS ABSOLUTELY NO EXCEPTION TO THIS POLICY. Due to pest and allergy problems associated with animals kept in high density units, only fish in an aquarium (20 gallon maximum) are permitted.

### Automobiles

During winter months head bolt heaters are a necessity for vehicles, however only a limited number of electric outlets for automobiles are available on campus. All motor vehicles garaged, stored or used on campus must be registered with UAF police and bear a University of Alaska Fairbanks parking permit.

## **HOUSING APPLICATION PROCEDURES**

Applications for single student housing are mailed to all students upon notification of acceptance from the Office of Admissions and Records. Student rooms cannot be reserved until the student is accepted by the university. In order to secure residence hall housing after acceptance the student should complete the Contract/Application for Room and Board and mail it immediately to the Office of Residence Life with \$250 ( \$225 reservation/damage deposit, \$25 application fee). Confirmation for residence hall housing is assured when the student receives written notification from the Office of Residence Life. Specific room assignments will be made in May, June and July for the fall semester. Spring semester assignments are made as space becomes available. The contract for single student housing in residence halls is for board and room.

Continuing students are eligible for renewal of housing privileges if they: 1) complete pre-registration for the subsequent semester and 2) successfully complete a full-time academic course load. Room selection procedures are outlined each semester.

## **RESIDENCE HALL FEES**

### Room Rent

Along with all other fees, room rent is due in full at the time of registration. Room charges are currently: \$900 per person in double rooms, \$1100 for single rooms, and \$1150 in apartments. Room fees quoted are per semester and are subject to change. Room rental permits the use of all lounge, recreation, storage and laundry areas, and local telephone privileges.

### Room Deposit

The completed application for housing, with a \$225 reservation/damage deposit, must be returned to the Office of Residence Life, University of Alaska Fairbanks, Fairbanks, Alaska 99775-6860. If you decide not to attend UAF and a written statement is received by the Office of Residence Life by August 1st, your deposit will be refunded.

### Refund of Room Deposit

If all provisions of the contract have been complied with and no charges for damages have been assessed, the \$225 deposit will be refunded at the end of the school year.

The deposit may be used to pay outstanding damage charges for repair or replacement of furniture or fixtures for which the student is responsible. Residents are responsible for damages beyond normal wear to facilities and equipment. The University may assess groups of residents for damages to common areas. In addition, the deposit may be used to pay other outstanding university bills or charges. Any balance remaining in the deposit after all charges have been paid will be refunded after the close of the contract period. If the resident elects to reapply for room in the residence hall for the following year, the deposit will not be refunded, but will be transferred to the renewal application.

### Contracts

Room and board contracts are for one year. An application for housing becomes a binding contract at the beginning of the fall semester. Contracts for subsequent semesters will be carried over to the following semester unless the student cancels their contract with the Office of Residence Life. All cancellations for the Spring must occur by December 10 in order to receive a full refund.

Contracts may be voided if the student doesn't maintain full-time academic status (as defined by the Office of Residence Life). Contracts may be released due to marriage, health reasons or other emergencies deemed appropriate by the Director of Residence Life, (907) 474-7247.

### **BOARD PROGRAM**

The board program runs from dinner the Monday the halls open to dinner on the last day of finals. The board program is not in operation during the Winter Break between semesters and during Spring Break. Limited meals are available on a cash basis in the Student Center during these times.

During registration, each residence hall student is required to purchase a meal ticket for dining hall meals in the Lola Tilly Commons. Full payment for a semester meal ticket is required at that time. There are 19 scheduled meals per week (breakfast, lunch and dinner are served Monday through Friday and brunch and dinner are served Saturday and Sunday). Students may choose to purchase a full board plan (approximately \$895 per semester), a two-meals-per-day board plan (approximately \$870), or a one-meal-per-day plan (\$845, including \$200 credit at campus food outlets). Students living in the Student Apartment Complex are not required to purchase a board plan.

Students who do not live in University residence halls may be authorized by the Director of Residence Life to purchase meal tickets. The charge will be the price of the meal ticket plus a board net charge of \$110. The \$110 is used to maintain the dining facilities and equipment and is also paid by residence hall students as a part of their rent.

### **FAMILY HOUSING**

Family housing is provided in several areas, with rentals ranging from \$410 (efficiency) to \$680 (3 bedroom) per month including utilities. All apartments are furnished.

Laundry facilities are provided but not always on an individual basis for each unit. Storage facilities are extremely limited. Personal items such as dishes, utensils and bedding are not provided. Parking areas are provided for each housing complex. Pets are not allowed

### Applications and Eligibility for Student Family Housing

Applications for student family housing are mailed to students with notification of acceptance to graduate study from the Office of Admissions and Records. Assignments are not made for student family apartments unless the head of the household will be enrolled as a full-time student. Families may not change the head of household designation. A reservation deposit of \$25 is due with the completed application. An additional \$225 cleaning/damage deposit is required upon assignment to the apartment.

Space is always at a high demand in student family housing, and the units are therefore assigned on a first-request, first-served basis.

For more information about housing:

Office of Residence Life

P.O. BOX 756860

FAIRBANKS, AK 99775-6860

PHONE (907) 474-7247

## STUDENT INFORMATION

### GENERAL RESPONSIBILITIES

The university provides services to assist students in making their educational careers more profitable and meaningful. Mindful of its obligation to assist the total development of the student, the University of Alaska Fairbanks continues to encourage individualization in the educational process.

Student services include: (a) orientation activities to assist new students in adjusting to the privileges and responsibilities of membership in the university community; (b) academic counseling and vocational testing; (c) counseling with students relative to their personal problems; (d) financial assistance by means of scholarships, loans, and part-time jobs; (f) special services, advising and tutorial assistance programs for students in need of these services; and (g) a full-service health center available for medical and health education services.

### DISABLED STUDENTS

Curb cuts and ramps have been installed at UAF to make it easier for everyone to traverse the campus. Most campus buildings contain accessible restroom facilities and elevators; the library and museum are accessible and the swimming pool is equipped with a hydraulic lift. Skarland Hall provides special living accommodations and is connected to other residence halls by an indoor concourse.

The University of Alaska Fairbanks is committed to equal opportunity for the disabled. Students with disabilities are encouraged to contact the Disabled Student Services Advisor at the Center for Health and Counseling (907) 474-7043 or the Section 504 Coordinator at Personnel Services, Administrative Services Center, (907) 474-7919, as early as possible to get assistance. If students are not satisfied with actions taken by the University of Alaska Fairbanks in response to requests for assistance or accommodation, they may obtain a copy of the university's grievance procedures from either the Disabled Student Services Advisor or the Section 504 Coordinator.

### STUDENT RIGHTS AND RESPONSIBILITIES

The university prescribes to principles of due process and fair hearings as specified in the Joint Statement on Rights and Freedoms of Students. Students are encouraged to familiarize themselves with this document which can be found in the Office of the Dean of Students.

Most students find it relatively easy to adjust to the privileges and responsibilities of campus citizenship. For those who find this process more difficult, the university attempts to provide counseling to help the student gain insight and confidence in adjusting to the new environment. In some cases, when a student is unable or unwilling to assume social responsibilities as a citizen in the university community, the institution may terminate enrollment, or take whatever action is deemed necessary and appropriate.

A student may be dismissed for cause by the university after appropriate review.

### SUMMER SESSIONS

A wide variety of academic and non-academic programs are offered to residents and visitors during the summer. Summer classes are open to candidates for graduate or undergraduate degrees and to unclassified students wishing to take special courses without reference to degree objectives. Numerous courses and workshops are available throughout the summer in three-week, six-week, or twelve-week sessions. Students may choose from teacher-oriented course work, cross-cultural education, arctic-oriented studies, computer workshops, and field experiences in areas such as anthropology, biology, fisheries, geology, marine sciences and wildlife management. Additionally, basic degree requirements and courses heavily enrolled in during the fall and spring semesters are often available during the summer terms.

Summer Sessions faculty include members of the regular teaching staff, supplemented by outstanding visiting instructors.

For more information contact:

Director, Summer Sessions

2nd Floor Signers' Hall

University Of Alaska Fairbanks

Fairbanks, AK 99775-1540 Phone: (907) 474-7021

## **ADULT RE-ENTRY SERVICES**

Over the past several years there has been a significant increase nationwide in the number of adult students on college campuses. More than half of UAF's students are adults who have returned to school. Adult Re-Entry Services offers an orientation for returning students at the start of each fall and spring semester covering topics such as registration, planning class schedules, financial aid and family life.

For information on Adult Re-Entry Services, contact the Career Planning and Placement Office, (907) 474-7596.

## **ALASKA TEACHER PLACEMENT**

Alaska Teacher Placement (ATP) has been designated as Alaska's statewide clearinghouse for educational placement. ATP assists all of Alaska's public school districts with the employment of educators for their schools.

Educators from Alaska, other states, and around the world may register with ATP. When listings are received at ATP, they are referred to registrants who meet the school district endorsement requirements. Registrants often come to Fairbanks during the summer when school district personnel are on campus for interviews. Permanent Placement files for UAF education majors are maintained by ATP.

For more information, contact:  
ALASKA TEACHER PLACEMENT  
MOORE-BARTLETT COMPLEX  
732 YUKON DRIVE  
FAIRBANKS, ALASKA 99775-1550  
PHONE: (907) 474-6644

## **ALUMNI SERVICES**

The UAF Office of Alumni Relations is located on the ground floor of Constitution Hall. The UAF Alumni Association was created in 1986 when the statewide association voted to dissolve in favor of campus-specific associations. Former students and graduates qualify for membership in the organization. The association's mission is to promote the general welfare of the university and support current students through the efforts of UAF alumni.

## **ATHLETICS AND RECREATION**

The Student Recreation Center, completed in 1994, is the newest addition to UAF's Student Recreation Complex (SRC). Along with the Patty Center and Ice arena, the complex houses a variety of sports and physical activities facilities: multi-purpose areas for basketball, volleyball, badminton, tennis, calisthenics, dance, gymnastics, judo and karate; rifle and pistol ranges; courts for handball, racquetball and squash; an elevated 200-meter three-lane jogging track; a swimming pool; weight training and modern fitness equipment areas; an ice arena for recreational skating and hockey; a special aerobics area; and a three story climbing wall. A soccer and softball field is adjacent to the center and the campus has many miles of cross-country trails for running and skiing including a lighted ski trail.

A wide variety structured recreational activities - such as intramural leagues and competitions, aerobic workouts, fitness and recreation instruction - are offered to allow all students to use their leisure time to learn new lifetime skills, to play using those they already have, and to stay fit. Additionally, unstructured use of the recreational facilities through the scheduling of both traditional and non-traditional sport and activity use allows students, faculty and staff to pursue diverse fitness and recreational interests.

Students with disabilities are encouraged to use the Student Recreation Complex and the intramural and recreational sport program. Please contact the SRC office at 474-6814 if confronted with any barriers to participation.



The UAF "Nanooks" (Eskimo word for polar bear) compete in intercollegiate athletic events at the NCAA Division II level in men's and women's basketball, men's and women's cross-country running and skiing, co-ed rifle and swimming, and women's volleyball. UAF sponsors men's ice hockey at the NCAA Division I level. Students may try out for these teams by contacting the appropriate coach.

## **CAMPUS CENTER**

Facilities and services of William Ransom Wood Center are designed to meet the varied out-of-class needs of the campus community -- whether recreational, cultural, leisure, personal, or facilitative. Food service, meeting rooms, and lounge and exhibit areas, in addition to providing their specific functions, are also available for additional special programming..

Service-oriented functions of Wood Center include campus information, facility scheduling, lost and found, sundry sales, and campus switchboard. Showers, laundry facilities and rental lockers are available for use by university students and faculty and staff. Darkrooms and a general-purpose workroom provide students with areas for developing specific skills. The games area is equipped with foosball, pocket and carom billiards, snooker, table tennis, video games and bowling lanes. The area is regularly used for tournaments, classes, and open play. The Pub, which serves beer, wine and non-alcoholic beverages, is also located in Wood Center. The Pub provides a wide variety of entertainment for the university community.

## **CAREER PLANNING AND PLACEMENT**

The Career Planning and Placement Center offers students and alumni a variety of services. The Career Planning and Placement staff offers counseling assistance, provides a variety of career information and assists the student in finding summer jobs, and in some cases academic internships, which help toward employment after graduation.

Students are encouraged to make use of the various job hunting aids available at the center. These include placement files, tips on writing a resume, help in preparing for interviews and information on current job openings. Each year many employers visit the campus to recruit students and alumni. The Career Planning and Placement Center coordinates this activity. Many employers advertise job openings with Career Planning and Placement and an attempt is made to match the needs of the employer with those of the students and alumni. The Career Planning and Placement Center is located on the fifth floor of the Gruening Building, (907) 474-7596.

## **CENTER FOR HEALTH AND COUNSELING**

Once health was viewed as merely the absence of physical illness and it was seen as the responsibility of health professionals. Now health is viewed as a positive growing condition of the total person and people take more responsibility for their own health.

Preventive, educational, diagnostic, and remedial medical and psychological services are offered by the center staff, as well as student health insurance claim processing services.

Outpatient service is provided by full-time registered nurse practitioners and a physician. The primary care benefits that students receive by paying the health fee include all routine office care or outpatient services including family planning, routine physical examinations and immunizations.

Diagnostic services including laboratory procedures are available at the health center. The health fee does not cover the "Pap" test or some other routine examinations or the cost of medications, but these are available on a fee-for-service basis. X-ray services are available at Fairbanks area medical care facilities.

Counseling is a process that allows individuals to explore their own personal feelings, doubts and problems without being judged, evaluated or pressured. The counseling staff believes that one does not need to be sick in order to get better. Counseling occurs with individuals, couples, with families or within small groups of concerned students. These counseling interactions are kept confidential.

A self-help lab is available to students, and provides information on self-management and self-improvement. Additionally, the substance abuse prevention program is administered through the Center for Health and Counseling.

The Center for Health and Counseling is located in the Safety and Security Building, 474-7043.

## **INTERNATIONAL STUDENT ADVISING**

The International Student Advisor assists students who are not citizens of the United States with problems they may have in adapting to American/Alaskan culture, and adjusting to the unique characteristics of American higher education. Additionally, the International Student Advisor is responsible for issuing the form I-20 needed to obtain a student visa, authorizes documents for student visas, acts as a liaison between the foreign student and the U.S. Immigration and Naturalization Service, and provides counseling for personal and academic problems. The International Student Advisor is located on the fifth floor of the Gruening Building, (907) 474-7317.

## **ORIENTATION FOR NEW GRADUATE STUDENTS**

An orientation program for new graduate students is held before classes begin for fall semester. Topics covered include living in Fairbanks, general requirements for UAF graduate degree programs, student services on campus, and library and computer facilities and use. This is a good opportunity for new graduate students to meet others outside their own area of study and to learn about their responsibilities as students. An additional program is held for new international students. Contact the Graduate School for more information (907) 474-7464.

## **TEACHING ASSISTANT TRAINING**

The Office of the Graduate School hosts a brief orientation for new teaching assistants (TA's) during the week before fall classes begin, to introduce students to concepts of pedagogy. Seminars and workshops and several classes are offered throughout the year to continue discussions of teaching techniques, and further TA training is provided within individual department.

# **ACADEMIC REGULATIONS**

## **STUDENT RESPONSIBILITIES**

It is each graduate student's responsibility to be informed of and comply with all regulations and requirements for admission to graduate study and for the completion of graduate degree requirements. Therefore, it is essential that the student become familiar with the policies and regulations presented in this catalog.

## **REQUIREMENTS FOR GOOD STANDING**

In order to remain in good standing a student must maintain a cumulative grade-point average of 3.0 in courses identified on the student's Advancement to Candidacy. Before advancing to candidacy, however, a cumulative grade point average of 3.0 is required on all courses taken since admission to graduate study. A student will be placed on probation if the GPA falls below 3.00, and will remain on probation until grades are brought up to 3.00. UAF will report to the Administration (VA) any veteran receiving VA benefits who is not maintaining a semester or cumulative GPA of 3.00 or above in graduate studies. Failure to maintain the required GPA may result in suspension of VA benefits.

## **MINIMAL ACCEPTABLE GRADES**

For those courses specified on the student's Advancement to Candidacy, a grade of "C" or better will be accepted in 600 level courses, provided the student maintains a "B" average in all courses required for the student's program. A grade of "B" or better ("P" is unacceptable) must be earned in any 300-400 level course. No 500 level courses may be used to satisfy credit requirements in graduate degree programs.

## **DISQUALIFICATION FROM GRADUATE STUDY**

Upon recommendation or either the dean of the college or school, or the student's advisory committee (and with the concurrence of the dean), a student may be disqualified from graduate study when the student's performance is deemed unsatisfactory. The dean will send the student a letter informing the student of the disqualification, the reasons for the action, and the conditions under which the student may be readmitted, if readmission is possible. A copy of this action will be sent to the Office of the Graduate School who will then forward it to the Office of Admissions and Records.

## **ACADEMIC HONOR CODE**

All students who have enrolled in UAF will work in accordance with the Honor Code. The university assumes that the integrity of each student and of the student body as a whole will be upheld. Honesty is a primary responsibility of each student. It is also the responsibility of each student to help maintain the integrity of the entire student community.

### **The Honor Code**

1. Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.
2. Students will not represent work of others as their own. All sources of information that are not the student's original work (including direct quotes or paraphrases) must be properly attributed in compositions, theses, and other reports.
3. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.

Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violations of the Honor Code may result in suspension or expulsion of a student from UAF.

Instructors shall either deal with suspected violations of the Honor Code themselves or refer such matters to the University Disciplinary and Honor Code Committee (UDHCC). If the instructor believes that a student should be suspended or expelled from the university for an Honor Code violation, the instructor must request a hearing before the UDHCC. The UDHCC shall decide if the Honor Code has been violated. If it has not been violated, the instructor will evaluate the assignment according to normal procedures. If it has been violated, the instructor will determine how this violation affects the student's grade for the course; the UDHCC will recommend to the Dean of Students whether the student should be dismissed from UAF.

## **ACCESS TO RECORDS**

Under the Family Educational Rights and Privacy Act of 1974, students are entitled to review their records. Except for directory information (see below), no personally identifiable information will be disclosed to agencies off-campus without the written permission of the student. Records are made available for legitimate on-campus professional use on a need-to-know basis. Public information or directory information is disclosed unless the student requests, in writing, to the Director of Admissions and Records that such information may not be released. Forms to request that directory information not be released are available in the Office of Admissions and Records. These forms must be completed each semester. No directory information will be released during the first five working days of each semester. After that time, such information will be released when appropriate, unless otherwise requested in writing. The following is considered directory information: 1) Name 2) telephone 3) Home address (permanent) 4) Weight and height of students on athletic teams 5) Date of birth 6) Dates of attendance and current class standing 7) Major field(s) of study 8) Degrees and awards received, including dates 9) Participation in officially recognized activities.

## **HUMAN SUBJECTS RESEARCH**

All UAF research dealing with humans, whether gathering information through interviews or questionnaires, or collecting samples such as blood from individuals, must be approved by the UAF Human Subjects Committee before beginning the research. Application for approval must be filed by a faculty member on behalf of a graduate student. Guidelines for conduct of such research and an application for approval of the planned project can be obtained from the Office of Arctic Research.

# **REGISTRATION**

## **REGISTRATION REGULATIONS**

You must register and pay your fees to attend classes and earn credit. Registration is held at the beginning of each semester, and regular attendance is expected in all classes. Unexcused absences may result in a student receiving a failing grade. It is the responsibility of the student to confer with the instructor concerning absences and to work out acceptable arrangements for making up missed work.

A graduate student must be registered for a minimum of six graduate credits per academic year (Fall, Spring, Summer) while actively working toward a degree. A student failing to either register for at least six graduate credits or obtain a leave of absence will be dropped from graduate study and will be required to apply for reinstatement before resuming graduate study. Financial Aid, Housing, and other areas may have different registration requirements. Check with the area of concern or contact the Graduate School for specific information.

Students must be registered for at least 3 graduate credits in the semester in which they receive their degree, and they must submit an application for graduation in that semester.

## **TEMPORARY LEAVE OF ABSENCE (form on Pg. 194)**

Students wishing to temporarily suspend studies during the process of earning a degree must obtain an approved leave of absence. A student failing to register for at least 6 credits in a school year (Aug-July) or to obtain a leave of absence will be dropped from graduate study and will be required to be reinstated before resuming graduate studies. Reinstatements should be made in memo format from the advisory committee chair, through the department head and dean, to the Dean of the Graduate School.

## **DROP/ADD**

Students may add courses to their schedule until the end of the published late registration period. Students may drop a course during the first two weeks of the semester. Dropped courses do not appear on official academic records. The forms to complete this process may be obtained at the Admissions and Records window, first floor Signers' Hall.

Summer Sessions has condensed drop/add schedules. Refer to the current Summer Sessions bulletin for deadlines.

## **WITHDRAWAL**

Students may withdraw from an individual course after the first two weeks of the semester until the last published date for each semester. Courses from which students withdraw will appear on the transcript as "W" but will have no effect on the GPA.

To withdraw from all classes, students will need to obtain a total withdrawal form from the Admissions and Records Office. After 60 percent of the semester or session has passed, a total withdrawal can only be initiated by the dean of the college/school in which the degree program is located.

All withdrawals must be acknowledged by the student in writing. The above withdrawal policy deadline will be adjusted for courses shorter in time than the regular semester. The appeals route for students or faculty regarding a dean's decision is through the Provost's Office, the Chancellor, and then the UAF Grievance Council.

## **AUDITING**

A student wishing to enroll in one or more courses for informational instruction only may register as an auditor, as space permits. An auditor does not receive academic credit or have laboratory privileges and may not submit papers for grades and correction. Audited credit is not included in the computation of the study load for full-time, part-time determination or for overload status. Audited classes may not be used to fulfill any graduate degree requirements. At the instructor's discretion, an auditor not maintaining satisfactory attendance in class may be issued a "W" grade at the end of the semester. A person who has audited a class may not request credit via departmental (local) exams until the subsequent academic year.

## **TIME LIMITS FOR COMPLETION OF DEGREES**

All work, including transfer credits from other institutions, used to fulfill degree requirements for the master's and educational specialist degrees must be completed within seven years. For the doctoral degree, the time limit is ten years. Requests for exception to this policy should be submitted to the Office of the Graduate School at least one semester prior to the anticipated date of graduation, and must have the approval of the student's graduate advisory committee, department head, and dean. An estimated time schedule for completion of degree requirements must be contained in the request for extension of the time limit.

## **CHANGE OF MAJOR (form on Pg. 130)**

If a student's intended degree or intended area of emphasis changes during the course of study, a formal Change of Major form must be completed. The Change of Major form may be used only when the areas of emphasis or the degree are within the same department (M.S. in Biology to a Ph.D. in Biology or M.Ed. Curriculum Development to M.Ed. Educational Leadership). A student who wishes to change to a different program in another department, school, or college (M.S. in Civil Engineering to M.S. in Mechanical Engineering) must submit a new application for admission so that the credentials may be fully reviewed by the faculty responsible for the new degree program.

A student admitted to an interdisciplinary degree program has had accepted a proposed research project. Significant changes in the project or committee will require re-application, if so recommended by the advisory committee.

## **PETITIONS FOR EXCEPTIONS**

A graduate student may request an exception to a degree requirement, policy, procedure, deadline, etc. Petitions for such requests should be prepared by the student, in memorandum format, with adequate explanation of the extenuating or unusual circumstances warranting the request. The petition must be approved by the student's advisory committee, department head, and dean and must be submitted to the Office of the Graduate School. Grievances, and appeals to regulations or decisions, are handled in the same manner and will be responded to in a timely manner.

## **APPEAL AND GRIEVANCE PROCEDURE**

Students wanting to appeal an academic decision should begin an appeal within 30 days after the beginning of the next semester in which the decision was made.

Appeals must be made in writing and filed through the advisor, department head, dean, and Graduate School. The appeal should be made in writing at each step, and must include an explanation of the salient points of the grievance and the process followed to try to solve the grievance. A final written appeal to the issue may be made to the Office of the Provost. The decision of the Provost is final.

# **COURSE NUMBERING AND CREDIT**

## **COURSE NUMBERING**

Courses numbered 100-299 are lower division undergraduate, 300-499 upper division, 500-599 professional development, and 600-699 graduate level courses. When cross-listing 400/600 courses, additional student effort is required for graduate credit. Reserved course numbers are as follows: -92 seminars; -93 special topics; -94 approved trial courses; -95 special topics taught during summer sessions; -97 individual study; -98 research or project; and -99 thesis.

## **COURSE CREDITS**

One semester credit represents satisfactory completion of 800 minutes of lecture or 1600 or 2400 minutes of laboratory, whichever is appropriate. Credit hours may not be divided, except one-half credit hours may be granted at the appropriate rate. For short courses and classes of less than one semester in duration, course hours may not be compressed into fewer than three days per credit.



## GRADES

### Grading System

Grades in all courses are letter grades unless otherwise specified in the class schedule. The method of grading (letter or pass/fail) is an integral part of the course structure and is included in the course description. It is the same for all students taking the course. Instructors are expected to state their grading policies in writing at the beginning of each course. Grades appearing on academic records are as follows:

- A** An honor grade, indicates originality and independent work, a thorough mastery of the subject, and the satisfactory completion of more work than is regularly required.
- B** Indicates outstanding ability above the average level of performance.
- C** Indicates a satisfactory or average level of performance.
- D** The lowest passing grade, indicates work of below average quality and performance.
- F** Indicates failure. All "F" grades, including those earned in pass/fail courses, are included in the GPA calculations.
- P** Pass - The grade "pass" indicates satisfactory completion of course requirements at either the undergraduate or graduate level. A "pass" grade does not affect the grade point average but credits earned with "pass" grades may be applied toward meeting degree requirements and may be used as a measure of satisfactory progress. Satisfactory performance is the equivalent of a grade of "B" or better in graduate courses.
- DF** Deferred - Indicates that the course requirements cannot be completed by the end of the semester, that credit may be withheld without penalty until the course requirements are met within an approved time. This designation is used for such courses as theses, special projects, etc., that require more than one semester to complete.
- AU** Audit - A registration status indicating that the student has enrolled for informational instruction only (no academic credit).
- W** Withdrawn - Indicates withdrawal from a course after the first two weeks of a semester.
- Cr** Indicates credit was given under the credit-no-credit option.
- I** Incomplete - A temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of the work in a course, but for personal reasons beyond the student's control has not been able to complete the course during the regular semester. Normally, an incomplete is assigned when the student is in the class until at least the last three weeks of the semester or summer session. Negligence or indifference are not acceptable reasons for an "I" grade.
- An incomplete must be made up within one year or it will automatically be changed to an "F" grade. The "I" grade is not computed in the student's GPA until it has been changed to a regular letter grade by the instructor or until one year has elapsed, at which time it will be computed as an "F".
- NB** No Basis - Instructors may award a No Basis (NB) grade if there is insufficient student progress and/or attendance for evaluation to occur. No credit is given, nor is "NB" calculated in the GPA. This is a permanent grade and may not be used to substitute for the Incomplete (I). NB cannot be removed by later completing outstanding work.

### Grade Point Average (GPA) Calculation

Grade point average (GPA) is a weighted numerical average of the grades earned in courses at UAF. Undergraduate work is not included in the GPA for graduate students. After earning a Bachelor's degree, a student's GPA in future work is calculated on all the credits and grades earned since completion of the Bachelor's degree. To compute a GPA, the total number of credits attempted is divided into the total number of grade points earned. Grade points are calculated by multiplying the number of grade points awarded, according to the chart below, by the number of credits attempted for the course.

| Grade | Grade Points<br>per Credit |
|-------|----------------------------|
| A     | 4.0                        |
| B     | 3.0                        |
| C     | 2.0                        |

| Grade | Grade Points<br>per Credit |
|-------|----------------------------|
| D     | 1.0                        |
| F     | 0.0                        |

Grades of AU (audit), DF (deferred), I (incomplete), NB (no basis), P/NP (pass/no pass), and CR (no-credit option) as well as noncredit courses, transfer credits, and credit by examination, do not carry grade points and do not affect the GPA.

All thesis credits receive a grade of DF until the final version of the thesis has been approved by the Graduate School. The grade is then automatically changed to a grade of P (pass).

#### Change of Grade Policy

Grades, other than incompletes and deferreds, submitted by the instructor upon completion of a course, are assumed to be the student's final grade and they become part of the student's permanent records. A grade may not be changed unless a legitimate error has been made on the part of the instructor in calculating the grade; such a change must be approved by the instructor's unit head and dean. Corrections of grading errors must be made within 30 days after the beginning of the next regular semester.

#### **REPEATING COURSES**

All grades (original and retakes) for a course completed at UAF will be shown on the permanent record. For scholastic standing calculations, the GPA calculation for graduate students includes all courses identified on the student's advancement to candidacy (including repeats). For those graduate students who have not yet been advanced to candidacy, the GPA includes all courses (including repeats) taken since admission to graduate study.

#### **GRADUATE SCHOLASTIC STANDING**

A graduate student's official UAF transcript will reflect the GPA for all courses taken after the bachelor's degree (or last degree at UAF). However, a student's scholastic standing in the graduate program is determined by the GPA of the courses identified on the Advancement to Candidacy (including repeats). If not yet advanced to candidacy, a graduate student's scholastic standing is determined by the GPA of all courses taken since the bachelor's or last degree.

### **GRADUATION**

#### **RESPONSIBILITY**

The responsibility for meeting all requirements for graduation rests upon the student.

#### **APPLICATION FOR GRADUATION**

Graduate students must be registered for at least three graduate credits in the semester in which they receive their degree. An Application for Graduation must be filed with the Office of Admissions and Records near the beginning of the semester the student plans to graduate. Applications for graduation filed after the deadline date will be processed for graduation the following semester. You need not have all requirements met before you apply for graduation; this is an indication that you are planning to finish during the semester.

#### **DIPLOMAS AND COMMENCEMENT**

UAF issues diplomas to degree candidates three times each year: in September following the summer session, in January at the close of the fall semester, and in May at the end of the spring semester. All students who complete degree requirements during the academic year are invited to participate in the annual May commencement ceremony which follows the spring semester.

All graduate students who attend commencement are responsible for ordering their caps and gowns through the UAF Bookstore in early spring. Master's students also must order hoods; the color of the hood is determined by the graduate's school or college.

Doctoral students who attend the commencement ceremony will receive a doctoral hood from the university in the UAF colors of blue and gold. Each Ph.D. student's advisor will be present on stage at commencement to assist with the hooding.

## **ADDITIONAL GRADUATE DEGREE INFORMATION**

### **GRADUATE ADVISORY COMMITTEE (Form on Pg. 181)**

A graduate advisory committee is normally appointed within the first semester of study to provide guidance to students in developing and completing their degree programs. Committee members for graduate degrees are approved by the appropriate dean, usually upon recommendation of the department head, and by the Dean of the Graduate School. Advisory committees for interdisciplinary students are appointed by the Dean of the Graduate School. Each interdisciplinary student follows procedures through the department of his or her advisory committee chair. The committee chair's department will be the "home" of the interdisciplinary student for academic purposes.

#### **Committee Composition**

The advisory committees of the master's and educational specialist degree students consist of at least three faculty members, one or more of whom may be from outside the student's major, department, program, or school. The doctoral advisory committee consists of at least four faculty members, one of whom may be from outside the department.

A minimum of three committee members for the master's degree and the educational specialist degree and four for the doctoral degree shall be faculty whose primary employment is with the University of Alaska Fairbanks. This does not exclude cooperative unit members associated with the different Colleges and Schools, or Institutes. Adjunct or affiliate professors, and persons without University of Alaska Fairbanks appointments, may serve as additional members of the advisory committee. A current vita should be on file in the Office of the Graduate School for those committee members not associated with UAF. Any exceptions to the composition of graduate advisory committees must be explicitly approved in writing by the Dean of the Graduate School.

#### **Committee Responsibility**

The major responsibilities of the Graduate Advisory Committee are: to formulate a Graduate Study Plan, in consultation with the student, by the end of the student's second semester in the graduate program; to develop a tentative timetable for completion of all requirements for the degree program; to monitor the student's work, both in coursework and research; to provide advice and feedback to the student on that progress; to file an Annual Report of Graduate Student Advisory Committee (form on Pg. ) with the Office of the Graduate School; to approve, where appropriate, a research topic; to supervise the preparation of the research thesis or project when one is required; to uphold the standards of the college/school and the university; to inform the dean, in writing, if a student's performance is inadequate, and provide relevant advisory committee recommendations; and to formulate and conduct the comprehensive examination and other exams as required by the department. The student's advisor (major professor, advisory committee chair) acts as head of the graduate advisory committee and takes the lead in fulfilling these responsibilities.

**Thesis Signatures:** The advisor's signature on the thesis signifies the approval of the content of the thesis and its conformance with standard use of English, as well as with UAF thesis format requirements. The advisor has the principal institutional responsibility for verifying that thesis content and format meet UAF's standards. The advisory committee member signatures on the thesis signify that each member agrees with and supports the thesis advisor's assessment of the thesis.

### **GRADUATE STUDY PLAN (form on Pg. 183)**

A Graduate Study Plan (GSP) should be filed with the Graduate School before the end of the student's second semester in a graduate degree program at UAF. The GSP outlines the curriculum of study and a timetable to be followed by the graduate student in meeting graduate degree requirements. The GSP is prepared by the advisory committee in consultation with the student, and it serves as a working agreement of mutual expectations between the student and the faculty committee. Preparation of the GSP should begin during the student's first months at the university, and a working draft should be completed prior to the completion of the student's second semester at the university. Copies of the document, as well as subsequent revisions, shall be made available to the student and to each member of the advisory committee, and a copy filed in the office of the appropriate department and the Graduate School.

The GSP not only contains the specific degree requirements, but indicates the mechanism for fulfilling these requirements (e.g., via coursework, examinations, readings, internships, other supervised experience, etc.) and a projected timetable for completing the various requirements. The final GSP is the basis for preparation of the application for Advancement to Candidacy.

#### **ADVANCEMENT TO CANDIDACY (forms on Pg 176 & 178)**

Advancement to Candidacy formally establishes a student's specific degree requirements, and, thus, it is in the interest of both the student and the student's advisory committee that the student applies for candidacy as soon as possible after qualifying. At the latest, application for advancement to candidacy must be submitted one semester prior to awarding of the degree. For those students completing their programs primarily during the summer sessions, applications for advancement to candidacy should be submitted the summer session prior to awarding of the degree.

The finalized Graduate Study Plan should be used as a basis for completing this form. Please refer to the sections on "Requirements for Good Standing" and "Minimal Acceptable grades" when selecting courses to be included on the Advancement to Candidacy application.

A memo from the student or committee is used to request any changes to the Advancement to Candidacy once it has been filed.

Note that admission to graduate study does not imply "advancement to candidacy" for a degree. The student's graduate advisory committee has the option of refusing to recommend a student to candidacy.

#### **Master's Degree**

Students may apply for advancement to candidacy for a specific master's degree if they are in good standing and have satisfied the following requirements: 1) satisfactorily completed at least nine semester credits of graduate study in residence at the University of Alaska Fairbanks (i.e., study after admission to a specific degree program), 2) received approval of a provisional thesis or project topic, and 3) received approval of the finalized Graduate Study Plan including specific coursework to be completed and any other requirements.

#### **Doctor of Philosophy**

A student may apply for advancement to candidacy for the Doctor of Philosophy degree if they are in good standing and have accomplished the following: 1) completed the full-time equivalent of two academic years of graduate study, 2) completed at least one semester in residence at the University of Alaska Fairbanks, 3) received approval of the finalized Graduate Study Plan, 4) obtained approval of the advisory committee for the title and synopsis of the thesis, and 5) passed a written comprehensive examination.

### **EXAMINATIONS**

Examinations are given in both written and oral form, depending upon the policy of the program unit, the decision of the advisory committee, and the specific examination being taken.

#### **PLACEMENT EXAMINATION**

Some programs have a formalized placement evaluation procedure designed to pinpoint strengths and weaknesses in the student's background as an aid in developing the student's Graduate Study Plan. This evaluation is carried out during the student's first semester at the university, preferably in the first month, and may be written, oral, or both.

#### **QUALIFYING EXAMINATIONS**

A few master's degree programs require the successful completion of a written and/or oral qualifying examination before a student may be advanced to candidacy. This examination is an interim evaluation of the student's academic progress, and the student may pass unconditionally or conditionally. A conditional pass indicates specific weaknesses in the student's background that must be remedied before degree requirements are completed. The Graduate Study Plan and, later, the Advancement to Candidacy form, should include mechanisms for remedying these weaknesses.

### **COMPREHENSIVE (FINAL) EXAMINATION (form on Pg. 188)**

The primary purpose of the comprehensive examination, and the thrust of the questions, should be to determine whether the student has integrated knowledge and understanding of the principles and concepts underlying the major and related fields. Wherever possible, comprehensive examinations should be tailored to the individual student. Well in advance of the examination, preferably at least three months, students should be informed as to the format and general areas of questioning they may expect, and this information be included on the Graduate Study Plan.

For master's and educational specialist degrees, students usually take this examination during their final year; it may be either oral or written, or a combination of both.

For the Ph.D. degree, students normally take a written comprehensive examination within two academic years of entering the program, but no later than two academic years before the expected completion of the degree (whichever is earliest). At the discretion of the Ph.D. student's advisory committee, an oral examination may supplement the written comprehensive examination. Each student must pass the comprehensive examination prior to advancement to candidacy.

The Ph.D. comprehensive examination is a department-based examination. Some programs hold regularly scheduled Ph.D. comprehensive examinations and have established examination procedures. In departments that do not hold regularly scheduled Ph.D. comprehensive examinations, the examining committee will consist of the student's advisory committee and an outside examiner appointed by the Graduate School. For committee based examinations, the advisory committee will determine the subject areas of the examination and will report those subject areas on the Advancement to Candidacy. Chosen subject areas should provide examination of both depth and breadth in the student's discipline. Each member of the advisory committee will formally question the student in written and oral (if required) portions of the examination.

Programs that do not hold regularly scheduled Ph.D. comprehensive examinations may augment the graduate student's advisory committee with one or two department faculty who are not members of the student's advisory committee. The augmented members will be appointed by the department chair for the examination. All members of the augmented committee will be voting members. Examination questions may be sought from all faculty in the program with expertise in the appropriate areas. The augmented committee will select the exam questions from all those submitted.

In general, a document outlining the required topics, the optional topics, and the time to be spent on the written and oral exams should be spelled out for each Ph.D. program. Each Ph.D.-granting program should prepare such a document and submit it for review and approval to the Dean of the Graduate School. This document will become a part of the student's Graduate Study Plan.

### **DEFENSE OF THESIS EXAMINATION (form on Pg. 188)**

Each student who is required to complete a thesis in partial fulfillment of degree requirements must pass an oral defense of thesis examination. The defense will consist of a presentation by the candidate, the length of which will be predetermined by the advisory committee, followed by questions on the research, analysis, and written presentation. An outside examiner will be assigned by the Office of the Graduate School to attend all Ph.D. thesis defense. The presentation of research by the student may be a public seminar, with the questioning period closed to the public. A thesis will not be accepted for final submission by the Graduate School until it has been successfully defended by the candidate. All committee members must be present for the defense of thesis.

In some non-thesis master's programs, a defense of the research project is required in the same manner.

### **EXAMINATION COMMITTEE**

In most cases, examinations are prepared and administered by the student's graduate advisory committee under guidelines formulated by the faculty of the program unit in which the degree is being taken. In a few programs, examinations are replaced or supplemented by departmental or school examinations and administered by an established examining committee and the chair of the student's advisory committee.

For the purpose of examination, the advisory committee may be supplemented with additional faculty members at the discretion of the dean, or the Dean of the Graduate School.

Should it be necessary for a committee member to be absent from an examination (other than the thesis defense), a memorandum to the dean should be prepared by the chair of the committee

requesting that a substitute be appointed, if appropriate, or summarizing the absent member's pre- or post-exam participation. A copy of this approved request should be submitted with the Report on Examination.

All committee members must be present at the student's thesis defense.

#### **OUTSIDE EXAMINER (form on Pg. 187)**

The presence of an "outside examiner," representing the Dean of the Graduate School, is required at all Ph.D. oral examinations (except the Placement Examination). The outside examiner is appointed by the Dean of the Graduate School and must be from a different department than the candidate and chair of the advisory committee. The function of the outside examiner is to determine that a stringent, unbiased examination is given and that it is fairly administered and evaluated. The outside examiner will be asked by the Graduate School to complete a Report of Outside Examiner form.

It is the student's responsibility to request that an outside examiner be appointed. The student should submit the Request for Outside Examiner form to the Office of the Graduate School at least two weeks prior to the scheduled exam date. The Office of the Graduate School will advise the student of the faculty member appointed to serve as outside examiner, and in the case of a thesis defense, the student must supply the examiner with a copy of the thesis at least seven days prior to the examination.

The outside examiner should sign the Report on Examination form, but not the signature page of the thesis.

An outside examiner is not necessary for written examinations. Instead, copies of all written exams, questions, and evaluated responses should be retained in department/school files for at least one year after the degree has been awarded.

#### **REPORT ON EXAMINATION (form on Pg. 188)**

After the completion of each examination, the Report on Examination form must be completed by the student's committee and submitted to the Office of the Graduate School. If it was a Ph.D. oral exam, signature of the outside examiner is required.

#### **LANGUAGE/RESEARCH TOOL REQUIREMENT (form on Pg. 185)**

Proficiency in a second language or a research tool may be required in some programs. This is not a university requirement, but it may be required by the department or program offering the degree, or specified by the student's advisory committee if its requirements exceed those of the program.

The specific language or research tool to be required is determined by the students' advisory committee, guided by policies of the administrative unit in which the degree is offered and by discussions with the student. Generally, competency in a second language is required; however, computer languages, statistics, mathematics, etc., or study in areas as history of philosophy of science, business, administration or law, economics, etc., may be substituted by the committee upon the approval of the department or program head. In all instances, topics selected must be supportive of the student's degree program.

At the discretion of the advisory committee and the approval of the department head, proficiency in written and oral English may be used to satisfy this requirement for foreign students whose primary language is not English. In such cases, the advisory committee should formulate the examination so that the student is clearly tested for a level of competency in written and oral English that is clearly beyond the level necessary for admittance into the graduate program.

Determination of the student's proficiency in meeting the requirement is the responsibility of the advisory committee.

The university assumes no responsibility to students in preparing for language and research tool examinations -- the responsibility is the student's alone. To aid in this preparation, however, a student may enroll in a regular course, registering for regular credit with grades, credit/no-credit, or as an auditor. Credits used to satisfy the language/research tool requirement may not be used to meet the minimum number of credits required for the student's degree and should not be included in the credit list on the Advancement to Candidacy form.

Completion of the language/research tool, if required, should be reported on the Report on Completion of Language/Research Tool Requirement form and submitted to the Office of the Graduate School.



## **RESEARCH**

The Research programs at UAF take advantage of the university's unique location in the subarctic region of interior Alaska, with easy accessibility to the Pacific and Arctic oceans, accessibility to glaciers and permafrost areas, and a location near the auroral zone, the region in which maximum effects are seen from the bombardment of the earth by charged particles from the sun.

In addition to research carried out in its academic departments, the university has a number of research institutes and centers that focus on problems of the arctic and subarctic concerning the environment of the earth, renewable and non-renewable resources, energy sources and the peoples of the north.

Assistantships are available for graduate students working on research with faculty in many of these research institutes and centers. Each of the researchers has a joint appointment with an academic department. Contact the academic departments for information on specific faculty research projects and the availability of research assistantships.

## **RESEARCH INSTITUTES AND CENTERS**

### **AGRICULTURAL AND FORESTRY EXPERIMENT STATION**

The Agricultural and Forestry Experiment Station (AFES) conducts research to enhance the quality of life in Alaska through the beneficial use and development of natural, economic and human resources with emphasis on factors typical of high latitudes. The research is designed to provide a base of resource information for the management of renewable resources, and to provide technology for enhancing the economic and social well being of Alaskans. Specifically, this work includes studies on: the dynamics of natural and manipulated ecosystems, sustainable soil productivity, food safety, genetics for improved economic plants, enhanced livestock production, economic and legal aspects of resource use, silviculture and forest management, resource use for tourism and recreation, and education and communications in resources management.

Research centers of the Agricultural and Forestry Experiment Station are located on the UAF campus and at Palmer in the Matanuska Valley. A plant materials center, established cooperatively by AFES and the Alaska Department of Natural Resources, is located near Palmer. Agronomy research is conducted near Delta Junction and Point MacKenzie, and research to support Alaska's reindeer industry is underway near Nome. Forestry research is carried out in the Bonanza Creek Experimental Forest near Fairbanks in cooperation with scientists from the Institute of Northern Forestry, U.S. Forest Service.

The Fairbanks research center of AFES has a faculty representing the disciplines of agronomy, animal science, economics, food science, forestry, horticulture, land use planning, outdoor recreation, plant pathology, resource policy and law, and soil science. The Palmer research center has faculty in agronomy, animal science, horticulture, plant breeding, range science, and soil science.

### **ALASKA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT**

The Cooperative Research Unit is jointly sponsored and financed by UAF, the Alaska Department of Fish and Game, and the U.S. Fish and Wildlife Service. The unit provides financial support and guidance for graduate training in fishery and wildlife biology and management.

Research emphasis in fisheries is on the ecology and fisheries of aquatic ecosystems, alteration and contamination of Alaskan freshwater, and evaluation and development of cold water fisheries techniques. Wildlife research is directed toward ungulate habitat relationships, waterfowl and seabird ecology, wildlife population dynamics, and the impact of northern development on wild animals and their habitats.

### **ALASKA NATIVE LANGUAGE CENTER**

The Alaska Native Language Center was established by state legislation in 1972 to document and promote the cultivation of the Indian and Eskimo languages in Alaska. It is part of the College of Liberal Arts and is the major center in the United States for the study of Eskimo and Northern Athabaskan languages. The center's library houses a valuable collection of manuscript materials in and on Alaska Native languages which is available for use by scholars and students.

### **ALASKA SEA GRANT COLLEGE PROGRAM**

The Alaska Sea Grant College Program, established in 1970, represents a partnership between the National Sea Grant Program within the National Oceanic and Atmospheric Administration and the University of Alaska. Research supported by Sea Grant provides the knowledge and means of developing, utilizing and conserving the marine resources of the state and nation through a program of teaching, research and advisory activities.

The research program includes projects in fisheries oceanography, fisheries sciences, fisheries enhancement, fisheries economics, food science and technology, and aquaculture. Sea Grant supports continuing programs of public information and advisory services.

### **ALASKA QUATERNARY CENTER**

The Alaska Quaternary Center (AQC) was established in 1983 to serve as the focus for interdisciplinary research in Quaternary Studies at UAF. The Quaternary period spans the past two million years and encompasses glacial epochs, warm interglacials, changing biotic assemblages and human adaptations. Pleistocene fossil faunas, floras, and sediment sequences are the physical bases for paleoecological and paleoclimatic reconstruction. Climate and ecosystem models establish the modern analogs for interpretation.

The AQC is associated with the University of Alaska Museum; the Center sponsors seminars and workshops and hosts visiting faculty from throughout the world. Quaternary scholars from UAF regularly correspond with Soviet colleagues and travel to Siberia and the Soviet Far East to work in the field and at the institutes of the Soviet Academy of Sciences. With the Arctic Research and Policy Act of 1984 and other programs (e.g. global change and biodiversity) focusing on the importance of interdisciplinary research in high latitudes, the AQC will play an increasingly important role in the organization of northern science in the 1990's.

### **CENTER FOR CROSS-CULTURAL STUDIES**

Established in 1971, the Center is the research and development unit of the Rural College. It promotes programs which concentrate on the needs of Alaska's multicultural society, with particular regard to the development of the state's human resources.

Objectives of the Center are to design and conduct basic and applied research projects and programs; develop, conduct and evaluate alternative educational approaches for Alaskan schools; disseminate findings on current Alaskan research in education, human services and behavioral sciences, and rural development; provide technical assistance to school districts, social and family service agencies, Native corporations, local governments, community colleges and university learning centers in rural Alaska; provide leadership for the improvement of the training and professional development of rural as well as urban Alaskans; and provide a forum for the development of cross-cultural education programs. Future research will strongly incorporate the perspective of community people and practitioners.

### **CENTER FOR GLOBAL CHANGE AND ARCTIC SYSTEM RESEARCH**

The Center for Global Change and Arctic System Research was created in 1990 as an organization for interdisciplinary research. The Center will coordinate and carry out work related to the Arctic and its role in global environmental change.

Considerable attention is being focused on the polar regions of the earth in connection with atmospheric pollution and global climate concerns. Polar regions play a key role in processes responsible for global climatic fluctuations and are now widely recognized as important repositories of information on past climates and the causes of past climatic fluctuations. The framework for research recommended by the U.S. Arctic Research Commission assigns first priority to integrated investigations of the coupled atmosphere and land components and how their interaction governs the terrestrial environment.

At UAF, annual funding for studies related to earth system science and global change is about \$6.17 million, and UAF is thus in a strong position to participate in this emerging field. The faculty has the experience, interest, and capability to participate in interdisciplinary research, and Alaska, as a high-latitude region, holds many sensitive indicators of global change.

### **FISHERY INDUSTRIAL TECHNOLOGY CENTER**

The Fishery Industrial Technology Center (FITC), located in Kodiak, is part of the School of Fisheries and Ocean Sciences. FITC is dedicated to the contribution of scientific and technical expertise to the harvesting, processing and marketing efforts of the fishing industry. The center's activities include the harvesting technology group which studies fishing gear and methods with an attempt to make them more selective so as to avoid incidental catch. Its processing technology group develops new or modified seafood products that are safe, wholesome, nutritious, functional, attractive, and stable. Its faculty have expertise in the areas of biochemistry, microbiology, and seafood technology and engineering. In order to tap these resources for students within the university system, the School of Fisheries and Ocean Sciences offers courses in seafood science and a degree program in cooperation with Oregon State University. FITC research efforts are often coordinated with the Alaska Sea Grant College Program and the Marine Advisory Program.

### **GEOPHYSICAL INSTITUTE**

Geophysical Institute research programs deal with phenomena that can best be studied at high latitude. Programs are established in upper atmospheric physics and chemistry, the aurora, the earth's magnetic field, radio communications, solar-terrestrial physics, meteorology, glaciology, seismology, volcanology and several fields of geology and geochemistry. In addition to basic research in these areas, the Geophysical Institute contributes to the solution of problems specifically related to Alaska and the polar regions – for example, improving radio communication services in the Arctic, assessing the earthquake risk in Alaska, studying ice movements and stresses off the north coast as a basis for engineering design of shore facilities, developing alternative energy sources, reducing the effects of ice fog and air pollution, and providing advisory services to local government. Assistantships are available for well-qualified students to work with the Geophysical Institute faculty toward master's and doctoral degrees.

The Geophysical Institute was established by an Act of Congress in 1946 as a cooperative venture by the federal government and the University of Alaska. The federal obligations and property were transferred to the University of Alaska in 1960. The Geophysical Institute is housed in the C.T. Elvey Building on the West Ridge of the Fairbanks campus. The present staff numbers approximately 200, including 40 faculty members. Financial support is obtained mainly from federal agencies.

Research facilities include the Poker Flat Research Range for auroral studies, radio transmitter Sheep Creek Station, Alaska Synthetic Aperture Radar (SAR) Facility, and a potassium-argon geochronology laboratory. In addition to these local facilities, the institute uses many field stations throughout Alaska, such as the Augustine volcano station, the network of seismic sites and the meridian chain of optical and magnetic observatories. The institute's library and archives offer excellent coverage of geophysics. Specialized technical shops provide services in electronics, machine work and carpentry, photography, drafting, data processing and digital computing.

### **INSTITUTE OF ARCTIC BIOLOGY**

The Institute of Arctic Biology is the principle research arm for life scientists in the College of Natural Sciences. The Institute was established in 1963 through authorization from the Alaska Legislature following the recommendation of a select committee of nationally and internationally recognized biologists. The original mandate of the institute, the study of physiological adaptations of plants, animals and human beings to past and present climates of the Arctic, has been expanded to include well-developed programs in ecology and systematics. Ecology programs include research on taiga and tundra sites, including community organization, ecosystem structure and function, functional interactions and interdependencies of plants and animals and the way in which environmental and organismal processes modify nutrient cycling and decomposition within systems. These studies on ecosystem research are closely tied to physiological and biochemical processes of microorganisms, plants and animals, emphasizing coevolved responses such as herbivory which are supported through strong programs such as chemical ecology. Systematics of organisms within arctic and subarctic systems is being studied to establish mechanisms that provide for maintenance of heterogeneity in members of isolated communities. Additional research programs exist in population genetics, freshwater ecology, wildlife diseases, wildlife biology, and biochemistry and molecular biology.

The Institute is located in the Laurence Irving Building and the Arctic Health Research Building, and provides a vivarium, animal isolation facility, surgery and a variety of technical and instrumental facilities and services for coordinated and individual research. Special field sites include a 40-acre experimental biological reserve on campus and the Large Animal Research Station, adjacent to the campus, which houses breeding colonies of musk ox, caribou and reindeer. The Institute maintains the only major ecological research station in the Arctic, at Toolik Lake north of the Brooks Range. Research field camps at Cantwell near Denali National Park, and at Homer and Halibut Cove on the shores of Kachemak Bay, provide a wide range of ecological diversity for specimen collection and research.

#### **INSTITUTE OF MARINE SCIENCE**

The Institute of Marine Science was established in 1960 by the Alaska Legislature to advance oceanographic knowledge with an emphasis on problems of high-latitude seas, to train graduate students in modern oceanography and to conduct both basic and applied marine research. Subsequent expansion has included research and training in marine biology, fisheries oceanography, and special problems in limnology. Financial assistance for graduate students is provided through stipend support from agency, industry and foundation grants to the institute, and through state research assistantships.

Current research projects include: studies on water circulation in the Gulf of Alaska, environmental studies at the oil pipeline terminus of Valdez and related to the EXXON VALDEZ oil spill, seagrass ecology, ecological studies of the northern Bering Sea and Southern Chukchi Sea, marine mammals, shellfish and finfish biology, ecological systems associated with the marginal ice zone, the geochemistry of lakes, upwellings of seawaters, carbon and nutrient cycles, recent and Pleistocene sedimentation and the origin of the continental shelf of Alaska.

Research facilities include modern advanced laboratories on the Fairbanks campus and at Seward, and the Kasitsna Bay Laboratory, a marine biology field station on Kachemak Bay. The Seward Marine Center includes a high quality running seawater system, as well as biological and chemical laboratories. Ship operations are also based at the Seward Marine Center. The center is also home port for the ALPHA HELIX, a 135-foot ice-strengthened research vessel operated by IMS for the National Science Foundation. The ALPHA HELIX routinely operates in the Chukchi and Bering Seas, in Aleutian waters, and in the Pacific waters adjacent to Alaska.

#### **INSTITUTE OF NORTHERN ENGINEERING**

The Institute of Northern Engineering (INE) is the research arm of the School of Engineering. INE is composed of three divisions: the Water Research Center, the Transportation Research Center, and the Engineering Research Center. Its objective is to provide the faculty and students with research opportunities in support of the engineering programs offered by the school. Research is conducted in the program areas of civil, electrical, environmental, management, mechanical, and transportation engineering, with a special focus on cold region problems as well as water-related problems which occur in Alaska and other northern areas. Many of the active research programs also have regional, national, or international scope.

External grants and research support approach \$2 million annually. Most of INE's researchers are also full-time faculty in undergraduate and graduate degree programs, so results of their research reach the classroom quickly to benefit all Alaskans.

Through cooperation with other research groups, a diverse interdisciplinary team has been formed for tackling difficult problems. This environment provides graduate students with an extraordinary experience, making them particularly valuable to future employers.

#### **JUNEAU CENTER FOR FISHERIES AND OCEAN SCIENCES**

The Juneau Center was officially established in 1974 as part of the Juneau campus of the University of Alaska. Its mandate was to provide instruction in the basic science disciplines and to offer specialized training at both the undergraduate and graduate levels and to conduct research in marine and anadromous fisheries. With restructuring of the university in 1987, the program became part of the School of Fisheries and Ocean Sciences of the University of Alaska Fairbanks.

Research programs currently include: association of primary production with recruitment of marine fish and invertebrates, aging and growth of larval fish, early life history of commercially important shellfish, pathology of finfish and shellfish, aquaculture of salmon and seaweeds,

genetic improvement of salmon brood stocks, molecular genetic stock separation techniques, behavior of brown bear, population dynamics and management of commercially important fish and shellfish, and hydroacoustic stock estimation.

The Juneau Center is located on the shores of Auke Bay, near the National Marine Fisheries Service Laboratory approximately 12 miles north of Juneau. Research facilities include both freshwater and seawater wet labs, a walk-in freezer and coldroom, and modern computer labs. The Center's 42-foot research vessel, R/V MAYBESO, operates in inland waters in southeast Alaska. The Center cooperatively operates a research salmon hatchery located on Auke Creek with the National Marine Fisheries Service.

#### **MINERAL INDUSTRY RESEARCH LABORATORY**

The (MIRL) was established by the 1963 Alaska Legislature for the purpose of conducting basic and applied research to aid in the development of Alaska's mineral and energy resources. This unit, as one of two research branches of the School of Mineral Engineering, conducts studies concerning beneficiation and hydrometallurgy of Alaskan ores, geology and mineral deposits of the state, placer mining and gold recovery, mining related problems in frozen ground, feasibility studies on mineral deposits and environmental studies related to mining activities.

A well-equipped coal laboratory is devoted to research and service activities on the characterization, petrography, distribution and preparation of Alaska's coals.

Cooperative efforts are maintained with state and federal agencies, and where applicable, a service function is supplied to individuals and industry. Publications pertinent to the industry are issued and made available to the general public.

#### **PETROLEUM DEVELOPMENT LABORATORY**

The Petroleum Development Laboratory (PDL) was established in 1984 to engage in practical research to develop and improve technology which will maximize the recovery of Alaska's petroleum and natural gas resources. The work conducted will assist industry and state agencies in their effort to effect additional recovery of these resources.

The primary function of the PDL as a research branch of the School of Mineral Engineering is to explore various aspects of enhanced oil recovery research, including the production of heavy oil through thermal recovery and miscible oil displacement. The goal is to transfer the information from the laboratory and field experiments to engineers who can apply it to problems in the oil fields.

Research programs include secondary (waterflooding) and enhanced oil recovery processes, a comprehensive study of Alaska's oil and gas reservoirs, development of thermal recovery projects to initiate production from Ugnu and West Sak fields, miscible flooding methods for tertiary recovery from Prudhoe Bay, and estimation of gas hydrate reserves in northern Alaska.

#### **UNIVERSITY OF ALASKA MUSEUM**

The University of Alaska is a center for the collection, preservation and dissemination of information pertaining to cultural and natural history of Alaska.

Although the museum is a place to look at interesting objects, it is also a research center; the staff conducts field work, teaches university courses and publishes reports as well as administers a full range of public service and educational programs. Particular emphasis is placed on materials and exhibits that support research, teaching and education in general. The Alaska Quaternary Center and the Alaska Tephrochronology Center provide an interdisciplinary forum for research in the Quaternary Sciences.

The museum has extensive research collections in aquatic organisms, archaeology, plants, ethnography, art, geology, tephrochronology, and terrestrial vertebrates. The Alaska Native Heritage Film Project produces films that document Alaska culture for instruction and public education statewide.

#### **ACADEMIC AND RESEARCH SUPPORT**

Numerous research support services, including state and federal agencies, are located on the University of Alaska Fairbanks campus. Graduate students use the library and computer network in their coursework and research, and cooperative employment positions are sometimes available through agencies in the state.

### **ELMER E. RASMUSON LIBRARY/MEDIA PROGRAM**

The university library, named in honor of pioneer Alaskan public servant, philanthropist and businessman, Elmer E. Rasmuson, moved into the library building in the Fine Arts Complex in the fall of 1969. A 69,616 square foot addition was completed in the summer of 1985. With the addition, and the remodeling of 22,000 square feet, the six-level library/media facility now totals 181,616 square feet of well-designed space. The library collections consist of more than 1,025,000 bibliographical items in a variety of print and audiovisual media, including books, periodicals and serial titles, government documents, microfilms, microcards and microfiches, archival documents and manuscripts, maps, photographs, phonography disks, audiocassettes, videotapes and motion picture films.

The Bio-Medical Library, located in the Arctic Health Research Building on the West Ridge, is a branch of the Rasmuson Library. Bio-Med collections number approximately 36,000 volumes, the majority of which are bound periodical titles. Journal titles cover the fields of the health sciences, microbiology, animal physiology, fisheries, veterinary medicine, plant pathology, oceanography and the environment as it relates to cold regions research.

The Alaska and Polar Regions collections include the world-class Alaska Collection, the University Archives and Manuscripts Collection, historical photographs, rare books, rare maps, and the oral history materials.

The library is a participant in the Washington Library Network (WLN), with automated database containing more than 3,500,000 bibliographic records from more than 250 libraries located from Alaska to Arizona. Interlibrary loan services are available to students and faculty members through the Instructional Media Production and Communications Technology (IMPACT). The library's membership in the University of Washington Library Resource Sharing Program and electronic mail systems make the resources of the larger university libraries in the nation quickly available to augment the resources available at UAF.

### **ACADEMIC COMPUTING/COMPUTER NETWORK**

Academic Computing is UAF's student resource for computing facilities. The staff provide consulting services, access to documentation, seminars and classes, and acts as a "one stop" source for all academic user help. Academic Computing supports over 500 terminals and microcomputers installed on the UAF campus. Dial-up ports are used by many students to access the systems from their homes and each residence hall is equipped with at least one terminal for student use.

Most administrative computing is provided for the university by the University of Alaska Computer Network (UACN). The systems are run on an IBM 3090 computer configuration located in Fairbanks. Several administrative computing services are provided by UAF-developed and operated systems.

The UACN data communication backbone has been designed so that from any terminal users may access any host in the network on which they have resources. Using over 8,000 land miles of satellite and microwave communication facilities, the network spans an area 1,400 by 1,100 miles. Any member of the university academic community can request computer resources for a specific course or for independent study.

Primary academic computing support for UAF is provided through a Digital Equipment Corporation VAX 8800. This system is currently configured with 64 megabytes of main memory, 4 gigabytes of disc storage, 128 user-accessible ports, and the VMS operating system. Similar VAX systems are located at the university's Juneau and Anchorage locations, and are accessible through the UACN multiplexing and DECNET data communication facilities. The VAX 8800 is also connected to BITNET and NorthWestNet, facilitating data transfer with several thousand other academic and research computers worldwide.

Various academic and research departments on campus have both mini- and microcomputers for research and instruction. There are also numerous microcomputer systems available for student use.



## COLLEGES AND SCHOOLS

### COLLEGE OF LIBERAL ARTS

Gorden Hedahl, Dean

The primary mission of the College of Liberal Arts is to provide a broad liberal arts education to students at UAF whatever their area of specialization. The college includes disciplines in the social sciences, humanities, performing arts, mathematical sciences, as well as professional programs in journalism and broadcasting and physical education. Research efforts are in many directions but there is an increasing emphasis on Alaskan studies, especially those related to public policy issues. A major goal of the College of Liberal Arts is to increase its national and international reputation in northern studies. Students are encouraged to participate in northern research projects and to take advantage of the many course offerings in the college that deal with the circumpolar north.

*Graduate Degrees* -- Master of Arts in anthropology, communication, education, English and music. Master of Arts in Teaching in English, history, and mathematics. Master of Education in education and guidance and counseling. Master of Fine Arts in creative writing. Master of Science in computer science and mathematics. Doctor of Philosophy in anthropology and mathematics.

#### Research Affiliation

*Alaska Native Language Center:* Michael E. Krauss, Director

### COLLEGE OF NATURAL SCIENCES

Paul Reichardt, Dean

The College of Natural Sciences embraces many areas of study: biology and wildlife; chemistry; biochemistry and molecular biology; geology and geophysics; and physics, space physics and atmospheric sciences.

Work at the master's level is offered in all of these areas of study. Ph.D programs are offered in all except chemistry.

Graduate programs in the College of Natural Sciences take advantage of the outstanding campus research facilities relating to northern problems: the Geophysical Institute, the Institute of Arctic Biology, the Alaska Cooperative Wildlife and Fisheries Research Units, the University of Alaska Museum, and the Alaska Quaternary Center. The college also offers two interdisciplinary programs, earth sciences and general sciences, specifically intended for those planning to teach at the elementary or secondary level.

*Graduate Degrees* --Master of Science in biology, zoology, wildlife management, biochemistry and molecular biology, chemistry, geology, geophysics, physics, general science, space physics and atmospheric sciences. Master of Arts in Teaching in biological sciences, chemistry, geology and physics. Doctor of Philosophy in biological sciences, biochemistry and molecular biology, physics, space physics, atmospheric sciences, geophysics, and geology. Interdisciplinary degrees are also possible through the College of Natural Sciences where the faculty have cooperative research programs in areas such as the ecological sciences and atmospheric chemistry. Contact the Graduate School for further information.

#### Research Affiliations

*Geophysical Institute:* Syun-Ichi Akasofu, Director

*Institute of Arctic Biology:* Robert G. White, Director

*Alaska Cooperative Fish and Wildlife Research Unit:* James B. Reynolds, Unit Director

*University of Alaska Museum:* Aldona Jonaitis, Director

*Alaska Quaternary Center:*

## **SCHOOL OF AGRICULTURE AND LAND RESOURCES MANAGEMENT**

**James V. Drew, Dean (Fairbanks)**

**G. Allen Mitchell, Associate Dean (Palmer)**

The School of Agriculture and Land Resources Management is composed of the Divisions of Resources Management, Forest Sciences, and Plant and Animal Sciences. The Agricultural and Forestry Experimental Station, with facilities at Fairbanks and Palmer, and the Forest Soils Laboratory at Fairbanks are included in the school and provide research opportunities for graduate students. Research in many aspects of agriculture, forestry, outdoor recreation, water resource management, soils, park and wilderness management, and resource planning and administration is carried on by faculty of the school.

The instructional program offers a Master of Science degree in natural resources management under the direction of faculty members actively involved in research. The courses and program were developed in close cooperation with university units and non-university agencies and groups involved in resource management. Graduates are currently employed by municipal, state, and federal agencies as well as in the private sector of Alaska's economy.

State and federal agencies which significantly contribute to the programs by providing guest lecturers, work with graduate students and internship/field work experience for students are the Alaska Department of Natural Resources, Agricultural Research Service, U.S. Forest Service, Bureau of Land Management, Soil Conservation Service, and U.S. Fish and Wildlife Service.

*Graduate Degree -- Master of Science in Natural Resources Management.*

### **Research Affiliation**

*Agriculture and Forestry Experiment Station: James V. Drew, Director*

## **SCHOOL OF ENGINEERING**

**Frank Williams, Dean**

Engineering, as a profession, embraces a wide range of cultural and technical areas related to the planning, design and construction of works necessary for a modern civilization. Engineers are innovators, builders and problem solvers. Engineers turn scientific knowledge into goods and services useful to human beings and are responsible to society for the decisions they make. Engineers are interested in creating, and are willing to work as members of a professional team in positions of leadership.

In addition to providing the training necessary for entrance into the professional practice of engineering, an undergraduate degree in engineering provides an excellent background for those desiring to enter law, medical or business school. The engineering programs at the University of Alaska Fairbanks emphasize northern problems and principles. Engineering graduates of UAF are in great demand not only in the Alaskan job market, but in all areas of the United States where engineering involving the problems of high latitude are a factor. Many of the leading professional engineers in Alaska are graduates of the UAF engineering program.

The School of Engineering offers graduate-level programs in engineering and science management, environmental quality engineering and arctic engineering, as well as in civil, electrical, and mechanical engineering, to students with baccalaureate degrees in engineering. Seminars and workshops are offered to practicing engineers and others.

*Graduate Degrees -- Master of Science in Arctic Engineering, Civil Engineering, Electrical Engineering, Engineering Management, Environmental Quality Engineering, Environmental Quality Science, Mechanical Engineering, Science Management. Master of Civil Engineering. Master of Electrical Engineering.*

### **Research Affiliation**

*Institute of Northern Engineering: Frank Williams, Director*

## **SCHOOL OF FISHERIES AND OCEAN SCIENCES**

**Vera Alexander, Dean**

**Albert V. Tyler, Associate Dean**

The School of Fisheries and Ocean Sciences (SFOS) was created in 1987 as a result of the merger of all the fisheries and marine programs of the University of Alaska into a single unit administered by one campus. This amalgamation has created an opportunity to focus and strengthen those elements into a comprehensive and cohesive unit. SFOS presently educates students at the master's level in the areas of fisheries, marine biology, biological oceanography, chemical oceanography, fisheries oceanography, geological oceanography, and physical oceanography. Planning is also underway for a master's degree level program in seafood science and nutrition. Ph.D. degrees are offered in fisheries and oceanography.

The School of Fisheries and Ocean Sciences is home to research institutes, academic programs, and public service components throughout the state. The M.S. and Ph.D. in Fisheries are offered through the Program in Fisheries at the Fairbanks Campus and at the Juneau Center for Fisheries and Ocean Sciences. The Graduate Program in Marine Sciences and Limnology offers degree programs in marine biology and oceanography, under the direction of faculty members at the Institute of Marine Science, with facilities in Fairbanks and Seward. The faculty of the Fishery Industrial Technology Center in Kodiak, while presently focusing on research, will be involved with the planned degree program in seafood science and nutrition.

*Graduate Degrees* – Master of Science in Fisheries, Marine Biology, and Oceanography (with options in biological, chemical, geological, or physical oceanography). Doctor of Philosophy in Fisheries and Oceanography.

### **Research Affiliation**

*Institute of Marine Science:* Vera Alexander, Director

*Alaska Sea Grant Program:* Ronald K. Dearborn, Director

## **SCHOOL OF MANAGEMENT**

**David Porter, Dean**

The School of Management offers programs of study which provide the foundation for professional careers in private or public, small or complex organizations.

The M.B.A. program, with its broad action-oriented approach to management education, is designed to develop the knowledge and skills necessary to prepare students for successful careers in professional management in both the public and private sectors. The program seeks to develop the student's analytical and judgmental capabilities by providing a set of analytical tools, a knowledge of the functional areas of business, and a conceptual foundation of the social and economic environment within which organizations function. The program is designed to increase and intensify the student's capacity for decision-making and strategic planning in complex organizations. In order to meet these objectives, the M.B.A. program stresses the teaching of the basic disciplines that underlie business operations and management.

The M.S. in resource economics degree program is offers a specialization in the economics of natural resources. Emphases are possible in a wide variety of fields such as fisheries; wildlife, land resources, or forest management; agriculture; oil and minerals; and water resources. The program consists of core course work in microeconomic and macroeconomic theory, mathematical economics, econometric methods, and economic theory and public policy as they apply to natural resources, plus elective courses and thesis research.

*Graduate Degrees* – Master of Business Administration. Master of Science in Resource Economics.

## **SCHOOL OF MINERAL ENGINEERING**

**Robert Trent, Dean**

Our emergence and progress is marked by passage from one metal age to another. The keystone to our present economy is measured in minerals and energy and it would be difficult to conceive of a modern life without them. Within the career fields of geotechnics, minerals, and energy, the opportunities are limited only by a person's ability to apply engineering principles in new and imaginative ways.

The School of Mineral Engineering is composed of the Department of Mining and Geological Engineering, the Department of Petroleum Engineering, the Mineral Industry Research Laboratory, the Petroleum Development Laboratory and the Department of Mineral Exploration and Mining Technology, which includes Mining Extension and a one-year certificate program in Applied Mining Technology.

Emphasis is placed upon engineering as it applies to geotechnical engineering and to the exploration, development and exploitation of mineral and energy resources in the education and training of graduate students who will be tomorrow's leaders in these industries.

*Graduate Degrees* -- Master of Science in Geological Engineering, Mining Engineering, Mineral Preparation Engineering, and Petroleum Engineering. Engineer of Mines.

Research Affiliations

*Mineral Industry Research Laboratory:* Robert Trent, Director

*Petroleum Development Laboratory* Robert Trent, Director

*University of Alaska Fairbanks  
Departmental Degree  
Requirements*

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# *Anthropology Department*

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310 Eielson, University of Alaska Fairbanks, Fairbanks, AK 99775-7720 (907) 474-7288

## **Degrees: M.A. and Ph.D. in *Anthropology***

The anthropology program offers a balanced and flexible program of academic courses and research opportunities in cultural anthropology, archaeology, and physical anthropology, particularly with respect to the past and present cultures of the North. Anthropology contributes to an understanding of the complex problems of human behavior, cultural and social organization, and the relationship of human beings to various environments. Archaeological and human ecological research carried out in the field and library provides information about past and present modes of living and of origins and distribution of peoples and cultures in the arctic and subarctic.

The graduate program emphasizes a basic and general preparation in the field of anthropology. Such preparation enables graduates of the master's program to (1) pursue more advanced training leading to the Ph.D. in anthropology, or (2) prepares them to teach anthropology within secondary education and/or undergraduate levels of higher education, or (3) prepares students for career positions with various levels of government in which some anthropological background and/or expertise is beneficial. While the basic program is oriented toward general competence, subfield specialization is possible through individual programs. Field research in Alaska is a common experience for graduate students in Anthropology. All students must have fieldwork and laboratory experience appropriate to the discipline or subdiscipline.

The program offers thesis or non-thesis options. The choice of option is guided by the student's interests and goals, the graduate advisory committee, and the requirements of the university.

## ***Faculty***

- Basham, Charlotte S. -- 1983 -- Discourse analysis; second language acquisition; contrastive rhetoric. Associate Professor; University of Michigan '86, Ph.D.
- Black, Lydia -- 1984 -- Anthropological theory; human communication (symbolism); complex societies; Circumpolar and North Pacific studies. Professor; University of Massachusetts '73, Ph.D.
- Ellanna, Linda J. -- 1986 -- Hunter-gatherer ecology; demography; kinship; economic anthropology. Associate Professor; University of Connecticut '83, Ph.D.
- Gerlach, Craig -- 1990 -- Archaeology of pastoralists; arctic hunter/gatherers; zooarchaeology; quaternary paleoecology. Assistant Professor; Brown University, '89, Ph.D.
- Jonaitis, Aldona -- 1993 -- Director, University of Alaska Museum and Professor of Anthropology; Columbia University, '77, Pd. D.
- Kwachka, Patricia -- 1979 -- Sociolinguistics; language acquisition; language shift; medical communication. Associate Professor; University of Florida at Gainesville '81, Ph.D.
- Lee, Molly C. -- 1995 -- Native Alaskan, Eskimo, and Inuit art of the historical and contemporary periods. Curator of Ethnology, University of Alaska Museum and Assistant Professor; University of California at Berkeley, '92 Ph.D.
- Morrow, Phyllis -- 1987 -- Language and culture, folklore (Inuit/Yupik); ethnography; ritual and symbolism. Associate Professor; Cornell University '87, Ph.D.
- Powers, W. Rogers--1971--Archaeology; prehistory; ethnology and paleoecology of Eurasia, North America, Alaska and Siberia. Professor; University of Wisconsin, Madison '73, Ph.D.



- Schweitzer, Peter P. -- 1991 -- Social organization and ethnohistory of Siberia and Alaska.  
Assistant Professor; Institute of Social Anthropology - Vienna '90, Ph.D.
- Scott, G. Richard - 1973 -- Human evolution; skeletal biology; dental anthropology.  
Professor; Arizona State University '73, Ph.D.; Graduate Program Coordinator,  
Department Head.

### **Departmental Degrees:**

#### **Anthropology - M.A. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination in anthropology. Each student is expected to take the examination during the second year in the program.
3. A graduate advisory committee is established in the first semester of the program. The committee must be composed of at least three UAF faculty members. At least two of the committee members must be from the department (in the subfield of student interest, if available). The chair must be a member of the department as well as in the subfield of the student's interest. The student is expected to meet at least twice during each semester with the committee.
4. The need for a language requirement or a suitable substitute shall be determined by the advisory committee and the student. Each student must have at least one course in statistics (may be part of undergraduate record).

##### **Course Requirements (30-36 credits):**

###### **Thesis Option (30 credits):**

Complete at least 30 credits, of which 24 credits must be regular course work (not research or thesis) with 21 credits at the 600 level; 6 credits are thesis.

Core Courses (9 Credits, 3 of 4 proseminars required)

ANTH 601--Proseminar in Social/Cultural Anthropology 3

ANTH 604--Proseminar in Language and Culture.....3

ANTH 611--Proseminar in Archaeology.....3

ANTH 621--Proseminar in Physical Anthropology.....3

Additional courses ..... 15

Thesis

ANTH 699--Thesis.....6

###### **Non-Thesis Option (36 credits):**

Complete at least 36 credits, of which at least 30 credits must be regular course work, with 24 of these (including the core requirements) at the 600 level. A maximum of 6 hours may be devoted to research (ANTH 698). The student must complete a research paper in a style which the advisory committee judges to be of publishable quality.

Core courses (see above).....9

Additional courses (21 credits)..... 21

Research (6 credits)

ANTH 698--Research.....6

#### **Anthropology -- Ph.D. Degree**

The Ph.D. in Anthropology was approved by the Board of Regents in the Fall of 1988. The focus of the program is on the sociocultural anthropology and archeology of the North. Course work in anthropology and related disciplines as determined by the advisory committee, at least three full years of study beyond the baccalaureate degree, minimum 18 credit hours of thesis, one foreign language and a research tool or two foreign languages, and a comprehensive exam as well as a research thesis and an oral thesis defense, are required.

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# *Biology and Wildlife Department*

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211 Irving, University of Alaska Fairbanks, Fairbanks, AK 99775-6100 (907) 474-7671

**Degrees:** M.S. in *Biology, Botany, Wildlife Biology, and Zoology*; MAT in *Biology*; Ph.D. in *Biological Sciences with emphasis in Biology, Botany, Wildlife Biology, and Zoology*

Graduate Students at UAF have extraordinary opportunities to conduct independent biological research in controlled-experiment or field settings, taking advantage of arctic, alpine, and boreal environments near campus or at remote locations. The department has intimate connections with the NSF taiga Long Term Ecological Research (LTER) site, located about 20 miles from campus. Our students also have access to the tundra LTER site at Toolik Lake, where the UAF Institute of Arctic Biology runs a field station. Additional facilities available to graduate students on the Fairbanks campus include small animal colonies, the Large Animal Research Station, both electron and light microscope laboratories, an imaging laboratory and a new greenhouse facility. Students and faculty work on systematic collections in the UAF Museum using a variety of approaches from traditional morphology to molecular biology.

Areas of strong research emphasis of department faculty include arctic plant eco-physiology, plant-animal coevolution, insect ecology (terrestrial and aquatic), bird and mammal physiological ecology, vertebrate population dynamics, biology of seabirds, molecular evolution and systematics, pollution ecology, wetland ecology, population genetics, ungulate biology, and wildlife management.

Virtually all of our advanced degree recipients have significant teaching experience conducting labs and a few take primary responsibility for instruction in a course at the undergraduate level. Some of our M.S. and Ph.D. recipients have gone into education at the university, community college and secondary levels. Many find professional positions with state and federal resource agencies, with whom the department faculty maintain close contact.

The Department of Biology and Wildlife has approximately 100 graduate students. The atmosphere is informal and students and faculty interact frequently, not only in small-enrollment classes, but also on field trips and in community and social settings.

Research assistantships are available on a competitive basis. Teaching assistantships in department courses provide excellent experience. Several competitive fellowships are available through the UAF Graduate School. Applicants interested in graduate assistantships should contact the department for assistantship application forms.

## *Faculty*

Armbruster, Scott – 1980 – Evolutionary ecology; plant-insect interactions; plant reproductive ecology. Professor; University of California, Davis '81, Ph.D.

Barnes, Brian -- 1986 - Environmental physiology; environmental adaptation; hibernation; mammalian reproductive mechanisms. Associate Professor; University of Washington '83, Ph.D.

Blake, John -- 1988 -- Diagnostic anatomical pathology; wildlife diagnostics. Associate Professor; Western College of Veterinary Medicine Saskatchewan '80, D.V.M.; '87, M.V.Sc.

Bowyer, R. Terry – 1986 -- Quantitative vertebrate ecology; wildlife management; ungulate population dynamics. Professor; University of Michigan '85, Ph.D., Department Head and Graduate Program Coordinator.

Boyer, Bert -- 1992 -- Molecular biology, molecular genetics, mammalian thermogenesis. Assistant Professor; Louisiana State University Medical Center '88, Ph.D.

- Braddock, Joan Forshaug -- 1990 -- Microbiology; bacteriology and immunology. Assistant Professor; University of Alaska Fairbanks '89, Ph.D.
- Bryant, John P. -- 1985 -- Plant ecology; chemical aspects of plant/herbivore interactions. Professor; University of Alaska Fairbanks '84, Ph.D.
- Cook, Joseph A. -- 1990 -- Mammalian genetics; systematics; ecology. Assistant Professor; University of New Mexico '90, Ph.D.
- Deviche, Pierre -- 1988 -- Animal behavior; neurophysiology; behavioral endocrinology. Associate Professor; University of Liege (Belgium) '80, Ph.D.
- Edwards, Mary Elizabeth -- 1989 -- Climate change; vegetation diversity; quaternary science. Assistant Professor; Cambridge University '81, Ph.D.
- Feist, Dale -- 1971 -- Physiological adaptations of mammals; endocrine and neuroendocrine adjustments and adaptations to cold and to seasonal change. Professor; University of California, Berkeley '67, Ph.D.
- Follmann, Erich H. -- 1976 -- Biology and ecology of mammalian carnivores. Associate Professor; Southern Illinois University, '73, Ph.D, Wildlife Program Head.
- Fox, John F. -- 1973 -- Plant-animal interactions; plant ecology; ecological modeling. Assistant Professor; University of Washington '76, Ph.D.
- Guthrie, Dale R. -- 1963 -- Vertebrate paleontology; evolution of mammalian morphology. Professor; University of Chicago '63, Ph.D.
- Klein, David R. -- 1962 -- Ungulate ecology, with an emphasis on forage relationships; land-use policy and resource management in the North. Professor; University of British Columbia '63, Ph.D.
- LaPerriere, Jacqueline -- 1972 -- Primary and secondary productivity and water quality as parameters of fish habitats. Associate Professor; Iowa State University '81, Ph.D.
- Laursen, Gary A. -- 1976 -- Mycological ecology, morphology and taxonomy; science education. Adjunct Associate Professor; Virginia Polytechnic Institute and State University '75, Ph.D.
- MacLean, Jr., Stephen F. -- 1971 -- Evolutionary ecology of northern animals; insect life cycles; insect herbivory. Professor; University of California, Berkeley '69, Ph.D.
- Murphy, Edward C. -- 1983 -- Behavioral and population ecology of birds and mammals. Professor; University of Kansas '77, Ph.D.
- Oswood, Mark W. -- 1977 -- Freshwater ecology, especially of rivers and streams; limnology; entomology. Professor; University of Montana '76, Ph.D.
- Rexstad, Eric -- 1991 -- Quantification of population demographics; mark-recapture theory; design of biomonitoring programs. Assistant Professor; Colorado State University '90, Ph.D.
- Ruess, Roger W. -- 1989 -- Plant nutrition; nutrition cycling; herbivore interaction. Associate Professor; University of North Dakota '80, Ph.D.
- Schamel, Douglas L. -- 1975 -- Behavioral ecology of water birds (shore birds); science education. Assistant Professor; University of Alaska Fairbanks '74, M.S.
- Schwaegerle, Kent -- 1986 -- Plant population biology; ecological genetics. Associate Professor; University of Illinois at Urbana-Champaign '84, Ph.D.
- Sedinger, James S. -- 1985 -- Waterbird ecology and management; evolution of life-history traits of birds; behavior and nutrition. Professor; University of California, Davis '83, Ph.D.
- Shields, Gerald F. -- 1975 -- Cytogenetics; molecular evolution. Professor; University of Toronto '74, Ph.D.
- Smiley, Scott -- 1989 -- Molecular approaches to development and evolution. Associate Professor; University of Washington '86, Ph.D.
- Smith, Ronald L. -- 1968 -- Marine biology; physiology and ecology of fishes. Professor; University of Miami (Florida) '68, Ph.D.
- Sousa, Marsha Crowder -- 1989 -- Reproductive endocrinology. Adjunct Assistant Professor; Colorado State University '82, Ph.D.

White, Robert G. -- 1970 -- Large-animal ecology; mechanisms of food and nutrition handling, digestibility and intermediary metabolism of northern mammals. Professor; University of New England (Australia) '73, Ph.D., Director, Institute of Arctic Biology.

## **Departmental Degrees**

### **Biological Sciences:**

#### **Biology or Botany -- M.S. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete a minimum of 30 credits of approved courses. At least 24 credits, including thesis and research, must be at the 600 level.
3. Students working in subject areas involving significant non-English literature may be expected to read the appropriate foreign language.

#### **Biology -- M.A.T. Degree**

The M.A.T. requires 36 credits beyond the baccalaureate degree. Persons interested in this degree program should contact the head of the department.

#### **Biological Sciences -- Ph.D. Degree**

The doctoral degree is awarded for proven ability and scholarly attainment. Candidates' degree programs are planned with their graduate advisory committees. There are no fixed course requirements required to earn the Ph.D. degree. A candidate for the Ph.D. degree in the Biological Sciences program will be expected to have course work at least equivalent to that required for the M.S. degree. See UAF degree requirements.

## **Wildlife Biology**

The geographic location of the university is particularly advantageous for the study of wildlife biology. Spruce forest, aspen-birch forest, alpine tundra, bogs and several types of aquatic habitats are closely situated to the Fairbanks campus. Studies can be made in many other habitats ranging from the dense forest of Southeastern Alaska to the arctic coast.

Study collections of plants and animals are available. There is also a 2,000-acre study area near the campus. Graduate students have ample opportunity for close association with the personnel of the Alaska Cooperative Fish and Wildlife Research Unit and local offices of federal and state conservation agencies. These agencies often provide support for graduate student projects. Thus, an unusually good opportunity is available for students to gain experience and to make job connections.

The Department of Biology and Wildlife and the Alaska Cooperative Fish and Wildlife Research Unit cooperate in offering graduate work leading to the Master of Science and Doctor of Philosophy degrees. Persons desiring detailed information on the graduate program in wildlife biology and management may obtain this from the chair, Wildlife Program. The procedure to be followed in applying for admission to graduate study is outlined in the section on Graduate Admissions.

The Alaska Cooperative Fish and Wildlife Research Unit offers a limited number of research assistantships; information on these and the unit's program can be obtained from the Leader, Alaska Cooperative Fish and Wildlife Research Unit at the University of Alaska Fairbanks. Assistantship applications should be sent to the unit leader; such applications are supplementary to the application for admission to graduate study.

### **Wildlife Biology-- M.S. Degree**

#### **Degree Requirements:**

1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits of approved courses, including thesis, in the field of wildlife biology. At least 24 credits, including thesis and/or research, must be at the 600 level.
3. Students working in subject areas involving significant non-English literature will be expected to read the appropriate foreign language.

### **Wildlife Biological Sciences -- Ph.D. Degree--emphasis in wildlife biology**

The doctoral degree is awarded for proven ability and scholarly attainment. Candidates' programs are planned with their graduate advisory committees, as there are no fixed course requirements required to earn the Ph.D. degree. A candidate for the Ph.D. degree in the Wildlife Biology program will be expected to have course work at least equivalent to that required for the M.S. degree. See the UAF degree requirements.

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## ***Business Administration Department***

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201 Bunnell, University of Alaska Fairbanks, Fairbanks, AK 99775-0360 (907) 474-7253

#### **Degree: Master of Business Administration**

The Business Administration Department offers professional education in the field of management to those individuals interested in entering industry or government upon graduation. The goal of the program is to prepare men and women to meet the complex problems of the technical, economic, and social environment and to enable them to provide imaginative and responsible leadership to industry and government on the basis of their education.

The MBA program at the University of Alaska Fairbanks recognizes that competence in the practice of management necessitates education in both breadth and depth. The MBA program is accredited by the American Assembly of Collegiate Schools of Business (AACSB).

#### ***Faculty***

##### ***Business Administration:***

- Bischak, Diane P. -- 1991 -- Simulation; production and operations management. Assistant Professor; University of Michigan '88, Ph.D.
- Borgeson, Cory R. -- 1983 -- Teaching ethics; employment discrimination; constitutional law. Affiliate/Adjunct Faculty; Drake University '81, J.D.
- Collins, James M. -- 1991 -- Strategic decision making; risk analysis; corporate performance. Assistant Professor; University of Texas at Austin '91, Ph.D.
- Harikumar, T. -- 1991 -- Agency theory; information and capital markets research. Assistant Professor; University of Houston '87, Ph.D.
- Hoffman, David -- 1985 -- Production/operation management; simulation modeling; computer graphics. Professor; Kent State University '76, D.B.A.
- Joseph, Jacob -- 1991 -- Career plateauism; dependent child and elder care. Assistant Professor; University of Iowa, '92, Ph.D.
- Lindahl, Mary R. -- 1986 -- Investments; futures; options. Associate Professor; University of Illinois at Urbana Champaign '75, Ph.D.; MBA Director.

Milner, Laura -- 1986 -- Marketing; tourism. Associate Professor; Kansas State University '85, Ph.D.  
 Pace, Kelley R. -- 1986 -- Statistical appraisal. Associate Professor; University of Georgia '85, Ph.D.  
 Tansey, Richard -- 1994 -- Marketing research, international business, advertising and business ethics. Associate Professor; University of Texas at Austin, '81, Ph.D., University of Houston, '91, Ph.D.  
 Taylor, John N. -- 1982 -- Human motivation; human values; personnel management. Associate Professor; The George Washington University '75, D.B.A.  
 Toepper, Lorin K. -- 1994 -- Tourism. Assistant Professor; University of Rhode Island, '91, Ph.D.

#### **Accounting**

Abramowicz, Kenneth -- 1994 -- Income taxes, financial accounting. Assistant Professor; University of Missouri, '91, C.P.A., Ph.D.  
 Bartlett, Thomas E. -- 1974 -- Financial accounting; auditing standards; accounting legislation. Associate Professor; Emory University '69, M.B.A.; C.P.A.  
 Harter, Charles -- 1991 -- Financial accounting; capital markets. Assistant Professor; University of Nebraska - Lincoln '91, Ph.D.; C.P.A.  
 Lehman, John -- 1987 -- Systems design. Professor; University of Michigan '82, Ph.D.; C.M.A.  
 Marshall, Dianne L. -- 1988 -- Virtual reality; distance delivery. Instructor; University of Alaska Fairbanks '86, M.B.A.  
 Robinson, E. Thomas -- 1974 -- Financial accounting; managerial accounting; applied computer systems. Associate Professor; University of Wisconsin '71, M.S.; '82, C.P.A.; C.M.A.  
 Sparks, Charles -- 1994 -- Financial accounting; auditing; applied computer systems. Assistant Professor, University of Iowa '95, Ph.D.; C.P.A.  
 Warbelow, Art -- 1989 -- Electronic markets. Assistant Professor; Harvard '91, D.B.A.  
 Wichmann Jr., Henry -- 1986 -- Governmental accounting; small business management; financial accounting, management control systems. Professor; University of Northern Colorado '72, Ph.D.; C.P.A.

#### **Departmental Degrees:**

##### **Business Administration -- M.B.A.**

##### **Admission Requirements:**

1. Undergraduate grade point average (overall or upper division G.P.A.) times 200 plus Graduate Management Admissions Test (GMAT) score must be greater than, or equal to, 1000 points. For a G.P.A. of less than 3.0, a high GMAT score will be required to obtain the minimum 1000 points total for admission.
2. GMAT score must be greater than, or equal to, 400. GRE scores may be substituted for the GMAT score, however the GMAT will remain the preferred test criteria. GRE scores, if substituted, will be averaged for an overall score; this score must be greater than, or equal to, 400.
3. Prior to initial enrollment, the student's record is reviewed to determine whether deficiencies exist in algebra, calculus, statistics and computer literacy which must be remedied before MBA work is undertaken.

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Comply with grade requirements established by the School of Management Graduate Committee.

## Course Requirements (30-54 credits)

1. Complete a minimum of 30 credits plus up to 24 credit hours of foundation first year courses if previous college work was not in business. Foundation courses are prerequisites to the advanced MBA core courses. Students with strong academic background in business or management may be able to reduce the required MBA course sequence to as few as ten courses. Foundation courses may be waived by competency exams or equivalent coursework completed within the last five years with a grade of B or better. Waiver requests are evaluated after an applicant is accepted into the program.

For advanced coursework, students may choose: (1) the general MBA program (2) the Accounting concentration, or (3) the Natural Resources Management concentration.

### Foundation Courses (24 credits):..... Credits

|  |   |
|--|---|
| ACCT 602--Accounting for Managers .....          | 3 |
| AIS 605--Management Information Systems .....    | 3 |
| BA 604--The Legal Environment of Business .....  | 3 |
| BA 610--Production/Operations Management.....    | 3 |
| BA 617--Organizational Theory and Behavior ..... | 3 |
| BA 625--Financial Management.....                | 3 |
| BA 643--Marketing Management .....               | 3 |
| ECON 622--Managerial Economics.....              | 3 |

### Advanced MBA Core Courses (30 credits): ..... Credits

All students must complete the following courses:

|   |   |
|---|---|
| BA 675--Practical Quant. Methods for Business Dec. Making | 3 |
| BA 690--Corporate Strategy .....                          | 3 |

General MBA option (1) :

BA 675, BA 690, the following breadth courses and two electives:

|  |   |
|--|---|
| ACCT 650--Management Accounting Seminar .....  | 3 |
| BA 607--Human Resources Management .....       | 3 |
| BA 660--Seminar in Production Management ..... | 3 |
| BA 680--Seminar in Finance.....                | 3 |
| BA 683--Seminar in Marketing .....             | 3 |
| BA 691--Sources of Business Information.....   | 3 |
| Elective**.....                                | 3 |
| Elective**.....                                | 3 |

\*\* The two electives can be chosen from undergraduate 400 level courses in Accounting or Business Administration, or from other graduate courses. All electives must be preapproved by the MBA director. Highly motivated students who wish to focus their studies may take up to two additional graduate electives and reduce the number of breadth courses to as few as four courses (12 credits).

Accounting concentration (2):

BA 675, BA 690, four breadth courses (see above) and:

|   |   |
|---|---|
| ACCT 620--Accounting Theory and Practice..... | 3 |
| ACCT 670--Public Accounting Seminar .....     | 3 |

Two electives from the following:

|   |   |
|---|---|
| AIS 473--Applied System Design.....                           | 3 |
| ACCT 401--Advanced Accounting.....                            | 3 |
| ACCT 403--Advanced Taxes .....                                | 3 |
| ACCT 404--Advanced Cost Accounting and Controllershship ..... | 3 |

|   |   |
|---|---|
| ACCT 472--Computer Control and Advanced Auditing..... | 3 |
| ACCT 650--Management Accounting Seminar .....         | 3 |

(ACCT 650 may not be used to meet both the MBA breadth and elective requirements. Also, to meet prerequisites, additional courses may be required.)



**Natural Resources Management concentration (3):**

BA 675, BA 690, four breadth courses (see above) and:

|   |   |    |
|---|---|----|
| ECON 635--Resource Economics.....               | 3 |    |
| NRM 630--Planning Theory .....                  | 3 | OR |
| NRM 681--Natural Protection and Management..... | 3 |    |

Two electives from the following:

|   |   |    |
|---|---|----|
| NRM 630--Planning Theory .....                  | 3 | OR |
| NRM 681--Natural Protection and Management..... | 3 |    |

(whichever was not taken as a required course)

|   |   |  |
|---|---|--|
| ECON 434--Environmental Economics .....                         | 3 |  |
| ECON 436--Energy Economics .....                                | 3 |  |
| ECON 438--Fisheries Management.....                             | 3 |  |
| ECON 636--Microeconomics II-Dynamic Resource Optimization ..... | 3 |  |
| ECON 638--Marine Policy .....                                   | 3 |  |
| NRM 407--Environmental Law .....                                | 3 |  |
| NRM 431--Wildlife Policy and Administration.....                | 3 |  |
| NRM 651--Advanced Silviculture.....                             | 3 |  |
| NRM 665--Advanced Outdoor Recreation.....                       | 3 |  |
| NRM 693--Research Methods.....                                  | 3 |  |

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## *Department Of Chemistry And Biochemistry*

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194 New Science Facility, University of Alaska Fairbanks, Fairbanks, AK 99775-6160 (907) 474-7525

**Degrees:** M.S. and M.A. in *Chemistry*  
M.S. and Ph.D. in *Biochemistry/Molecular Biology*  
M.S. and Ph.D. in *Environmental & Atmospheric Chemistry*

Graduates in chemistry and biochemistry qualify for employment in many fields: as teachers of chemistry; supervisors in industry; technical sales personnel; research chemists in federal, state, municipal, academic, or industrial laboratories; in pre-medicine; and as laboratory technicians. The rapid introduction of chemical techniques in all branches of commerce and the creation of the many synthetic products has caused substantial growth in the profession. In addition to the traditional employment opportunities in chemistry, well-qualified graduates find positions in the fields of environmental sciences, oceanography, and related interdisciplinary fields.

The curriculum in chemistry offers an opportunity for broad scientific study. All students specializing in chemistry will meet basic requirements in general inorganic, analytical, organic, and physical chemistry, as well as mathematics and physics. These may be supplemented by courses in biology, education, engineering, geophysics, geology, and advanced courses in biology, chemistry, mathematics, and physics according to the interest of the individual student.

The program in Biochemistry and Molecular Biology utilizes faculty from many departments and research institutes in the university and emphasizes an understanding of the molecular principles involved in life processes. Another cooperative program is in Environmental and Atmospheric Chemistry, with faculty from the Chemistry and Biochemistry, Geology and Geophysics, and Physics Departments working together in the study of the atmosphere.

The chemistry and biochemistry department offers students well-equipped laboratories housing instrumentation for nuclear magnetic resonance spectrometry, infrared, ultraviolet/visible, laser Raman, and atomic absorption spectrophotometry, mass spectrometry, gas chromatography, and carbon-hydrogen-nitrogen analysis. Additional equipment such as gas chromatograph/mass spectrometer, x-ray diffractometer, electron microscopes, liquid scintillation counters, amino acid analyzers, DNA synthesizers and DNA sequencers are available in cooperation with other departments and institutes at UAF.

### **Faculty**

- Benner, Richard L. -- 1991 -- Atmospheric chemistry and analytical chemistry. Assistant Professor; University of Denver '91, Ph.D.
- Button, Don K. -- 1964 -- Microbial biochemistry; biochemical kinetics; environmental chemistry. Professor; University of Wisconsin, Madison '64, Ph.D.; (Chemistry/Marine Sciences).
- Buttrey, Lisa A. -- 1993 -- Inorganic chemistry. Assistant Professor; SUNY at Buffalo '92, Ph.D.
- Clausen, Thomas -- 1990 -- Isolating and identifying plant secondary metabolites with interesting biological properties. Assistant Professor; Michigan State University '80, Ph.D.
- Duffy, Lawrence K. -- 1986 -- Comparative biochemistry; neurochemistry; toxinology. Professor; University of Alaska '77, Ph.D. Department Head and Graduate Program Coordinator.
- Hoskins, Claron L. -- 1965 -- Physical chemistry; Raman spectroscopy. Professor Emeritus; Massachusetts Institute of Technology '65, Ph.D.
- Jaffe, Daniel A. -- 1987 -- Atmospheric chemistry; environmental chemistry; atmospheric ozone. Associate Professor; University of Washington '87, Ph.D.
- Keller, John W. -- 1979 -- Bio-organic chemistry; enzymology. Professor; University of Wisconsin, Madison '76, Ph.D.
- Philip, Betty Anne -- 1965 -- Physical chemistry of solutions; chemical education. Associate Professor; Yale University '60, Ph.D.
- Reichardt, Paul B. -- 1972 -- Organic chemistry; natural products. Dean, CNS and Professor; University of Wisconsin, Madison '69, Ph.D.
- Shaw, David G. -- 1973 -- Organic chemistry; environmental chemistry; marine chemistry. Professor; Harvard University '71, Ph.D.
- Stolzberg, Richard J. -- 1978 -- Chemometrics; experimental design; atmospheric chemistry. Professor; Massachusetts Institute of Technology '73, Ph.D.

### **Departmental Degrees:**

#### **Chemistry**

A graduate student seeking a master's degree with a major in chemistry must develop a program in one of the general divisions of chemistry: analytical, biochemistry, inorganic, organic or physical. A student entering without preparation to take these courses may require additional time to earn the degree.

#### **Application Requirements:**

1. Send graduate application form, official transcripts, and letters of recommendation to Admissions and Records, with the following:
  - a. Statement of academic and professional goals
  - b. GRE scores - general and subject (in chemistry, biology, or cell and molecular biology)
2. Send a copy of the graduate application form to the Chemistry Department, with copies of the statement of academic and professional goals and a completed Summary Application Form

### **Chemistry -- M.A. Degree**

This is a non-thesis degree program. Complete the same requirements as for the M.S. in Chemistry (see below), substituting research project (Chem 698) for thesis. Comply with UAF degree requirements.

### **Chemistry -- M.S. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based thesis and pass an oral defense of the thesis.
3. Two credits of seminar are required.
4. At least one semester of assisting in an undergraduate chemistry laboratory is required.

#### **Course Requirements (30 credits):**

Complete a minimum of 30 credits of approved courses. At least 24 credits, including thesis and/or research, must be at the 600 level.

### **Environmental and Atmospheric Chemistry Program - M.S. & Ph.D. Degree**

Alaska is a magnificent natural laboratory with unparalleled opportunities for study in many fields. The UAF program of study in environmental chemistry offers relevant courses and mentored individual research projects in several areas, including: Global warming and greenhouse gases; Arctic haze and industrial pollution in the Arctic; Oil spills and the fate of hydrocarbons in the marine environment. (See the Graduate School for application requirements.)

#### **Admission Requirements**

1. Fulfill all university application requirements; baccalaureate degree in chemistry, biochemistry, chemical engineering or closely related field; ability to perform graduate work as evidenced by transcripts, standardized tests, letters of reference and statement of purpose.

#### **Degree Requirements (M.S.)**

1. Comply with general UAF degree requirements.
2. Complete 30 credits of approved courses including Chem 606 --Atmospheric Chemistry, Chem 608 --Global Chemical Cycles, Chem 660 --Chemical Oceanography and Chem 692 --Chemistry Seminar.
3. Pass a written and oral comprehensive examination.
4. Write a research-based thesis and successfully defend it orally.

#### **Degree Requirements (Ph.D.)**

1. Comply with UAF degree requirements.
2. Complete core course work: Chem 606 --Atmospheric Chemistry, Chem 608 --Global Chemical Cycles, Chem 660 --Chemical Oceanography and Chem 692 --Chemistry Seminar.
3. Complete at least three semesters in residence at UAF.
4. Pass a written and oral comprehensive examination.
5. Complete and successfully defend an original research-based dissertation.

### **Biochemistry and Molecular Biology --M.S. and Ph.D. Degree**

Alaska presents rich opportunities for biochemical and molecular biological research. Plants and animals living in the Arctic have evolved remarkable genetic and biochemical adaptations to the region's characteristic low temperatures and dim sunlight. For instance, a large alga that inhabits the floor of the Beaufort Sea along the northern coast of Alaska stores carbohydrates during the continuous daylight of the Arctic summer, then uses that carbohydrate for growth during the long Arctic night under the pack ice. Our understanding of the molecular mechanisms underlying this adaptation is still far from complete. Nevertheless, solutions to this and many other fascinating biochemical problems beckon on the Arctic horizon.

**Admission Requirements:**

1. Fulfill all university application requirements.

**Degree Requirements (M.S.):**

1. Comply with UAF degree requirements.
2. Complete a minimum of 30 credits of approved courses. At least 24 credits, including thesis and/or research, must be at the 600 level.
3. Complete a thesis and pass an oral defense of thesis.

**Degree Requirements (Ph.D.):**

1. Comply with UAF degree requirements.
2. Complete at least three semesters in residence at the University of Alaska Fairbanks.
3. Complete 12 credit hours of core courses plus 4 electives, 18 credit hours of thesis, and a foreign language (or research tool) requirement.
4. Pass a written and oral comprehensive examination.
5. Complete and defend an original research-based thesis.

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## *Civil Engineering Department*

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263 Duckering, University of Alaska Fairbanks, Fairbanks, AK 99775 (907) 474-7241

**Degrees:** M.C.E. and M.S. in *Civil Engineering*; M.S. in *Arctic Engineering*; M.S. in *Engineering Management* M.S. in *Environmental Quality Engineering*; M.S. in *Environmental Quality Science* M.S. in *Science Management*

The civil engineering program at UAF began in 1922, had its first graduates in 1931 and since has graduated over 500 men and women. Many of these graduates work in Alaska's cities, towns and villages in a wide range of responsible positions. Over 60% of Alaska's professional engineers practice in civil engineering. Civil engineers continue to provide a significant contribution to society. The UAF civil engineering undergraduate program has been accredited since 1940. The program is presently accredited by the national Accreditation Board for Engineering and Technology (ABET). All engineering programs in the department give special attention to problems of northern regions.

***Faculty***

- Baker, IV, Elisha R.--1990--Simulation; manufacturing systems; project management. Associate Professor; Clemson University '75, Ph.D.
- Behr-Anders, Tina -- 1994 -- Solid waste management, transport of inorganic contaminants. Assistant Professor; Michigan Technological University '92, Ph.D.
- Bennett, F. Lawrence--1968--Cold regions construction; project management; logistics information system. Professor; Cornell University '66, Ph.D., P.E.
- Carlson, Robert F. -- 1967 -- Cold regions hydrology; river engineering; fluid mechanics. Professor; University of Wisconsin, Madison '67, Ph.D. Department Head.
- Hulsey, J. Leroy -- 1987 -- Thermal stresses of bridges; bridge behavior; numerical methods and the finite element method for engineering applications. Associate Professor; University of Missouri Rolla '76, Ph.D.
- Johnson, Ronald -- 1976 -- Energy systems; air pollution; water and wastewater treatment. Cornell University '69, Ph.D.; P.E.
- Kane, Douglas -- 1975 -- Hydrology; hydraulics; water resources. Professor; University of Minnesota, Minneapolis '75, Ph.D.
- Kinney, Thomas C. -- 1983 -- Transportation materials; geosynthetics; frozen ground engineering. Associate Professor; University of Illinois '79, Ph.D.

Lu, Jian (John) -- 1993 -- Traffic engineering; transportation systems and modeling; network analysis. Assistant Professor; University of Texas '90, Ph.D.

McFadden, Terry -- 1974 -- Arctic engineering; heat transfer and energy analysis. Associate Professor; University of Alaska '74, Ph.D.

Menderhall, William -- 1955 -- Professor (Emeritus); Cornell University '60, M.S.

Raad, Lutfi -- 1988 -- Pavements; highway materials; soil mechanics. Associate Professor; University of California, Berkeley '77, Ph.D.

Succarieh, Mohamed -- 1991 -- Soil dynamics; earthquake engineering. Assistant Professor; Rensselaer Polytechnic Institute '90, Ph.D.

Tilsworth, Timothy -- 1974 -- Professor (Emeritus); University of Kansas '70, Ph.D.

Tumeo, Mark A. -- 1988 -- Hazardous waste treatment and remediation; water quality management; environmental modeling. Associate Professor; University of California, Davis '88, Ph.D.

## **Departmental Degrees:**

### **Arctic Engineering**

The arctic engineering program is administered by the Civil Engineering Department in cooperation with the Department of Mechanical Engineering. It is designed to provide education for graduate engineers who must deal with the unique challenge of design, construction, and operations in cold regions of the world. The special problems created by the climatic, geological, and logistical conditions of the Arctic and subarctic require knowledge and techniques not usually covered in the normal engineering courses.

Of primary importance is a thorough understanding of heat transfer processes. In addition, properties of frozen ground and frozen water are basic to most engineering activities in the Arctic. The areas of hydraulics, hydrology and utility operations are also uniquely affected by arctic considerations. The arctic engineering program requires a set of core courses that prepares an engineer to understand and adapt to cold regions problems. It also allows the student to round out the program with advanced elective courses in a particular field of interest. Arctic engineering research activities carried out by faculty associated with this program can provide opportunities for theses or project papers dealing with the most current arctic knowledge.

The current development of petroleum and other natural resources has accentuated the demand for engineers with education in northern operations, both from the private industries that are involved in the development and from government agencies that must plan for or regulate this activity.

### **Arctic Engineering -- M.S. Degree**

#### **Degree Requirements:**

Comply with UAF degree requirements. At least 24 credits, including thesis and/or research, must be at the 600 level.

#### **Credit Requirements (30 credits):**

Core Courses (Minimum 15 credits): ..... 15

CE 681--Frozen Ground Engineering

CE 682--Ice Engineering or

GEOS 615--Sea Ice

CE 683--Arctic Hydrology and Hydraulic Engineering

CE 684--Arctic Utility Distribution

ME 685--Arctic Heat and Mass Transfer

ME 687--Arctic Materials Engineering

Thesis or Project (3 credits)

CE 699 or 698--Thesis or Project ..... 3

Electives (12-15 credits): ..... 12-15

All electives must be in areas related to or supportive of the student's degree program and approved by the student's graduate advisory committee. Note: CE 603, Arctic Engineering is not an approved elective for the M.S. in Arctic Engineering.

## **Civil Engineering**

Civil engineers plan, design, inspect, and/or supervise the construction of facilities essential to modern life in both the public and private sector - facilities that vary widely in nature, size and scope: space launching facilities, offshore structures, bridges, buildings, tunnels, highways, transit systems, dams, airports, irrigation projects and treatment facilities for wastewater.

Civil engineers are leading users of today's sophisticated high technology and are in the forefront of high-technology's newest applications. They employ the latest concepts in computer-aided engineering (CAE/CAD) during design, construction, project scheduling and cost control.

The opportunity for creativity is unlimited given the wide scope of projects covered by civil engineering.

Graduate students may enter one of two programs: The master of civil engineering is for those whose goal is broad professional practice. Those whose interests or background favor a specialized program, with emphasis on research and/or advanced specialized study, will ordinarily select the master of science in civil engineering degree.

In addition to the general civil engineering courses offered, specialties are available in transportation, geotechnical, structures, water resources, hydrology, and environmental studies. The courses within the department in these areas stress the problems of northern regions and emphasize principles of analysis, planning and engineering design.

In addition to the civil engineering courses, a master's degree program can include courses in environmental quality engineering, engineering management, and other areas. An advanced degree in environmental quality engineering administered within the Civil Engineering department is available. (See EQE program)

### **Civil Engineering -- M.C.E. Degree**

Students entering the master of civil engineering program should have completed a bachelor's degree in civil engineering. The GRE general examination, and for international students the TOEFL (with score of 575 or better), are required. Students with bachelor's degrees in other fields of engineering should work out a program to remove background deficiencies with their graduate advisory committee. A student will elect a civil engineering program approved by the graduate committee and must comply with UAF degree requirements.

Thirty credits of approved courses beyond the B.S. degree are required. MCE candidates will have passed a State Engineer-in-Training Examination prior to the awarding of the degree. At least 24 credits, including research, must be at the 600 level.

### **Civil Engineering -- M.S. Degree**

Students entering the master of science in civil engineering program should have completed a bachelor's degree in civil engineering. The GRE general examination, and for international students the TOEFL (with score of 575 or better), are required. A student selecting this program must comply with UAF degree requirements. Coursework will consist of at least 30 credits approved by the graduate advisory committee, of which 6-12 credits will be thesis. At least 24 credits, including thesis or research, must be at the 600 level.

### **Engineering Management -- M.S. Degree**

### **Science Management -- M.S. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Demonstrate competence in computer programming by passing a programming course or a qualifying examination.
3. Write a project report which proposes a solution to a situation in an engineering or scientific management setting. Pass an oral defense of the project and oral comprehensive examination.

**Credit Requirements:**

Complete a minimum of 33 credits, at least 24 of which must be at the 600 level. Substitutes for one or more of the courses listed below are permitted if similar courses are included in the student's previous academic background. Both substitutes and transfer of credit (maximum 9 credits) must be approved by the department.

|   |         |
|---|---------|
| Required courses (9 credits).....                         | Credits |
| ESM 601--Engineers in Organization.....                   | 3       |
| ESM 609--Project Management -- OR                         |         |
| BA 643--Marketing Management*.....                        | 3       |
| <u>One of the following:</u>                              |         |
| BA 643--Marketing Management*.....                        | 3       |
| ESM 608--Legal Principles for Engineering Management..... | 3       |
| ESM 609--Project Management.....                          | 3       |
| BA 607--Human Resource Management*.....                   | 3       |

Six credits chosen from:

|  |   |
|--|---|
| ESM 605--Engineering Economy.....  | 3 |
| ACCT 602--Financial Accounting Concepts for Administrators*..  | 3 |
| (If a student has had a course in engineering economy, ACCT 602 and BA 625 may be taken; otherwise, ESM 605 and ACCT 602 are required) |   |

Six credits chosen from:

|   |   |
|---|---|
| ESM 620--Statistics for ESM.....              | 3 |
| ESM 621--Operations Research.....             | 3 |
| AIS 605--Management Information Systems*..... | 3 |

Technical Electives in the student's specialty.....9

Project: ESM 684--Engineering/Science Management Project.....3

\* School of Management courses can be applied to no more than 12 credits of the ESM program.

## **Environmental Engineering and Environmental Quality Science**

The environmental engineering and environmental quality science curriculum is administered through the Civil Engineering Department and designed for graduate engineers and science majors who will pursue careers in the areas of water supply, treatment, and distribution; waste treatment; stream and air pollution; solid waste disposal; hazardous and toxic waste management; and environmental impact evaluation. Consideration is given for broad study of the environment, prevention and abatement of quality deterioration, and solutions to environmental problems.

Graduates will be prepared to hold positions in federal, state, and municipal organizations as well as in consulting engineering offices. For students having non-engineering degrees, a program is available leading to the Master of Science in Environmental Quality Science. The GRE general exam is required of all applicants. Applicants for these degree programs who are not native English speakers are required to have a score of 575 on the TOEFL exam.

### **Environmental Engineering - M.S. Degree**

#### **Admission Requirements:**

1. B.S. in Engineering from an accredited institution with GPA of 3.0
2. Equivalent of UAF course in basic computer techniques.
3. GRE required for all applicants.
4. TOEFL (575), TSE (250), and TWE (5) required for international students.

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination and an oral defense of the thesis.



**Credit Requirements (30 credits):**

Complete a minimum of 30 credits of approved and required courses, of which at least 24 credits, including thesis and/or research, must be at the 600 level. All courses must be approved by the graduate advisory committee. A non-thesis option is possible with approval by the committee.

**Thesis Option:**

Required courses (18 credits)

|  |   |
|--|---|
| EQE 641--EQS Measurements.....                     | 3 |
| EQE 643--Air Pollution Management.....             | 3 |
| EQE 644--Environmental Management and the Law..... | 3 |
| EQE 645--Unit Processes-Chemical and Physical..... | 3 |
| EQE 646--Unit Processes-Biological.....            | 3 |
| EQE 648--Solid Waste Management.....               | 3 |

Electives (6 credits).....6

Thesis (6 credits)

|               |   |
|---------------|---|
| EQE 699 ..... | 6 |
|---------------|---|

**Non-Thesis Option:**

Required courses (above)..... 18

Electives (9 credits).....9

Special Project (3 credits)

|                       |   |
|-----------------------|---|
| EQE 698--Project..... | 3 |
|-----------------------|---|

**Environmental Quality Science - M.S. Degree****Admission Requirements:**

1. B.S. in from an accredited institution with GPA of 3.0
2. Equivalent of one year of UAF courses in calculus and general chemistry, and one semester of computer techniques
3. GRE required for all applicants.
4. TOEFL (575), TSE (250), and TWE (5) required for international students.

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination and an oral defense of the thesis.

**Credit Requirements (30 credits):**

Complete a minimum of 30 credits of approved and required courses, of which at least 24 credits, including thesis and/or research, must be at the 600 level. All courses must be approved by the graduate advisory committee. A non-thesis option is possible with approval by the committee.

**Thesis Option**

Required courses (18 credits)

|  |   |
|--|---|
| EQE 641--EQS Measurements.....                     | 3 |
| EQE 644--Environmental Management and the Law..... | 3 |
| EQE 647--Biotechnology.....                        | 3 |
| ES 341--Fluid Mechanics.....                       | 3 |
| EQE 643--Air Pollution Management - or             |   |
| EQE 648--Solid Waste Management.....               | 3 |
| EQE 645--Unit Processes-Chemical and Physical - or |   |
| EQE 646--Unit Processes-Biological.....            | 3 |

Electives 6

Thesis 6

**Non-Thesis Option:**

Required courses (above) .....18

Electives (9 credits).....9

Special Project (3 credits)

|                       |   |
|-----------------------|---|
| EQE 698--Project..... | 3 |
|-----------------------|---|

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# *Economics Department*

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103 Bunnell, University of Alaska Fairbanks, Fairbanks, AK 99775-0580 (907) 474-7119

## **Degree: M.S. in *Resource Economics***

Economics is the study of those social activities which are concerned with the production, distribution, and consumption of goods and services. In today's complex world, nearly all social phenomena and problems have economic aspects. Organized knowledge of the functioning of our economy and its relations with other economic systems is therefore essential to an understanding of the world in which we live.

The Department of Economics offers study leading to the Master of Science degree in resource economics. The resource economics program offers a specialization in the economics of natural resources with emphasis in a variety of specific fields possible through interdisciplinary elective courses and thesis research, e.g., fisheries, wildlife management, land resources management, agriculture, oil and minerals, water resources and forest management.

The program consists of core course work in micro- and macro-economic theory, mathematical economics, economic methods and courses in the economic theory and public policy of natural resources. Master's candidates will be required to write a thesis. Thesis topics, consistent with students' interest and project requirements, may be selected from current research projects of the department or from one of the several research institutes on campus. Most research projects deal with issues pertinent to the development and management of Alaska's renewable and nonrenewable resources.

## ***Faculty***

Boyce, John R.--1988--Resource and governmental economics; microeconomics; public choice. Assistant Professor; University of California Davis '90, Ph.D.; Graduate Program Coordinator.

Criddle, Keith R. -- 1989 -- Natural resource economics; fisheries; time series analysis. Associate Professor; University of California Davis '89, Ph.D.

Goering, Greg E. -- 1990 - Industrial organization; econometrics; microeconomics. Associate Professor; Purdue University '90, Ph.D.

Haney-Martinez, Barbara -- 1990 -- Public policy; macroeconomics; public finance. Assistant Professor; University of Notre Dame '89, Ph.D.

Herrmann, Mark L. -- 1991 -- Applied economics; fisheries marketing; international trade theory. Associate Professor; Washington State University '90, Ph.D.

Logan, Robert R. -- 1986 -- Public finance; public choice; econometrics. Associate Professor; University of Iowa '86, Ph.D.; Department Head.

Pippenger, Michael -- 1991 -- Macroeconomics, econometrics, time series models. Assistant Professor; Purdue University '90, Ph.D.

Read, Colin L. -- 1989 -- Urban and regional economics; industrial organization. Associate Professor; Queen's University '88, Ph.D.

## **Departmental Degrees:**

### **Resource Economics - M.S. Degree**

#### **Admission Requirements:**

1. Baccalaureate degree in appropriate undergraduate major.
2. Unconditional acceptance requires completion of intermediate microeconomics and macroeconomics, basic statistics, and one semester of calculus. Students may be accepted into the program subject to identified deficiencies being rectified.
3. Scores of the general Graduate Record Examination.

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination.
3. Write a thesis and pass an oral defense of thesis.

**Course Requirements (31 credits):**

Complete a minimum of 31 credits of course work in the field of resource economics. All courses must be approved by the graduate advisory committee. At least 24 credits, including thesis, must be at the 600 level.

| Required Courses (19 credits) .....             | Credits |
|---|---------|
| ECON 601--Microeconomic Theory I.....           | 3       |
| ECON 603--Macroeconomic Theory.....             | 3       |
| ECON 623--Mathematical Economics .....          | 3       |
| ECON 626--Econometrics.....                     | 3       |
| ECON 635--Resource Economics.....               | 3       |
| ECON 636--Microeconomics II.....                | 3       |
| ECON 670--Seminar in Research Methodology ..... | 1       |
| Electives (min. 6 credits) .....                | 6       |
| Thesis (min. 6 credits)ECON 699--Thesis.....    | 6       |

## *School Of Education*

7th Floor Gruening, University of Alaska Fairbanks, Fairbanks, AK 99775-6480 (907) 474-7341

### *Degrees: Master of Education; Educational Specialist*

Education offers an M.Ed. in one of five areas of specialization: 1) Cross-Cultural Education, 2) Curriculum and Instruction, 3) Educational Leadership, 4) Language and Literacy, and 5) Guidance and Counseling.

The program also offers an Educational Specialist (Ed.S.) degree, with an emphasis in Cross-Cultural Education and Educational Leadership. Subject to available resources, individualized programs of study with other emphases may be established in consultation with members of the Education faculty. All graduate degree programs have a strong cross-cultural emphasis.

**Faculty**

Adeodu, Rachel -- 1994 -- Instructor; University of Alberta, Ph.D.

Barnhardt, Carol A. -- 1991 -- Alaska Native education; cross-cultural communications; comparative/international education. Assistant Professor; University of British Columbia '94, Ph.D.

Barnhardt, Raymond J. -- 1970 -- Cross-cultural education; rural development; anthropology. Professor; University of Oregon '70, Ph.D.

Bradley-Kawagley, Claudette E. -- 1989 -- Math; computer technology in education. Assistant Professor; Harvard Graduate School of Education '87, Ed.D.

Browne, Dauna B. -- 1989 -- School counseling. Associate Professor; University of Northern Colorado '70, Ed. D.; Graduate Program Coordinator of Guidance and Counseling.

Caldwell, Patricia -- 1990 -- Student teacher perspectives; differentiated program delivery; special education/gifted and talented. Instructor; University of Memphis '70, M.Ed.

Cloud, Patricia L. -- 1991 -- Clinical Practice/ Instructor; University of Alaska Fairbanks '90, M.Ed.

Gilmore, Perry -- 1985 -- Sociolinguistics; language and culture; ethnography. Associate Professor; University of Pennsylvania '82, Ph.D.

Hubalik, Nick E. -- 1989 -- Exercise and sport psychology. Assistant Professor; Arizona State University '87, Ph.D.

- Jennings, Michael -- 1993 -- Social & Educational Policy; UBC, Ed. Leadership, Philosophy, History; Policy & Native Studies. Visiting Professor; University of British Columbia '94, Ph.D.
- Kawagley, Oscar -- 1987 -- Science education; Native philosophy. Assistant Professor; University of British Columbia '93, Ph.D.
- Keating, Pamela J. --1994 -- Federal and State educational policy. Director, School of Education. Professor; University of Washington '81, Ph.D.
- Lipka, Jerry M. -- 1981 -- Curriculum; teacher education; multi-cultural research. Associate Professor; University of Massachusetts '80, Ed.D.
- McLean-Nelson, Debbie -- 1993 -- Early childhood and special education. Assistant Professor; Memphis State University '92, Ed.D.
- McMillan, Chip -- 1994 -- Math and science education. Assistant Professor; University of Colorado '89, Ph.D.
- Noble, Diane --1994 -- Teachers for Alaska. Visiting Assistant Professor; University of Southern California '86, Ed.D.
- Norris-Tull, Roger -- 1992 -- Science education; teacher education. Assistant Professor; University of Idaho '77, Ph.D.
- Parrett, William H. -- 1979 -- Comparative and teacher education; curriculum design, teaching youth at risk. Professor; Indiana University '79, Ph.D.
- Pfisterer, William R. -- 1980 -- Oral history, teacher education; coordinator of student teaching. Instructor; University of Alaska '80, M.A.
- Savinova, Amelia -- 1988 -- Instructor; University of Alaska Fairbanks '81, M.A.T., Ph.D..
- Schall, Dennis G. -- 1988 -- Science education; biology; teacher education. Assistant Professor; University of Nebraska '77, Ph.D.
- Smith, David M. -- 1986 -- Ethnography of communication; literacy; cultural politics. Professor; Michigan State University '69, Ph.D.
- Stephens, Sidney -- 1985 -- Environmental education; science education. Instructor; University of Alaska '85, M.Ed.
- Titus, Jordan J. -- 1990 -- Ethnomethodology; sociology of education; gender; sociology of childhood. Assistant Professor; University of Toronto '90, Ph.D.
- Wells, W. Tom -- 1984 -- Head, Department of Physical Education (1985) and Interim Director of Athletics and Campus Recreation. Associate Professor, Indiana University '81 P.E.D.
- White, Nora -- 1991 -- Language and literacy; international cross-cultural education. Assistant Professor; Ohio State University '92, Ph.D.

## **Departmental Degrees**

### **Education -- M.Ed. Degree**

#### **Application Review Process:**

Applications are due on April 1 and October 1 and are reviewed immediately thereafter for admission in the following semester. Faculty may vote to Admit, to Not Admit, or to Admit With Stipulations. Stipulations are specified when additional development in particular areas is needed before beginning a graduate degree program.

#### **Admission Requirements:**

Minimum requirements for admission to the M.Ed. program are:

1. Bachelor's degree, minimum of 24 credits of education courses, and an average 3.00 GPA.
  2. One year of satisfactory teaching or administrative experience in public schools.
- Alternative experience may be accepted.

#### **Application Procedures:**

1. Application form, submitted to the UAF Office of Admissions and Records.
2. Scores on the general Graduate Record Examination.
3. A 4-5 page essay which describes the applicant's career goals and educational philosophy, and how those goals and philosophy are relevant to the College's mission and the education graduate degree program.

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete the Education Department requirements as follows:
  - a. At least 36 credits must be completed for specializations in Cross-Cultural Education, Curriculum and Instruction, Language and Literacy, and individualized programs with other emphases, and at least 42 credits for Educational Leadership with a Type B Principals Endorsement.(see following section).
  - b. No more than 9 credits earned before admission to an M.Ed. program may count toward that degree.
  - c. At least 30 credits must be completed at the 600 level.
  - d. At least 15 credits must be completed on the Fairbanks campus.
  - e. A synthesizing paper, to demonstrate mastery of the student's program of study, is required in lieu of the university comprehensive examination requirement.
  - f. An educational research project (or in some cases a thesis) is required.

**Course requirements (36-42 credits):**

1. Core courses (15 credits)..... Credits  
ED 601 Intro. to Applied Social Science Research .....3  
ED 603 Field Study Research Methods.....3  
ED 689 Proseminar in Applied Educational Research  
(satisfies requirement for ED 602).....3  
ED 690 Seminar in Cross-Cultural Studies .....3  
ED 698 Research Project.....3
2. One of the following (3 credits):  
ED 610- Education & Cultural Processes .....3  
ED 612- Cultural & Philosophical Foundations of Education ..3  
ED 616- Education & Socioeconomic Change.....3  
ED 621- Cultural Aspects of Language Acquisition.....3
3. Elective credits (to be selected in consultation with each student's advisory committee):  
Cross-Cultural; Curriculum/Instruction; or Language/Literacy 18 cr.  
Educational Leadership.....24 cr.

**Type B Certificate Program (24 Units)**

Effective Summer, 1995, a new statewide Type B Certificate Program will be available for those seeking School Administrative Certification (the State Type B Certificate). Four core courses (3 credits each) will precede an academic year (2 semesters) internship for an additional 12 credits. The required coursework will be available, and is transferable across the three U.A. campuses.

Students already holding a master's degree may add the Type B Certificate Program for Administrative Certification. This Type B Program is credited toward a Master's in Educational Leadership for those just beginning graduate school.

**Type B Certificate Program requirements (24 credits):**

- |  |         |
|--|---------|
| Required Courses (12 credits).....   | Credits |
| ED 663 School Law .....  | 3       |
| ED 695 Leadership: Structure and Organizational<br>Behavior for School Administrators..... | 3       |
| ED 695 Social and Political Foundations<br>of Education.....                               | 3       |
| ED 631 Small Schools Curriculum Design.....  | 3       |
| ED 676 Required Administrative Internship.....   | 12      |
| (2 semesters, 6 credits each)  |         |

## Guidance and Counseling

The M.Ed. program in Elementary and Secondary School Guidance and Counseling trains professional school counselors for the multicultural school settings. The purpose of this program is to prepare counselors at the graduate level with specific training in the areas of counseling and consultation for educational, social, and vocational decisions. The program prepares school counselors in the areas of developmental guidance, individual and group counseling, consultation, and program development. Supervised practicum and internships in the school setting are required.

### Guidance and Counseling -- M.Ed. Degree

#### Admission Requirements:

In addition to the admission requirements of the Graduate School which include the Graduate Record Examination, the student must apply for admission to and be accepted by the program area faculty. Admission to the Guidance and Counseling program requires a bachelor degree in a human service area such as Education, Social Work, Psychology, Human Services, etc. Suitability of other degrees will be considered on an individual basis by Guidance and Counseling faculty.

Students who are applying for the Type A certification option must have an Alaska Teaching Certificate or the equivalent of a University of Alaska Bachelor of Education Degree with a GPA of 3.0 in the major.

Students who are applying for the Type C certification option must have a bachelor's degree in one of several helping professions areas, i.e. psychology, social work, etc.

Acceptance into the Guidance and Counseling program is also based on consideration of the following criteria:

- Clarity of goals appropriate to those of the program.
- Commitment to working in multicultural settings.

#### Degree Requirements:

1. Comply with UAF degree requirements.
2. Complete 47 credits in approved courses and research.
3. Pass a written comprehensive examination.
4. Complete a research project or thesis.
5. Make an oral presentation of project or thesis to committee and colleagues.
6. Complete practicum and internship placements in an elementary or secondary setting, depending upon interest.

NOTE: Courses assigned by the student's graduate committee to remove deficiencies will not be allowed as part of the graduate program.

#### Course Requirements (Elementary or Secondary Counseling):

| Required Courses (47 credits)                         | Credits |
|---|---------|
| COUN 610--Culture and the Counselor.....              | 1       |
| COUN 611--Theory Building for Counselors.....         | 1       |
| COUN 615--Foundations of Guidance and Counseling..... | 3       |
| COUN 623--Counseling Theory and Applications.....     | 3       |
| COUN 628--Child and Adolescent Psychology.....        | 3       |
| COUN 629--Developmental Interventions.....            | 3       |
| COUN 634--Practicum in Individual Counseling.....     | 3       |
| COUN 636--Practicum in School Counseling.....         | 3       |
| COUN 646--School Counseling.....                      | 3       |
| COUN 647--Professional Ethics.....                    | 3       |
| COUN 660--Cross-Cultural Counseling.....              | 3       |
| COUN 674--Group Counseling.....                       | 3       |
| COUN 690--Internship.....                             | 3-6     |
| COUN 698--Research Project.....                       | 3-6     |
| or: COUN 699--Thesis.....                             | 6       |
| PSY 635--Field-Based Research Methods.....            | 3       |
| or: ED 601--Intro. to Ed. Research.....               | 3       |
| or: PSY/SOC 473--Social Science Research Methods..... | 3       |
| Total Required credits.....                           | 41      |
| Elective credits.....                                 | 6       |
| Total program credits.....                            | 47      |

## **Type A Certification Program**

Certified teachers who currently hold master's degrees in education may elect to enter a program which will qualify them for Alaska guidance and counseling endorsement. The practicum and internship placements will be elementary or secondary depending upon the certification sought. Any teacher wishing to become certified through the University of Alaska Fairbanks must apply for admission to the Guidance and Counseling Program, be accepted, and complete 12 credit hours in residence.

### **Admission Requirements:**

Apply for admission to the Guidance and Counseling M.Ed. degree program, specifying intent to complete the certification requirements.

### **Certification Requirements:**

#### **Minimum Course Requirements:**

|   |     |
|---|-----|
| COUN 615--Foundations of Guidance and Counseling..... | 3   |
| COUN 623--Counseling Theories and Applications .....  | 3   |
| COUN 628--Child and Adolescent Psychology.....        | 3   |
| COUN 629--Developmental Interventions .....           | 3   |
| COUN 634--Practicum in Individual Counseling.....     | 3   |
| COUN 636--Practicum in School Counseling.....         | 3   |
| COUN 646--School Counseling .....                     | 3   |
| COUN 660--Cross-Cultural Counseling .....             | 3   |
| COUN 674--Group Counseling.....                       | 3   |
| COUN 690--Internship.....                             | 3-6 |
| Total Required Hours .....                            | 30  |

## **Education -- Ed.S. Degree**

The Educational Specialist (Ed.S.) degree is designed for teachers and other educators (1) who wish to undertake graduate study beyond the master's degree; (2) who wish to qualify for an intermediate degree between the master's and the doctorate; (3) who wish to develop further competence in one field of specialization. The focus of this degree program is cross-cultural education or educational leadership.

### **Admission Requirements:**

1. Applicants must be experienced educators who have at least three years of professional teaching, counseling or administrative experience.
2. Applicant should have a master's degree in an approved area of study as determined by the Education faculty's admissions committee. The committee may recommend provisional admittance subject to elimination of deficiencies.
3. Admission will be contingent upon:
  - a. A minimum GPA of 3.00 in previous graduate work.
  - b. Acceptable scores on the Graduate Record Examination general test and the advanced test in Education (or permission of admissions committee)
  - c. A satisfactory review conducted by admissions committee of the education department (may include a personal interview by the committee).

### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Minimum requirements will be the completion of 36 semester hours beyond the master's degree level. Students may transfer a maximum of 9 hours from another university into their program.
3. At least 30 of the 36 semester hours must be at the graduate level (600).
4. Fulfillment of the requirements of the Ed.S. degree must be completed within seven years.
5. Satisfactory performance on a written and oral comprehensive examination is required.



### **Course Requirements (36 credits):**

Courses will be selected in consultation with the student's advisory committee and will depend upon the student's prior training and field of specialization. Candidates will be required to have 36 credits for this degree, and a total background of at least 60 semester hours beyond the baccalaureate degree as outlined in the following course requirements:

1. Core requirements for all Educational Specialist candidates (courses completed as part of a master's programs may not be applied toward the Educational Specialist Degree).

Core courses (12 credits)..... Credits

ED 601 Introduction to Applied Social Science Research ....3

ED 610 Education and Cultural Processes .....3

ED 612 Cultural and Philosophical Foundations of Education ..3

ED 690 Seminar in Cross-Cultural Studies (to be taken upon the completion of a minimum of 24 hours of graduate study)3

2. Cross-Cultural Education Specialization Courses (15 Credits)

ED 689 Proseminar in Applied Educational Research.....3

ED 611 Learning, Thinking and Perception in Cultural Perspective 3

ED 612 Cultural and Philosophical Foundations of Education ..3

ED 615 Social Organization of Classrooms and Learning ....3

ED 620 Language, Literacy and Learning .....3

3. Electives: 600 level courses approved by candidate's committee

4. Recommended courses to provide specialization depth:

ANS 475 Alaska Native Social Change

ED 621 Cultural Aspects of Language Acquisition

ED 630 Curriculum Theory

ED 660 Educational Administration in Cultural Perspective

5. Field Study or Internship (minimum of 6 credits)

Under the guidance of the student's graduate committee, each candidate will design a field research project. Students will submit a written report on their findings and will defend the completed project and their conclusions in an oral examination before their advisory committee.

A research design may include the following tools of research: analysis of cumulative records, questionnaires, sociometric techniques, interviews with open-ended questions, analysis of test scores, analysis of textbooks, observation of teaching and administrative techniques, participant observation in the school and community, and rating scales.

### **Education - Post-Baccalaureate Preparation for Teacher Certification**

UAF provides certification preparation for baccalaureate degree holders whose baccalaureate studies did not initially prepare them for certification. UAF education programs prepare highly qualified professionals in education who are able to teach in urban and rural Alaska and to work with multicultural and minority students, especially Alaska Native students. Post-baccalaureate students may pursue either elementary (K-8) or secondary (7-12) certification. See the UAF Undergraduate Catalog for additional information, or contact the Office of Certification and Advising in the Education Department.

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## ***Electrical Engineering Department***

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217 Duckering, University of Alaska Fairbanks, Fairbanks, AK 99775-5900 (907) 474-7137

### **Degrees: M.E.E. and M.S. in Electrical Engineering**

Electrical engineering encompasses the areas of computer applications and design, electrical power transmission and distribution, telecommunications and electronics. The electrical engineer designs and oversees the construction, installation and maintenance of electrical systems providing light, heat and power. Engineers design the communication systems of telephone, radio and television as well as the transistors and integrated circuits used in these systems. People trained in

computer engineering automate businesses, factories, pipelines and refineries. They also design control systems and computers which guide trains, planes and space vehicles. Even the test devices and tools of investigation -- in medicine, in physics, in geology and in other sciences -- are today largely electronic.

The scope of electrical engineering has expanded tremendously in recent years. Many developments have been important in this expansion, including automatic control theory, environmental monitoring, communications theory, new geophysical instrumentation, extra-high voltage power transmission, medical electronics, plasmas, magnetohydrodynamics, integrated circuits, satellites, and mini and microcomputers. The process controls in the extraction, transmission and refining of petroleum products are largely the responsibility of the electrical and computer engineer. Development of techniques for utilizing new energy sources presents a challenge, requiring much imagination and resourcefulness. Advanced training in engineering science and mathematics is required for creative work in these areas.

Graduate degree programs in electrical engineering are closely connected with research activities of the faculty. Research areas in electrical engineering emphasize high latitude problems, and include such areas as: data communications, telecommunications, electromagnetic wave propagation, satellite communications, digital and physical electronics, computer and microcomputer applications, remote biomedical and environmental instrumentation, electric energy system analyses, electric power quality improvement, geomagnetic storm interaction with electric energy systems, system identification and simulation and digital signal processing.

The M.S. degree program includes research and advanced specialized study with a thesis. The M.E.E. degree program is composed of coursework with the possibility of a research project.

### ***Faculty***

Aspnes, John -- 1978 -- Electric energy systems; control systems. Professor; Montana State University '76, Ph.D.; P.E. Department Head.

Cote, James W. -- 1992 -- Electric energy systems; expert systems. Assistant Professor; University of Washington '92, Ph.D.; P.E.

Hawkins, Joseph G. -- 1987 -- Space plasma physics; space systems engineering. Associate Professor; Stanford University '88, Ph.D.

Mayer, Charles E. -- 1988 -- Antennas; radiowave propagation; microwave systems. Associate Professor; University of Texas at Austin '83, Ph.D.

Merritt, Robert P. -- 1955 -- Professor; Stanford University '68, M.S.; P.E. (Emeritus)

Pender, Dorothy A. -- 1989 -- Neutral networks; adaptive systems; digital signal processing; control systems. Assistant Professor; Stanford University '91, Ph.D.

Spell, B. David -- 1978 -- Digital signal processing; computer/digital design; VLSI design. Associate Professor; University of Washington '83, M.S.; P.E.

Yerkes, Christopher R. -- 1994 -- Digital signal processing, digital hardware design. Instructor; Georgia Institute of Technology '90, M.S.

### **Departmental Degrees:**

#### **Electrical Engineering -- M.E.E. Degree**

The M.E.E. is structured to be a terminal degree for the practicing professional engineer.

Those entering the Master of Electrical Engineering degree program should have completed a bachelors degree in electrical engineering. Students with bachelors degrees in other fields should work out a program to remove background deficiencies with their graduate committee.

Students must comply with UAF degree requirements, , and complete 32 credits of coursework, beyond the Bachelor of Science degree, approved by their advisory committee. At least 26 credits must be at the 600 level. Courses may be selected from electrical engineering and related fields. A research project is not required, although up to six credit hours of research may be completed as part of the degree program. Candidates must pass a department-administered written comprehensive examination. If a research project is part of the degree program, an oral project presentation and defense is required.

## Electrical Engineering -- M.S. Degree

Students entering the Master of Science in electrical engineering degree program should have completed a bachelors degree in electrical engineering. Students with bachelors degrees in other fields should work out a program to remove background deficiencies with their graduate committee.

Students must comply with UAF degree requirements, , and complete 30 credits of coursework, beyond the Bachelor of Science degree, approved by their advisory committee. At least 24 credits, including thesis and research must be at the 600 level. Courses may be selected from electrical engineering and related fields. A thesis must be completed, carrying a maximum of 12 credits.

Candidates for the M.S. degree in electrical engineering must pass a department-administered comprehensive examination and an oral thesis presentation and defense.

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## *English Department*

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203 Fine Arts/Theater, University of Alaska Fairbanks, Fairbanks, AK 99775-5720 (907) 474-7193

### **Degrees: M.A. and M.A.T. in *English*, M.F.A. in *Creative Writing***

The Department of English offers three graduate degrees. The Master of Arts in English focuses on scholarly research in British and American literature. The Master of Fine Arts degree centers on the writing of original, imaginative work in poetry, fiction, drama and/or non-fiction. The Master of Arts in Teaching degree is currently suspended and no students are being accepted into this program at this time. The Master of Arts in Professional Writing, formerly offered by the English Department, is now the Master of Arts in Professional Communication. For degree requirements and course descriptions, refer to the Communication and Journalism-Broadcasting sections of this catalog.

After being admitted to one of the degree programs, a graduate student may apply for one of the department's teaching assistantships. All the degree programs require students to take graduate literature courses and to engage in research and writing. Master of Arts in English candidates write theses in literary scholarship; Master of Fine Arts candidates write original creative works as theses.

### ***Faculty***

- Banerjee, Debjani--1995--Post-colonial literature and theories; non-Western literature; twentieth-century British literature; Women's Studies. Visiting Assistant Professor; SUNY-Stony Brook '95, Ph.D. (expected).
- Bartlett, Dorisann--1982--Ancient, medieval and renaissance studies; traditional Alaska Native literature. Instructor; University of Oregon '77, Ph.D.; '81, M.A.
- Bird, Roy K.--1984--American literature; literary criticism. Professor; William Marsch Rice University '82, Ph.D.
- Blalock, Susan Elizabeth--1986--British literature; narrative theory. Assistant Professor; University of Texas '83, Ph.D.
- Box, Mark A.--1990--Seventeenth-and eighteenth-century British literature; Romantic-era British literature. Associate Professor; Oxford University '85, D. Phil.
- Cooper, Burns--1990--Linguistics; poetry; poetics. Assistant Professor; University of Texas '89, Ph.D.
- Corti, Lillian--1991--Comparative literature; African studies; psychoanalytic theory. Assistant Professor; The Graduate School of the City University of New York '84, Ph.D.
- Dupras, Joseph A.--1979--Nineteenth-century British literature; literary criticism. Professor; State University of New York at Binghamton '75, Ph.D.
- Heyne, Eric--1986--American literature; critical theory; literary nonfiction. Associate Professor; Ohio State University '84, Ph.D.
- Lull, Janis--1986--Shakespeare; English renaissance; poetry. Professor; University of Minnesota '83, Ph.D.

Manfredi, Renee--1994--Creative writing - fiction. Assistant Professor; Indiana University '91, M.F.A.

Morgan, John--1976--Creative writing; contemporary literature. Professor; University of Iowa '67, M.F.A.

Ruppert, James--1981--Native American literature; American literature; northern studies. Associate Professor; University of New Mexico '81, Ph.D.

Schuldiner, Michael--1980--Early American literature. Professor; Kent State University '79, Ph.D.

Shumaker, Peggy--1979--Poetry; creative writing; contemporary literature; Latin American literature. Professor; University of Arizona '79, M.F.A.

Soos, Frank--1986--Creative writing - fiction. Associate Professor; University of Arkansas '81, M.F.A.

Stark, David--1971--Creative writing - fiction, poetry, drama. Professor; University of California, Irvine '69, M.F.A.

Stern, Katherine--1992--Comparative literature; feminist theory; literature and performing arts. Assistant Professor; Princeton University '90, Ph.D.

Stratton, Russell E.--1983--Medieval literature; Chaucer; M.S. editing. Professor; University of Southern Mississippi '79, Ph.D.

Walker, Cynthia--1977--Twentieth-century literature; nineteenth-century British literature; American literature to the civil war. Associate Professor; Purdue University '74, Ph.D.; Department Head.

Worley, Joan--1990--Composition/rhetoric; comparative literature; film. Assistant Professor; Ohio University '83, Ph.D.

## **Departmental Degrees:**

### **English**

#### **English -- M.A. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination based on a standardized reading list; the examination is to be taken no later than the student's third semester of work. The examination will be held on the Saturday ending the fourth full week of classes.
3. Students may advance to candidacy when their advisory committee deems that they have made satisfactory progress toward completion of their degree.
4. Pass an oral defense of the thesis.

##### **Course Requirements (30 credits):**

Complete a minimum of 30 approved credits on the 600 level, distributed as follows:

|   |         |
|---|---------|
| Required Courses (6 credits).....   | Credits |
| ENGL 601--Bibliography, Meth., and Criticism.....   | 3       |
| ENGL 685--Teaching College Composition<br>(if a teaching assistant or planning to teach)..... | 3       |
| (Extra 600-level course required if student does not take ENGL 685.)                          |         |
| Electives (18 credits).....   | 18      |

To maximize breadth of study, M.A. students and their advisors will draft individualized courses of study with the following program requirements in mind. The advisor will direct students to courses covering the required areas, subject to particular exemptions based upon undergraduate coursework. Exemptions and any subsequent revisions of the course of study must have the agreement of the advisor and department head. Plans can be revised to substitute an appropriate seminar for one of the courses listed below.

##### **Choose three (9 credits):**

ENGL 603--Studies in British Literature: Old and Middle English  
 ENGL 604--Studies in British Literature: Renaissance & 17th Century  
 ENGL 606--Studies in British Literature: Restoration & 18th Century  
 ENGL 607--Studies in British Literature: 19th Century

Choose one (3 credits):

- ENGL 609--Early American Literature
- ENGL 611--Nineteenth Century American Literature
- ENGL 612--Studies in American Literature: 20th Century

Choose one (3 credits):

- ENGL 608--Studies in British Literature: 20th Century
- ENGL 615--Contemporary Literature
- A seminar in contemporary or comparative literature

Thesis (6 credits)

- ENGL 699--Thesis.....6

NOTE: The English Department requires that a student receive a grade of "A" or "B" for all 600 level courses that a student wishes to apply toward this degree program.

## Creative Writing

### Creative Writing - M.F.A. Degree

#### Degree Requirements:

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination, based on a standardized reading list; examination to be taken no later than student's fourth semester of work. Examination will be held on the Saturday ending the fourth full week of classes.
3. Students may advance to candidacy when their advisory committee deems that they have made satisfactory progress in both academic and writing areas.
4. Pass an oral defense of the thesis.

#### Course Requirements (45 credits)

Complete a minimum of 45 approved credits at the 600 level, except as noted under Electives, distributed as follows:

|   |         |
|---|---------|
| Required courses (15 credits) .....   | Credits |
| ENGL 671--Writer's Workshop .....   | 9       |
| ENGL 601--Bibliography, Meth., and Criticism.....   | 3       |
| ENGL 685--Teaching College Composition<br>(if a teaching assistant or planning to teach)..... | 3       |
| (Extra 600-level course is required if student does not take English 685)                     |         |
| Two of the forms courses (6 credits).....   | 6       |
| ENGL 681--Forms of Poetry   |         |
| ENGL 682--Forms of Fiction  |         |
| ENGL 683--Forms of Drama  |         |
| ENGL 684--Forms of Non-Fiction Prose  |         |
| Literature seminars (12 credits) .....  | 12      |
| (minimum of four; to be determined by student's advisory committee)                           |         |
| Electives (6 credits).....  | 6       |
| (to be approved by student's advisory committee)  |         |
| Thesis (6 credits)  |         |
| ENGL 699--Thesis.....   | 6       |

NOTE: The English Department requires that a student receive a grade of "A" or "B" for all 600 level courses that the student wishes to apply toward this degree program.

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# *Fisheries Department*

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School of Fisheries and Ocean Sciences (SFOS), University of Alaska Fairbanks, Fairbanks, AK 99775-1090 (907) 474-7289

Juneau Center School of Fisheries and Ocean Sciences (JC), 11120 Glacier Hwy, Juneau, AK 99801 (907) 789-4441

Fishery Industrial Technology Center (FITC), 900 Trident Way, Kodiak, AK 99615 (907) 486-1500

## **Degrees: M.S. and Ph.D. in Fisheries**

The graduate degree program in fisheries is administered through the School of Fisheries and Ocean Sciences (SFOS), with research locations in many areas of the state. Students attend classes and work with faculty in Juneau and/or Fairbanks, and academic programs can be developed in one of the following options:

Fisheries Management (Juneau/Fairbanks); Fish/Invertebrate Biology (Juneau/Fairbanks); Aquaculture (Juneau only)

The geographic location of UAF is advantageous for the study of interior Alaska aquatic habitats. A number of subarctic streams and lakes are within easy reach. Main access to the marine environment from Fairbanks is in Prince William Sound and Cook Inlet.

The Juneau Center SFOS (JC) houses the UAF Fisheries Program in southeast Alaska. The Juneau Center has well equipped labs, including both freshwater and seawater wet labs and computer labs. There is ready access to both marine and freshwater habitats, and it is located near the Auke Bay National Marine Fisheries Service Laboratory just north of Juneau. The Fishery Industrial Technology Center (FITC) is located in Kodiak. It has new facilities for work in harvest technology, seafood technology, seafood biochemistry, and microbiology.

Research assistantships are available; applicants should contact the Fisheries Program at SFOS for further information and application forms.

## **Faculty**

Barber, Willard -- 1976 -- General biology and ecology of fishes; fisheries management. Associate Professor; Michigan State University '70, Ph.D. (Fairbanks)

Choudhury, Gour S. -- 1990 -- Food extrusion; by-product utilization; unit operations. Assistant Professor; University of Alberta '87, Ph.D. (Kodiak)

Crapo, Charles A. -- 1983 -- Food technology; seafood product quality. Associate Professor, Oregon State University '83, M.S. (Kodiak)

Fagen, Robert -- 1982 -- Applied mathematics and statistics in fisheries; animal behavior; dance and choreographic theory. Associate Professor; Harvard University '74, Ph.D. (Juneau)

French, John S. -- 1980 -- Protein and lipid chemistry; postmortem biochemical changes in fish and shellfish; environmental effects on seafood quality. Associate Professor; University of Michigan '79, Ph.D. (Kodiak)

Gard, Richard -- 1975 -- Salmon biology; marine mammal biology. Professor Emeritus; University of California, Berkeley '58, Ph.D. (Juneau)

Gharrett, A.J. -- 1976 -- Fishery genetics; population genetics and evolution; and molecular genetics. Professor; Oregon State University '75, Ph.D. (Juneau)

Haldorson, Lewis J. -- 1980 -- Fisheries biology; larval fish ecology; demersal fish. Associate Professor; University of California, Santa Barbara '78, Ph.D. (Juneau)

Himelbloom, Brian H. -- 1987 -- Food microbiology; microbial enzymology; marine microbiology. Associate Professor; North Carolina State University '85, Ph.D. (Kodiak)

- Mathisen, Ole A. -- 1983 -- Salmon biology and management; Bering Sea ecosystem; hydroacoustic assessment of biomass. Professor; University of Washington '55, Ph.D. (Juneau)
- Quinn II, Terrance J. -- 1985 -- Animal population dynamics; biometrics; sampling biological populations. Associate Professor; University of Washington '80, Ph.D. (Juneau)
- Reynolds, James B. -- 1978 -- Ecology and management of freshwater fisheries and habitat. Associate Professor; Iowa State University '66, Ph.D. (Fairbanks)
- Shirley, Thomas C. -- 1987 -- Marine ecology; decapod crustacean biology; meiofauna-macrofauna interactions. Associate Professor; Louisiana State University '82, Ph.D. (Juneau)
- Smoker, William W. -- 1978 -- Pacific salmon biology; applied genetics. Associate Professor; Oregon State University '70, M.S.; '82, Ph.D. (Juneau)
- Stekoll, Michael S. -- 1978 -- Algal physiology; algal ecology; algal mariculture. Professor; University of California, Los Angeles '76, Ph.D. (Juneau)
- Tyler, Albert V. -- 1991 -- Fisheries oceanography; population dynamics of marine fish. Professor; University of Toronto '69, Ph.D.; Associate Dean, SFOS (Fairbanks)

### **Departmental Degrees:**

#### **Fisheries - M.S. Degree**

##### **Admission Requirements:**

1. Complete a personal statement concerning educational and career goals.
2. Fulfill all university application requirements.
3. Prerequisites: calculus, elementary statistics, ichthyology or invertebrate zoology, computer competency

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete a thesis and pass an oral defense of thesis and oral comprehensive examination.
3. Students working in subject areas involving significant non-English literature may be expected to read the appropriate foreign language.

##### **Course Requirements (30 credits)**

Complete a minimum of 30 credits, of which 24 credits must be at the 600 level.

Required courses (12-18 credits)..... Credits

STAT 401--Regression and Analysis of Variance.....4

Graduate seminars .....2

FISH 699--Thesis..... 6-12

Electives (12-18 credits) .....12-18

#### **Fisheries -- Ph.D. Degree**

##### **Admission Requirements:**

1. Have an earned master's degree in a fisheries-related field.
2. Complete a personal statement concerning educational and career goals.
3. Fulfill all university application requirements.

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete at least one year of full-time course work, as approved by the student's advisory committee.
3. Pass a written (plus sometimes an oral) comprehensive examination.
4. Complete a thesis exhibiting a substantial and original contribution to fisheries knowledge, and pass an oral defense of thesis.



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# *Geology and Geophysics Department*

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P.O. Box 755780, University of Alaska Fairbanks, Fairbanks, AK 99775-5780 (907) 474-7565

Degrees: M.S., M.A.T., and Ph.D. in *Geology*; M.S. and Ph.D. in *Geophysics*

Graduates in geology will have broad backgrounds in the earth sciences with firm foundations in mathematics, physics, and chemistry. Graduate programs are tailored around the special research and study interest of the student. In addition to courses in the geology and geophysics program, students should check the Mining and Geological Engineering Department and the Marine Science and Limnology Program for courses applicable to individual degree programs.

In addition to the facilities available directly through instructional programs, there are active research laboratories at UAF in the fields of seismology, volcanology, paleomagnetism, isotope geochronology, glaciology and ice physics. Other laboratories are also available in other divisions on campus, as listed under Research. There are approximately 40 professional geoscientists in residence on campus, and graduate students normally participate in the ongoing research of these professionals. The Alaska Quaternary Center provides students access to a core of scientists and a world-class polar regions library. A Quaternary studies interdisciplinary program of study and research is available in conjunction with other natural science departments on campus.

Teaching and research assistantships are available to graduate students in many of these areas.

## *Faculty*

- Beget, James -- 1984 -- Tephra; Quaternary; geomorphology. Associate Professor; University of Washington '81, Ph.D.
- Biswas, Nirenda -- 1971 -- Seismology. Professor; University of California Los Angeles '71, Ph.D.
- Christensen, Douglas -- 1988 -- Observational and theoretical seismology. Associate Professor; University of Michigan '87, Ph.D.
- Crowder, R. Keith -- 1983 -- Sedimentology; stratigraphy; geologic history. Associate Professor; University of Iowa '83, Ph.D.
- Echelmeyer, Keith A. -- 1984 -- Glaciology and ice physics. Associate Professor; California Institute of Technology '83, Ph.D.
- Edwards, Mary E. -- 1989 -- Climate change; vegetation diversity; Quaternary. Associate Professor; Cambridge University '81, Ph.D.
- Eichelberger, John C. -- 1991 -- Volcanology; igneous petrology. Professor; Stanford University '74, Ph.D.
- Gangloff, Roland A. -- 1987 -- Invertebrate paleontology. Associate Professor; University of California, Berkeley '75, Ph.D.
- Hopkins, David M. -- 1985 -- Quaternary of the Bering Straits. Professor Emeritus; Harvard University '55, Ph.D.
- Keskinen, Mary J. -- 1984 -- Metamorphic petrology; geothermal energy; manganese-rich rocks. Associate Professor; Stanford University '79, Ph.D.
- Kienle, Juergen -- 1965 -- Volcanology; seismology and gravity. Professor; University of Alaska '69, Ph.D.
- Layer, Paul W. -- 1989 -- Geochronology; tectonics; paleomagnetism. Associate Professor; Stanford University '86, Ph.D.
- Newberry, Rainer J. -- 1982 -- Ore deposits; skarns; statistics and ore deposits. Professor; Stanford University '80, Ph.D.

Osterkamp, Thomas -- 1969 -- Permafrost; ice physics. Professor; Saint Louis University '68, Ph.D.

Pessel, Garnett H. -- 1987 -- Field geology; microcomputers. Instructor; California Institute of Technology '60, M.S.

Pulpan, Hans -- 1968 -- Seismology. Associate Professor; University of Illinois '68, Ph.D.

Severin, Kenneth P. -- 1990 -- Electron microprobe; biomineralization. Adjunct Assistant Professor; University of California Davis '87, Ph.D.

Stone, David B. -- 1966 -- Paleomagnetism; geomagnetism; tectonics. Professor; University of Newcastle Upon Tyne '63, Ph.D.

Stringer, William J. -- 1965 -- Remote sensing. Associate Professor; University of Alaska '71, Ph.D.

Triplehorn, Don M. -- 1969 -- Sedimentology; ash partings in coal; clay mineralogy. Professor; University of Illinois '61, Ph.D.

Wallace, Wesley K. -- 1985 -- Regional structure and tectonics; tectonic evolution. Professor; University of Washington '81, Ph.D.

Weeks, Wilford F. -- 1986 -- Geophysics of sea ice. Professor; University of Chicago '56, Ph.D.

Wescott, Eugene -- 1958 -- Exploration geophysics. Professor; University of Alaska Fairbanks '64, Ph.D.

## **Departmental Degrees:**

### **Geology**

#### **Geology -- M.S. Degree**

Students working on the M.S. in Geology can specialize in one of four options:

General geology  
Economic geology  
Petroleum geology  
Quaternary geology.

#### **Admission Requirements:**

1. The applicant is expected to have a background at least to the level of that listed for the relevant B.S. Option in Geology and Geophysics. However, deficiencies can be made up concurrently with the degree program.
2. Fulfill all university application requirements.

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination.
3. Write a thesis and pass an oral defense of thesis.

#### **Course Requirements:**

Complete a minimum of 30 credits, at least 24 of which must be at the 600 level, and at least 15 of which must be from course work (not thesis or research) at the 600 level. All courses in the program must be approved by the student's graduate advisory committee.

#### **General Geology Option:**

Complete the required program as arranged by conference with the graduate advisory committee. This program will include any course work necessary to provide the student with a background equivalent to the B.S. degree with a general geology option, including GEOS 417 and GEOS 418.

#### **Economic Geology Option:**

Complete 9 credits in applied geoscience with at least one course in mineral economics or engineering management.

**Petroleum Geology Option:**

Complete at least one course in each of the following areas (12 credits)..... 12

Advanced structural geology  
Advanced stratigraphy  
Advanced sedimentology  
Geophysics

Electives (6 credits) chosen from: .....6

GEOS 643--Sandstone Depositional Environments  
GEOS 644--Advanced Stratigraphy  
GEOS 645--Advanced Carbonate Sedimentology  
GEOS 646--Seismic Stratigraphy  
GEOS 647--Advanced Sedimentology

**Quaternary Geology Option:**

Complete 8 credits in Quaternary geology and at least one course in another area of Quaternary studies, as approved by the graduate advisory committee.

**Geology -- M.A.T. Degree**

Comply with UAF degree requirements. Complete a minimum of 36 credits. Contact the head of the department for further information.

**Geology -- Ph.D. Degree**

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete a comprehensive examination.
3. Complete at least 18 credits of thesis. Write a thesis and pass an oral defense of thesis.
4. Complete a required research program as arranged with the graduate advisory committee.

**Geophysics**

**Geophysics -- M.S. Degree**

**Admission Requirements:**

1. The applicant is expected to have a background at least to the level of the relevant B.S. Option in Geology and Geophysics. However, deficiencies can be made up concurrently with the degree program. Acceptance for the snow, ice, and permafrost geophysics option is open to students with strong physical science or engineering backgrounds.
2. Fulfill all university application requirements.

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination.
3. Write a thesis and pass an oral defense of thesis.

**Course Requirements:**

Complete a minimum of 30 credits, at least 24 of which must be at the 600 level, and at least 15 of which must be from course work (not thesis or research) at the 600 level. All courses in the program must be approved by the student's graduate advisory committee.

**Geophysics Core Requirements:** Complete two of the three following courses

PHYS 645--Fundamentals of Geophysical Fluid Dynamics  
GEOS 602--Geophysical Fields  
GEOS 620--Geodynamics

Solid-Earth Geophysics Option:

In addition to core requirements, complete 6 credit hours from the following list:

- GEOS 604--Intermediate Seismology
- GEOS 605--Geochronology
- GEOS 606--Volcanology
- GEOS 607--Advanced Paleomagnetism
- GEOS 608--Advanced Exploration Geophysics

Snow, Ice and Permafrost Geophysics Option:

In addition to core requirements, complete 6 credit hours from the following list:

- GEOS 614--Ice Physics
- GEOS 615--Sea Ice
- GEOS 616--Permafrost
- GEOS 617--Glaciers

**Geophysics -- Ph.D. Degree**

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete a comprehensive examination.
3. Complete at least 18 credits of thesis. Write a thesis and pass an oral defense of thesis.
4. Complete required research program as arranged with the graduate advisory committee.

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## ***Marine Sciences and Limnology Program***

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230 Irving II, University of Alaska Fairbanks, Fairbanks, AK 99775-7220 (907) 474-7289

**Degrees:** M.S. in *Marine Biology*; Interdisciplinary Ph.D. in *Marine Biology*;  
M.S. and Ph.D. in *Oceanography* (biological, chemical, fisheries,  
geological, and physical)

The Marine Sciences and Limnology Program provides academic opportunities for students seeking M.S. and Ph.D. degrees in oceanography and marine biology. Students in the M.S. and Ph.D. programs are expected to complete a core curriculum in marine sciences, including courses in biological, chemical, fisheries, geological, and physical oceanography or marine biology. Students also select from a wide range of courses offered within the School or by other UAF programs to assure a high level of competence in their major area of interest.

Research is the major emphasis of both the M.S. and Ph.D. programs. Many challenging research problems are available under the supervision of the faculty of the School of Fisheries and Ocean Sciences. Faculty and student research addresses broad questions (e.g., global climatic change), as well as problems specific to the Alaskan and arctic regions. Research laboratories are located at the Institute of Marine Science in Fairbanks, the Juneau Center, the Fishery Industrial Technology Center at Kodiak, and the Seward Marine Center. Facilities include an excellent seawater system and "wet" laboratory at Seward and a variety of modern analytical instruments in Fairbanks, including mass spectrometers, gas and liquid chromatographs, a flow cytometer, and devices for measuring low levels of radioisotopes. Mainframe and microcomputing facilities are readily available to graduate students.

Coastal and nearshore field research is based at the Seward facility and at the Kasitsna Bay Laboratory near Homer. Offshore work is supported by the research vessels R/V ALPHA HELIX, which has open ocean capability and operates in the Gulf of Alaska and the Bering Sea, and the R/V LITTLE DIPPER, which operates in Resurrection Bay. Alaska's lakes and ponds provide a plethora of field sites for limnological studies.

Applicants are evaluated by Program faculty based on their academic record, national test scores, research experience, or other evidence of ability to successfully complete a graduate degree

program. Qualified applicants are admitted if the Program in Marine Sciences and Limnology can meet their educational needs. Applications are considered throughout the year but students should apply by March 1 to have the best chance for admission and financial support for the subsequent Fall semester. Stipends, including research and teaching assistantships, are awarded on a competitive basis. Prospective students should contact the Program for further information.

### **Faculty**

- Alexander, Vera -- 1962 -- Biological oceanography; limnology; nitrogen dynamics. Professor; University of Alaska '65, Ph.D.; Dean, SFOS.
- Button, Don K. -- 1964 -- Microbial growth kinetics; transport mechanisms; hydrocarbon metabolism. Professor; University of Wisconsin '61, M.S.; '64, Ph.D. (Chemistry Dept./IMS)
- Castellini, Michael -- 1989 -- Marine mammals; diving physiology; biochemical adaptation. Associate Professor; Scripps Institute of Oceanography '81, Ph.D.
- Cooney, T. Theodore -- 1970 -- Marine ecology; biological and fisheries oceanography; marine acoustics. Professor; University of Washington '71, Ph.D.
- Ebbesson, Sven -- 1985 -- Changes in brain circuitry and neurotransmitters with aging. Professor; University of Maryland '64, Ph.D.
- Elsner, Robert -- 1973 -- Marine mammals; diving physiology; research ships. Professor Emeritus; University of Washington '59, Ph.D.
- Eslinger, David -- 1992 -- Phytoplankton ecology, biological and physical interactions, remote sensing and numerical modeling. Assistant Professor; Florida State University '90, Ph.D.
- Feder, Howard M. -- 1970 -- Intertidal biology; benthic ecology; feeding biology of marine invertebrates. Professor Emeritus; Stanford University '57, Ph.D.
- Finney, Bruce P. -- 1991 -- Paleooceanography; paleoclimatology; sedimentary processes. Assistant Professor; Oregon State University '86, Ph.D.
- Goering, John J. -- 1962 -- Biological oceanography; marine ecology; nutrient cycling. Professor; University of Wisconsin '62, Ph.D.
- Henrichs, Susan M. -- 1982 -- Chemical oceanography; biogeochemistry; organic chemistry. Professor; Massachusetts Institute of Technology/Woods Hole Oceanographic Institute '80, Ph.D., Program Head.
- Highsmith, Raymond -- 1983 -- Community ecology; population biology; reproduction and behavior of marine invertebrates. Professor; University of Washington '79, Ph.D.
- Johnson, Mark A. -- 1991 -- High latitude oceanography; numerical modeling; bio-physical modeling. Assistant Professor; Texas A & M University '87, Ph.D.
- Kelley, John -- 1971 -- Sea ice; air-sea-gas transfer; marine acoustics; atmospheric chemistry. Professor; University of Nagoya, Japan '74, Ph.D.
- Kowalik, Zygmunt -- 1981 -- Physical oceanography, numerical modeling, tides, storm surges, tsunamis, currents. Professor; Institute of Water Engineering, Polish Academy of Sciences, Gdansk '65; Ph.D.
- McRoy, Peter C. -- 1969 -- Marine ecology; biological oceanography. Professor; University of Alaska Fairbanks '70, Ph.D.
- Musgrave, David L. -- 1974 -- Physical oceanography; biogeochemical oceanography. Assistant Professor; University of Alaska Fairbanks '83, Ph.D.
- Naidu, A. Sathy -- 1969 -- Geological oceanography; arctic sedimentary processes; paleooceanography. Professor; Andhra University '68, Ph.D.
- Niebauer, Henry J. -- 1976 -- Polar oceanography; physical oceanography; bio-physical oceanography. Professor; University of Wisconsin '76, Ph.D.
- Norcross, Brenda L. -- 1989 -- Fisheries oceanography; fisheries ecology. Assistant Professor; College of William and Mary '83, Ph.D.
- Paul, Augustus J., III -- 1971 -- Biological oceanography and physiology and bioenergetics of fish and invertebrate species. Associate Professor; Hokkaido University '87; Ph.D.
- Plumley, F. Gerald -- 1988 -- Photosynthesis; algal biotechnology. Associate Professor; University of Georgia '83, Ph.D.
- Royer, Thomas C. -- 1969 -- Physical oceanography; ocean circulation; air-sea interactive. Professor; Texas A & M University '69, Ph.D.

- Schell, Donald -- 1976 -- Marine ecology; nutrient dynamics; stable and radioisotope techniques. Professor; University of Alaska Fairbanks '71, Ph.D.
- Shaw, David G. -- 1971 -- Marine pollution; organic biogeochemistry; marine policy. Professor; Harvard University '71, Ph.D.
- Smith, Ronald L. -- 1968 -- Fish energetics; nearshore marine fishes. Professor; University of Miami '68, Ph.D. (IMS/Biology and Wildlife)
- Springer, Alan M. -- 1988 -- Marine ecology; seabird ecology and fisheries oceanography. Research Assistant Professor; University of Alaska Fairbanks '88, Ph.D.
- Weingartner, Thomas J. -- 1993 -- High latitude work in ice covered waters focusing in the Bering-Chukchi region. Assistant Professor; North Carolina State University '89, Ph.D.

## **Departmental Degrees:**

### **Marine Biology**

The M.S. and Interdisciplinary Ph.D. in marine biology focus on marine organisms. There is some overlap with biological oceanography but the latter focuses on how biological processes influence and are influenced by the ocean environment. Students may select courses offered by the Graduate Program in Marine Sciences and Limnology, the Fisheries Program, the Biology and Wildlife Department and the Chemistry and Biochemistry Department. Faculty from each of these programs or departments may serve on or chair a student's Interdisciplinary Marine Biology Ph.D. committee, depending on the expertise required to direct the thesis research.

Graduate students are afforded excellent opportunities for laboratory and field research through the Institute of Marine Science at Fairbanks, the Seward Marine Center, the Juneau Center, the Fishery Industrial Technology Center at Kodiak, and at a number of coastal field sites including Kasitsna Bay Laboratory near Homer. Opportunities for field work are available on the R/V ALPHA HELIX which operates in the North Pacific Bering Sea and on the R/V LITTLE DIPPER which operates in Resurrection Bay.

Students are admitted to the Graduate Program in Marine Sciences and Limnology on the basis of their ability and the capability of the program to meet their particular interests and needs. Applications are considered throughout the year but students should apply by March 1 to have the best chance for admission and financial support for the subsequent Fall semester. Assistantship stipends are awarded competitively, and some fellowship support is available. Most students are supported on research projects that relate directly to their degree research.

### **Marine Biology -- M.S. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination.
3. Complete a thesis and pass an oral defense of the thesis.

#### **Course Requirements (30 credits):**

Complete a minimum of 30 credits; at least 24 credits, including thesis and/or research, must be at the 600 level.

| Required courses (12 credits) .....                     | Credits |
|---|---------|
| MSL 610--Marine Biology.....                            | 3       |
| MSL 615--Physiology of Marine Organisms.....            | 3       |
| or:MSL 664--Algal Biology.....                          | 3       |
| or:MSL 665--Microbial Biochemistry .....                | 3       |
| MSL 650--Biological Oceanography .....                  | 3       |
| MSL 651--Biology & Ecology of Marine Invertebrates..... | 5       |
| or:MSL 611--Field Problems in Marine Biology.....       | 5       |
| or:an equivalent field course at another institution    |         |
| MSL 692--Seminar.....                                   | 3       |

## ***Marine Biology -- Interdisciplinary Ph.D. Degree***

The doctoral degree is awarded for proven ability and scholarly attainment, and each candidate's program is planned with a graduate advisory committee. There are no fixed course requirements, nor is an M.S. degree required, to earn the Ph.D. degree. However, a candidate for the Ph.D. degree in the Marine Sciences program will be expected to have completed course work at least equivalent to that required for the M.S. degree. Students must comply with UAF degree requirements. (See the Graduate School for application requirements.)

## ***Oceanography***

Oceanography is both interdisciplinary and multidisciplinary. For both M.S. and Ph.D. oceanography students, research emphasis is on processes influencing the ocean's circulation, composition, biological productivity, and geology. Students considering graduate study in oceanography should have a strong background in one of the sciences (physics, chemistry, biology, geology, mathematics) and a working familiarity with the others. The Graduate Program in Marine Sciences and Limnology offers M.S. degrees in several areas of oceanography (biological, chemical, fisheries, geological, physical). Limnological research projects may also be undertaken within the oceanography degree. Students are admitted to the Graduate Program in Marine Sciences and Limnology on the basis of their ability and the capability of the program to meet their particular interests and needs. Applications are considered throughout the year but students should apply by March 1 to have the best chance for admission and financial support for the subsequent Fall semester. Assistantship stipends are awarded competitively and limited fellowship support is available. Most students are supported on research projects that relate directly to their degree research.

## ***Oceanography -- M.S. Degree***

### ***Degree Requirements:***

1. Comply with UAF degree requirements.
2. Pass a written comprehensive examination.
3. Complete a thesis and pass an oral defense of the thesis.
4. Oceanography majors must demonstrate field experience aboard an oceanographic vessel.

### ***Course Requirements (30 credits):***

Complete a minimum of 30 credits; at least 24 credits, including thesis and/or research, must be at the 600 level.

|   |         |
|---|---------|
| Required courses (12 credits) .....                   | Credits |
| MSL 620--Physical Oceanography.....                   | 3       |
| MSL 630--Geological Oceanography.....                 | 3       |
| MSL 650--Biological Oceanography .....                | 3       |
| MSL 660--Chemical Oceanography .....                  | 3       |
| Seminar (3 credits)                                   |         |
| MSL 692--Seminar.....                                 | 3       |
| Fisheries Oceanography option:                        |         |
| MSL 640--Fisheries Oceanography.....                  | 3       |
| and MSL 620, 630, 650, 660, and 3 credits of seminar. |         |

## ***Oceanography -- Ph.D. Degree***

The doctoral degree is awarded for proven ability and scholarly attainment, and each candidate's program is planned with a graduate advisory committee. There are no fixed course requirements, nor is an M.S. degree required to earn the Ph.D. degree. However, a candidate for the Ph.D. degree in the Marine Sciences program will be expected to have completed course work at least equivalent to that required for the M.S. degree. Students must comply with UAF degree requirements.

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# Mathematical Sciences Department

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Chapman Building, University of Alaska Fairbanks, Fairbanks, AK 99775-6660 (907) 474-7332

**Degrees:** M.S., M.A.T., and Ph.D. in *Mathematics*; M.S. in *Computer Science*

The number of new fields in which professional mathematicians find employment grows continually. Various programs are offered by the Department of Mathematical Sciences. Options exist for those who are planning careers in industry, government, or education.

Admission to any graduate program within the Department of Mathematical Sciences requires the GRE general and subject exam. For teaching assistantship consideration, foreign applicants whose native language is not English must submit a TOEFL score of at least 600, and the department is currently giving preference to those applicants who also submit results of the Test of Spoken English (TSE.).

## *Faculty*

- Barry, Ronald -- 1991 -- Experimental design; spatial statistics. Assistant Professor; University of California, Irvine '91, Ph.D.
- Cooper, Charles -- 1990 -- Topology; differential geometry and topology; geometric topology; dimension theory. Assistant Professor; University of Oklahoma '90, Ph.D.
- Coutant, Basil -- 1990 -- Set theoretic topology. Assistant Professor; Ohio University '90, Ph.D.
- Ensign, Elaine C. -- 1982 -- Calculus; geometry; history of mathematics; number theory. Instructor; University of Wisconsin '55, M.S.
- Gatterdam, Ronald W. -- 1982 -- Computer Science; computability; complexity; combinatorial group theory. Professor; University of California, Irvine '70, Ph.D.
- Getz, Marty -- 1981 -- Calculus; number theory. Instructor; University of Alaska Fairbanks '72, M.S.
- Gimbel, John -- 1987 -- Graph theory; combinatorics; order. Professor; Western Michigan University '84, Ph.D.
- Gislason, Gary A. -- 1970 -- Approximation theory; numerical analysis; distance and telegraphic instruction. Professor; University of Oregon '70, Ph.D.
- Jiang, T. Ming -- 1988 -- Computer Science; database; knowledge base; distributed systems. Associate Professor; University of Illinois at Chicago '88, Ph.D.
- Kendrick, Charles T. -- 1990 -- Computer Science; programming language theory; machine learning. Associate Professor; Washington State University '71, Ph.D.
- Knoke, Peter J. -- 1988 -- Software engineering, computer networks, multimedia systems. Associate Professor; Syracuse University '68, Ph.D., P.E.
- Lambert, John P. -- 1982 -- Uniformly distributed sequences; Monte Carlo methods; mathematical modeling. Professor; Claremont Graduate School '82, Ph.D.
- Lando, Clif -- 1969 -- Differential equations; operations research. Department Head and Associate Professor; Rutgers University '69, Ph.D.
- Nance, Kara -- 1993 -- Database; knowledge base; operating systems. Assistant Professor; University of Oklahoma '91; Ph.D.
- Piacenza, Robert J. -- 1977 -- Algebraic topology; category theory. Professor; University of Miami '76, Ph.D.
- Quang, Pham X. -- 1985 -- Theoretical statistics; sampling designs. Associate Professor; University of California, Berkeley '74, Ph.D.
- Roth, Mitchell -- 1983 -- Computer Science; computer graphics; systems programming; simulation. Associate Professor; University of Illinois '80, Ph.D.
- Royer, Susan B. -- 1970 -- Mathematics education. Assistant Professor; Texas A & M University '69, M.S.
- Santoni, Larry -- 1988 -- Commutative algebra. Assistant Professor; University of Michigan '88, Ph.D.



Tape, Walter -- 1982 -- Atmospheric optics. Associate Professor; University of Michigan '68, Ph.D.

Thomas, Dana L. -- 1981 -- Experimental design; simultaneous inference; design and analysis of resource selection studies. Associate Professor; Oregon State University '82, Ph.D.

### **Departmental Degrees:**

#### **Mathematics**

The M.S. in mathematics is designed to give capable students the preparation necessary for Ph.D. level work, in addition to providing a terminal degree for those planning to enter industry or education. The M.A.T. degree provides for teaching secondary school mathematics. The aim of the doctoral program is to provide the student with the expertise to accomplish significant research in applied or pure mathematics, as well as to provide a broad and deep professional education.

#### **Mathematics -- M.S. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Upon completion of core course work, the candidate must pass a comprehensive examination based on the core material.

##### **Course Requirements (30-35 credits):**

Complete a curriculum of 30-35 credits of mathematics courses consisting of a core, electives, and a project or a thesis. At least 24 credits, including thesis and/or research must be at the 600 level.

#### **Mathematics -- M.A.T. Degree**

##### **Degree Requirements:**

Comply with UAF degree requirements.

##### **Course Requirements (36 credits):**

Complete 36 credits in courses approved by the student's graduate committee, including at least 18 credits in mathematics. At least 24 credits (12 credits in mathematics), including thesis and/or research, must be at the 600 level.

#### **Mathematics -- Ph.D. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Complete the required program as arranged by conference with the candidate's graduate advisory committee.

#### ***Computer Science***

The computer science program is administered by the Department of Mathematical Sciences within the College of Liberal Arts. Computer science is the study of information handling and its application to the problems of the world. Computing is widely used in support of activities in science, engineering, business, law, medicine, education, and the social sciences. The potential for employment is one of the highest in the entire range of subjects spanned by the College of Liberal Arts.

One track of the M.S. Degree, the TECHNICAL track, follows the recommendations of the Association for Computing Machinery (ACM) and the Institute for Electrical and Electronic Engineering (IEEE). A second track, the SOFTWARE ENGINEERING track, is also available. This track is derived in part from recommendations of Carnegie Mellon University's Software Engineering Institute.

The intent of the M.S. degree in computer science is to provide breadth and depth in course work and to culminate with a major unifying project. The TECHNICAL track is accessible to students who have completed a B.S. in C.S. at most institutions. Students from other universities who have completed a substantive portion of a Bachelors level computer science program may be admitted to the M.S. program. In such cases, undergraduate courses may be required to remedy deficiencies. The

SOFTWARE ENGINEERING track is intended for software practitioners with a Bachelor's degree and at least two years of relevant experience.

For admission to the MS Computer Science program, both tracks require the GRE general exam. The TECHNICAL track requires the GRE Computer Science subject exam in addition. For teaching assistantship consideration, foreign applicants whose native language is not English must submit a TOEFL score of at least 600, and the department is currently giving preference to those applicants who also submit results of the Test of Spoken English (TSE).

### **Computer Science -- M.S. Degree**

#### **Degree Requirements: (Both Tracks)**

1. Comply with UAF degree requirements.
2. Upon completion of core course work, the candidate must pass a comprehensive examination based on the core material.

#### **Course Requirements - Technical Track (30 credits):**

Complete the following requirements. At least 24 credits must be at the 600 level.

##### **Required Courses (12 credits)..... Credits**

CS 631--Programming Language Implementation.....3

CS 411--Analysis of Algorithms or

CS 611--Complexity of Algorithms or

CS 451--Automata and Formal Languages or

CS 651--The Theory of Computation..... 3

CS 448--System Architecture or

CS 641--Advanced System Architecture .....3

CS 671 --Software Engineering..... 3

Approved electives (12 credits)..... 12

Seminar and Project (6 credits)

CS 690-691--Graduate Seminar and Project.....6

#### **Course Requirements - Software Engineering Track (30 credits):**

Complete the following requirements. At least 24 credits must be at the 600 level.

##### **Required Courses (15 Credits)..... Credits**

CS 670--Computer Science for Software Engineers.....3

CS 671--Software Engineering.....3

CS 402--Senior Project and Professional Practice or

ESM 609 -- Project Management.....3

ESM 608 -- Legal Principles for Engineering Mgmt or

BA 604 -- The Legal Environment of Business.....3

Approved Electives (12 Credits)..... 12

Seminar and Project (6 Credits)

CS 690-691 -- Graduate Seminar and Project.....6

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## ***Mechanical Engineering Department***

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337 Duckering, University of Alaska Fairbanks, Fairbanks, AK 99775-5900 (907) 474-7209

### **Degree: M.S. in *Mechanical Engineering***

Mechanical engineers conceive, plan, design and direct the manufacturing, distribution and operation of a wide variety of devices, machines and systems for energy conversion, environmental control, materials processing, transportation, materials handling and other purposes. Mechanical engineers are engaged in creative design, basic and applied research, development and management. A master's degree in mechanical engineering also frequently forms a base for entering law, medical or business school.

Because of the unique location of the University of Alaska Fairbanks, special emphasis is placed on cold regions engineering problems. This fact is highlighted in the mechanical engineering program by the technical elective, arctic engineering.

## ***Faculty***

- Das, Deben K. -- 1984 -- Fluid mechanics; heat transfer; cold weather engineering and testing. Professor; University of Rhode Island '83, Ph.D.
- Goering, Douglas J. -- 1989 -- Fluid mechanics; heat transfer; environmental transport. Assistant Professor; University of California, Berkeley '89, Ph.D.
- Johnson, Ronald A. -- 1976 -- Fluid mechanics; energy systems; air pollution; water and wastewater treatment. Professor; Cornell University '69, Ph.D.; P.E.; Department Head.
- Lee, Jonah H. -- 1984 -- Theoretical and experimental solid mechanics; finite element methods. Professor; Iowa State University '83, Ph.D.; Graduate Program Coordinator.
- Lin, Chuen-Sen -- 1990 -- Machine design; Computer Aided Design (CAD); vibrations. Assistant Professor; University of Minnesota '88, Ph.D.
- McFadden, Terry -- 1974 -- Arctic engineering; heat transfer and thermal systems; permafrost foundations; housing research. Professor; University of Alaska '74, Ph.D.; P.E.
- Zarling, John P. -- 1976 -- Heat transfer; energy analysis. Professor; Michigan Technological University '71, Ph.D.; P.E.

## **Departmental Degrees:**

### **Mechanical Engineering**

#### **Mechanical Engineering -- M.S. Degree**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination.
3. Write a research thesis or project and pass an oral defense.

##### **Course Requirements (30 credits):**

Complete the following program (major) requirements:

Mathematics Core - at least two of the following (6-8 credits) 6-8

MATH 421--Vector Analysis

MATH 422--Partial Differential Equations

MATH 423--Applied Mathematics

MATH 310--Numerical Analysis

Any 600 level mathematics course

Mechanical Engineering Core - at least four of the following (12 credits)..... 12

ME 601--Finite Element Analysis in Engineering

ME 604--Experimental Mechanics

ME 617--Power Analysis

ME 631--Advanced Mechanics of Materials

ME 634--Advanced Materials Engineering

ME 641--Advanced Fluid Mechanics

ME 642--Advanced Heat Transfer

ME 685--Arctic Heat and Mass Transfer

Electives (6 credits).....6

Any ME or other engineering, science, or mathematics graduate courses approved by the student's advisory committee.

Thesis (6 credits)

ME 699--Thesis .....6

##### **Non-Thesis Option:**

Required courses (above)..... 18

Electives (9 credits).....9

Special Project (3 credits)

ME 698--Project.....3

NOTE: All students must take at least one course in the mechanical systems sequence (ME 604, 631, 634) and one from the fluids/thermal science sequence (ME 641, 642).

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## *Mining and Geological Engineering Department*

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206 Brooks, School of Mineral Engineering, University of Alaska Fairbanks, P.O. Box 755800, Fairbanks, AK 99775-5800 (907) 474-7388

**Degrees:** M.S. in *Geological Engineering*; M.S. in *Mining Engineering*; M.S. in *Mineral Preparation Engineering*

The Department of Mining and Geological Engineering has statewide responsibility for academic instruction in the fields of geological engineering and mining engineering. The objectives of the department are to prepare students for their places as contributive citizens and for professional careers in the geotechnical and mineral industries.

Programs leading to a Master of Science degree are offered in mining engineering, geological engineering, and mineral preparation engineering.

The professional degree Engineer of Mines (E.M.) may be earned by engineering graduates of the school.

Research and teaching assistantships are available on a competitive basis. Contact the department for further information.

### ***Faculty***

- Bandopadhyay, Sukumar -- 1982 -- Operations Research; mine ventilation; arctic mining. Professor; Pennsylvania State University '82, Ph.D.; P.E., Department Head.
- Chen, Gang -- 1993 -- Rock mechanics; ground control. Assistant Professor; Virginia Polytechnic Institute & State University '89, Ph.D.; P.E.
- Huang, Scott L. -- 1981 -- Geomechanics; image processing; strata control. Professor; University of Missouri - Rolla '81, Ph.D.
- Johansen, Nils I. -- 1971 -- Geotechnical engineering; permafrost; engineering education. Professor; Purdue University '71, Ph.D.; P.E.
- Lin, Hsing K. -- 1986 -- Hydrometallurgy; mineral processing; electrochemistry. Associate Professor; University of Utah '85, Ph.D.
- Metz, Paul A. -- 1975 -- Mineral exploration; mine evaluation; mineral economics. Associate Professor; Imperial College of Science Technology and Medicine '91, Ph.D.
- Nelson, Michael G. -- 1989 -- Mine automation; gold metallurgy; mine waste management. Associate Professor; West Virginia University '89, Ph.D.
- Ogunsola, Olayinka -- 1991 -- Coal preparation; fuel science and technology. Research Assistant Professor; Pennsylvania State University '83, Ph.D.
- Speck, Robert C. -- 1984 -- Geological engineering; hydrogeology; geomechanics. Professor; University of Missouri - Rolla '79, Ph.D.
- Swainbank, Richard -- 1990 -- Mineral exploration; mineral economics. Adjunct Associate Professor; University of Alaska Fairbanks '71, Ph.D.
- Walsh, Daniel E. -- 1982 -- Mineral processing engineering; gold recovery; plant design. Associate Professor; University of Alaska Fairbanks '85, M.S.; P.E.

### **Departmental Degrees:**

#### **Geological Engineering**

Geological engineering is a branch of engineering dealing with specialized applications of geology in that it deals primarily with earth materials. Properties of soil and rock materials, exploration activities, remote sensing, geotechnical engineering, site investigations and engineering geology are all phases of geological engineering. Geological engineers use geological techniques and reasoning and the knowledge of geological processes to assess site conditions.

The Master of Science in Geological Engineering degree requirements are tailored to fit student's professional goals. Electives courses are subject to approval by the student's advisory committee.

University policies pertaining to graduate study leading to a master's degree apply as approved by the student's advisor and the Department of Mining and Geological Engineering faculty.

### **Geological Engineering -- M.S. Degree**

#### **Degree Requirements:**

Comply with UAF degree requirements.

#### **Course Requirements (30-33 credits):**

Complete the following program requirements, as approved by the graduate advisory committee; at least 24 credits must be at the 600 level.

##### **Thesis Option (30 credits)..... Credits**

Geological Engineering courses and technical electives 19-22

GE 692--Graduate Seminar .....2

GE 699--Thesis.....6-9

##### **Non-thesis Option (33 credits)**

Geological Engineering courses and technical electives 25-28

GE 692--Graduate Seminar .....2

GE 698--Research/Project .....3-6

### **Mining Engineering**

In the mining engineering curriculum, particular emphasis is placed upon engineering as it applies to the exploration and development of mineral resources and upon the economics of the business of mining. The program allows the student the choice of technical electives to develop specialization in areas of exploration, mining or mineral beneficiation.

The graduate program leads to the Master of Science degree in mining engineering. The curriculum consists of required and elective course work as outlined below. University policies pertaining to graduate study leading to a master's degree apply as approved by the student's advisor and the Mining Engineering faculty.

### **Mining Engineering -- M.S. Degree**

#### **Degree Requirements:**

Comply with UAF degree requirements.

#### **Course Requirements (30-36 credits):**

Complete the following program requirements, as approved by the graduate advisory committee; at least 24 credits must be at the 600 level.

##### **Thesis Option (30 credits)..... Credits**

Mining Engineering 600-level courses..... 12

Technical electives ..... 11

MIN 688-689--Graduate Seminar.....1

MIN 699--Thesis.....6

##### **Non-thesis Option (36 credits)**

Mining Engineering courses..... 12

Technical electives ..... 17

MIN 688-689--Graduate Seminar.....1

MIN 698--Research/Project .....6

### **Mineral Preparation Engineering**

The mineral preparation engineering program offers the opportunity to specialize in the processes utilized in concentrating target minerals and in removing undesirable material from mined ore. Interdisciplinary combinations of chemistry, physics, the geological sciences, and engineering are integrated to allow the characterization, separation, agglomeration, extraction, and handling of mineral particles. Since large quantities of solid waste and process water are often produced as a result of mineral extraction, pollution control technology, also, is an important aspect of mineral preparation.

## **Mineral Preparation Engineering -- M.S. Degree**

### **Degree Requirements:**

Comply with UAF degree requirements.

### **Course Requirements (30 -36 credits)**

Complete the following degree and program requirements, as approved by the graduate advisory committee. At least 24 credits must be at the 600 level.

#### **Thesis Option (30 credits)..... Credits**

|  |    |
|--|----|
| MPR 601--Froth Flotation .....         | 3  |
| MIN 415--Coal Preparation.....         | 3  |
| MPR 606--Plant Design.....             | 3  |
| MPR 688--Seminar .....                 | 1  |
| Technical Electives (14 credits) ..... | 14 |
| MPR 699--Thesis.....                   | 6  |

#### **Non-thesis Option (36 credits)..... Credits**

|  |       |
|--|-------|
| MPR 601--Froth Flotation .....           | 3     |
| MIN 415--Coal Preparation.....           | 3     |
| MPR 606--Plant Design.....               | 3     |
| MPR 688--Seminar .....                   | 1     |
| Technical Electives (20-23 credits)..... | 20-23 |
| MPR 698--Research/Project.....           | 3-6   |

## ***Engineer of Mines -- E.M. Degree***

The graduate program also offers the professional degree, Engineer of Mines (E.M.). This degree may be conferred upon engineering graduates who present satisfactory evidence of continuous engagement in responsible engineering work for not less than five years and who write a satisfactory thesis.

### **Admission Requirements:**

1. The applicant must be a graduate from the School of Mineral Engineering, University of Alaska Fairbanks, with an engineering degree.
2. The applicant must submit a University of Alaska Fairbanks graduate application for admission form to the Director of Admissions and Records. Included with the application must be a resume of engineering work experience and a synopsis of the proposed thesis topic.
3. The application will be reviewed by the faculty and dean of the School of Mineral Engineering for concurrence with the thesis topic selected and university acceptance recommendation.

### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. A minimum of five years of responsible engineering work is required.
3. Class work beyond the initial degree is not required, but may be recommended, and credits for the thesis will be a minimum of six.
4. Registration at UAF during the semester of the thesis submittal is required.
5. An acceptable thesis must be submitted which is a demonstration of professional competence combined with normal research methods.

### **Thesis Requirement:**

1. The thesis will be prepared to meet the formal requirements as outlined in the University of Alaska Fairbanks Graduate Manual, including the filing of two copies in the university library.
2. The dean of the School of Mineral Engineering will convene a committee of four faculty members, one from outside the school, to review the thesis, give guidance as needed, assure that the thesis satisfactorily meets the degree requirements, and finally approve the thesis.
3. A defense of thesis, oral or written, will be made to the committee.

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# *Music Department*

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301 Fine Arts, University of Alaska Fairbanks, Fairbanks, AK 99775-5660 (907) 474-7555  
FAX (907) 474-6420

## **Degrees: M.A. in Music**

The curriculum of the graduate degrees in music is designed to satisfy cultural and professional objectives. The master of arts degree offers advanced training in four areas of specialization: performance, music education, music theory/composition and music history. The program is determined by the student and the graduate committee. Each graduate student's program is individually tailored and is designed to meet the student's professional interests and aspirations, consistent with the requirements outlined below.

The music department of UAF is a full member of the National Association of Schools of Music, the national accrediting organization.

## ***Faculty***

- Butler-Hopkins, Kathleen -- 1979 -- Violin and viola instruction and performance. Professor; Yale University School of Music '82, D.M.A.
- Chancler, Rose -- 1994 -- Piano instruction and performance. Visiting Assistant Professor; Eastman School of Music '94, D.M.A.
- Deal, William S. -- 1995 -- Percussion instruction and performance. Assistant Professor; University of Miami '94, D.M.A.
- DeCorso, Theodore -- 1974 -- Woodwind instruction and performance. Professor; University of Connecticut '77, Ph.D.
- DiCecco, Bruno -- 1981 -- Cello instruction and performance; music history. Professor; Yale University School of Music '58, M.M.
- Gibbens, Tracey -- 1992 -- Trombone instruction and performance; concert band. Assistant Professor; University of Iowa '89, M.A.
- Harbaugh, John P. -- 1977 -- Trumpet instruction and performance, Jazz. Associate Professor; North Texas State University '77, M.M.E.
- Hopkins, John -- 1979 -- Choral and voice instruction and performance; opera workshop. Associate Professor; University of Iowa '82, D.M.A.
- Schatz, Madeline -- 1990 -- Orchestral conducting and performance. Professor; University of Southern California '77, D.M.A.; Department Head.
- Stech, David A. -- 1972 -- Music theory. Associate Professor; Michigan State University '76, Ph.D.
- Summerville, Suzanne -- 1978 -- Vocal and choral music instruction and performance. Professor; Freie University at Berlin '77, Dr. phil.

## **Departmental Degrees:**

### **Music**

### **Music -- M.A. Degree**

#### **Admission Requirements:**

1. General requirements for admission to graduate study are consistent with those published in the UAF catalog.

2. All applicants will take an evaluative preliminary examination to help determine the areas of strength and deficiency. The examination will cover the following areas for all applicants: a) music theory, b) music history and literature, c) demonstration of keyboard proficiency, and d) performance in major area.

In addition to the areas listed above, music education majors will be required to complete a section pertaining to organizations, literature, knowledge of instruments and voice, and rehearsal techniques appropriate for public school music instruction.

3. Composition majors must submit examples of previous work.
4. Performance majors must demonstrate acquaintance with solo literature of the various historical periods through audition or submission of performance tapes.
5. Applicants will be accepted from any accredited institution; before admission to a degree program, however, all students (including UAF graduates) must take the preliminary examination.

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Following an applicant's admission to the program, the department head, after consultation with the applicant, will name an advisory committee of three faculty members, one of whom will act as chair and academic advisor for the student. The committee will assess the results of the preliminary examination, and then guide the development and completion of the student's program.
3. Near the completion of approximately one-half of the program, students will meet with their committees in an oral advisory comprehensive examination. This will be concerned primarily with the progress the student has demonstrated, particularly with regard to determining the major area of specialization. Such specialization is not to be conceived narrowly as a thesis topic, but rather as a broad area in which students plan to spend an appreciable amount of their scholarly career. Advisory examinations may be repeated until such time as the student has satisfactorily defined the area of specialization.
4. Each student, with the approval of the advisory committee, shall develop an appropriate final project or thesis. A thesis is required for students majoring in music theory, music history and ethnomusicology. Performance majors must present a graduate recital and prepare a supporting paper on selected aspects of the recital.
5. An oral examination is required on the major project, thesis, or recital.

#### **Course Requirements (30 credits):**

1. Complete 30 credits, at least 24 of which must be at the 600 level. At least 16 credits will be in a primary area of specialization, with the balance in a secondary area.
2. Complete the following core courses (12 credits) Credits

|   |   |
|---|---|
| MUS 601--Introduction to Graduate Study.....  | 3 |
| Applied Music (min. 4 credits).....   | 4 |
| (Private lessons at either the senior or graduate level. Committee may suggest further study if remedial work is deemed necessary.) |   |
| Two of the following (min. 6 credits).....  | 6 |
| Music theory, music history, ethnomusicology, music literature, and psychology of music   |   |
3. Students majoring in vocal performance or music history will be required to demonstrate proficiency in a foreign language appropriate to the area of concentration. Proficiency will be determined by the student's graduate committee in conjunction with the Department of Linguistics and Foreign Languages.
4. Graduate students studying applied music and/or presenting recitals are governed by the same regulations concerning recital preparation, recital jury prehearings, and jury examinations as apply to undergraduate students. These regulations are described in the Music Handbook.
5. All 600-level courses are restricted to graduate students only, however graduate students may elect some of their courses from upper division undergraduate courses (300- or 400-level).



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# Natural Resources Management

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P.O. Box 757140, University of Alaska Fairbanks, Fairbanks, AK 99775-7140 (907) 474-7083

## Degree: M.S. in *Natural Resources Management*

The School of Agriculture and Land Resources Management offers a Master of Science degree in natural resources management. The courses and curriculum for this program were developed in cooperation with groups and agencies that work professionally with resource management in Alaska.

State and federal agencies such as the Alaska Department of Natural Resources, Agricultural Research Service, U.S. Forest Service, Bureau of Land Management, Soil Conservation Service, and U.S. Fish and Wildlife Service contribute significantly to the instructional program, by providing guest lecturers and internship and field work opportunities for students.

Thesis research in natural resources management is directed toward resource problems at high latitudes. Research by graduate students has centered on biological and physical aspects of land management in Alaska in relation to land ownership, land use planning, economic analysis, and competing resources needs. Areas of emphasis have included:

- forest management
- land use planning
- soil management
- natural resource policy
- parks and recreation management
- horticulture and agronomy
- animal science

## Faculty

- Bader, Harry --1990-- Environmental law; natural resource policy. Associate Professor; Harvard Law School '88, J.D.
- Carling, Donald E. -- 1981 -- Plant pathology; plant endomycorrhizal relationships; vegetable crop diseases. Professor; University of Missouri-Columbia '75, Ph.D. (Palmer)
- Dofing, Stephen -- 1989 -- Genetics of small grains, forage grasses, and legumes; germplasm evaluation; adaptation studies. Associate Professor; University of Nebraska '83, Ph.D.
- Drew, James V. -- 1976 -- Dean; Rutgers University '57, Ph.D., Forest Sciences Department Head
- Fox, John D. -- 1973 -- Watershed management; forest systems; simulation and modeling. Associate Professor; University of Washington '76, Ph.D.
- Gasbarro, Anthony -- 1973 -- Forest management; international forestry development; land use planning. Associate Professor; University of Alaska '79, M.S. (Cooperative Extension Service)
- Greenberg, Joshua -- 1990 -- Resource economics; renewable resources; bioeconomic modeling. Associate Professor; Washington State University '90, Ph.D.
- Helm, Dot J. -- 1980 -- Succession in natural and human-caused disturbances. Research Associate Professor; Colorado State University '81, Ph.D.
- Holloway, Patricia S. -- 1984 -- Horticulture; cultivation of native plants for ornamental and fruit crop production. Associate Professor; University of Minnesota '82, Ph.D.
- Husby, Fredric M. -- 1975 -- Animal nutrition; feed value of Alaskan barley and marine by-products. Professor; Washington State University '73, Ph.D.; Plant, Animal and Soil Sciences Department Head.
- Jubenville, Alan -- 1979 -- Outdoor recreation management; interpretive studies. Professor; University of Montana '70, Ph.D.
- Juday, Glenn P. -- 1978 -- Forest community ecology; natural area protection and management. Associate Professor; Oregon State University '76, Ph.D.

- Karlsson, Meriam G. -- 1988 -- Environmental physiology of greenhouse-produced crops; flower initiation under Alaskan conditions. Associate Professor; Michigan State University '87, Ph.D.
- Knight, Charles W. -- 1978 -- Chemical fertilizers; conservation tillage; wetlands. Associate Professor; University of Alaska Fairbanks '88, Ph.D.
- Lewis, Carol -- 1973 -- Alaskan regional impact analysis; agricultural development in circumpolar areas. Professor; Georgetown University '70, Ph.D.; Resources Management Department Head.
- McBeath, Jenifer H. -- 1977 -- Biological control of plant disease; disease resistance through plant transformation; electron microscopy. Professor; Rutgers University '74, Ph.D.
- McKendrick, Jay D. -- 1972 -- Tundra revegetation; secondary plant succession; oil spill and mine spoil reclamation in arctic and boreal zones. Professor; Kansas State University '71, Ph.D. (Palmer)
- Mitchell, G. Allen -- 1987 -- Associate Dean; University of California Riverside '77, Ph.D.
- Packee, Edmond C. -- 1983 -- Forest management; forest growth and yield. Associate Professor; University of Minnesota '76, Ph.D.
- Panciera, Michael T. -- 1988 -- Ruminant nutrition and feed; management alternatives to improve forage quality. Associate Professor; Pennsylvania State University '82, Ph.D. (Palmer)
- Ping, Chien-Lu -- 1982 -- Soil chemistry; pesticide movements; heavy metals and pollutants in soils. Associate Professor; Washington State University '76, Ph.D. (Palmer)
- Sparrow, Stephen D. -- 1981 -- Soil microbiology; plant-soil relationships; soil fertility and nitrogen cycling in Alaskan soils. Associate Professor; University of Minnesota '81, Ph.D.
- Van Cleve, Keith -- 1967 -- Soil-plant relations with emphasis on the Alaskan taiga. Professor Emeritus; University of California, Berkeley '67, Ph.D.
- Verbyla, David L. -- 1993 -- Remote sensing and GIS technology for climate warming research and regional analysis. Assistant Professor; Utah State University '88; Ph.D.
- Walworth, James -- 1989 -- Soil fertility; soil and plant tissue analysis. Associate Professor; University of Georgia '85, Ph.D. (Palmer)
- Yarie, John A. -- 1978 -- Forest ecosystems modeling; landscape level process; GIS. Associate Professor; University of British Columbia '78, Ph.D.

***Affiliate Faculty:***

- Alaback, Paul, Oregon State University '80, Ph.D.
- Alden, John N., Oregon State University '71, Ph.D.
- Collins, William B., Utah State University '80, Ph.D.
- Foote, Margaret J., University of Colorado '64, M.A.
- Slaughter, Charles, Colorado State University '68, Ph.D.
- Viereck, Leslie A., University of Colorado '62, Ph.D.
- Werner, Richard, North Carolina State University '71, Ph.D.
- Wurtz, Tricia, University of Oregon '88, Ph.D.

**Departmental Degrees:**

**Natural Resources Management**

**Natural Resources Management -- M.S. Degree**

**Admission Requirements:**

1. Hold a baccalaureate degree in an appropriate undergraduate major.
2. Submit scores of the general aptitude sections of the Graduate Record Examination.
3. Submit personal resume. Include professional and life experiences.
4. Submit brief statement of career goals, research area of particular interest, and why UAF seems suited to student needs.

**Degree Requirements:**

1. Comply with UAF degree requirements.
2. Candidates must have or acquire a general familiarity with the major resource fields listed as program emphases above. Course requirements in any one field will depend on the needs of the candidate and the capabilities of the university.
3. Candidates must have course work, prior to or within the program, in computer science, statistical methods, and basic economics.

**Course Requirements (30-35 credits):**

Complete 30-35 credits with approval of the graduate advisory committee. At least 24 credits must be at the 600 level.

**Thesis option (30 credits):**

Designed for those intending to pursue management careers requiring thorough familiarity with research procedures and techniques in one or more of the resources fields, to proceed to doctoral programs, and/or to conduct research in management problems.

Required courses ..... Credits

A research methods course above the 200 level. (This requirement may be met with a research methods course in a discipline related to natural resources management.).....3

A statistics course above the 200 level. (This requirement may be met with a statistics course in mathematical sciences or in a discipline related to natural resources management.)...3

NRM 692--Graduate Seminar .....3

Additional approved courses ..... 9-15

NRM 699--Thesis..... 6-12

**Non-thesis option (35 credits):**

Designed for those planning a management career involving largely non-research responsibilities such as general planning and administration, communication and public information, and impact assessment. The requirements are similar to the above, with exceptions as noted.

Required courses (same as above) .....9

Additional approved courses..... 23

NRM 698 - Professional paper.....3

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## *Northern Studies Program*

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601A Gruening, University of Alaska Fairbanks, Fairbanks, AK 99775 (907) 474-5266

**Degree: M.A. in Northern Studies**

The Northern Studies Program offers an interdisciplinary study of northern problems and policy issues.

The geographic location of UAF is outstanding for the study of northern issues. Students examine the countries and regions throughout the circumpolar north, and their distinctive problems, such as the survival of indigenous populations, environmental and wilderness issues, high rates of alcoholism and suicide, fragile environments, adaptation to extreme cold and cycles of light and darkness, and adult development in small frontier societies.

The master's program is designed especially for students who live and work in the north and who want to expand their knowledge of the history, economics, politics, psychology, and anthropology of northern regions. Many Northern Studies students are seeking employment with northern agencies and want to develop a broad perspective on northern issues. Some students plan to pursue doctoral work in a discipline such as history or anthropology and seek a master's degree with a broad approach. Other students are employed as teachers, military personnel, or agency staff and want a rich, interdisciplinary program. The Northern Studies program is suitable for any of these goals, and it is designed to be compatible with either full time graduate study or full time employment.

The program offers a thesis or non-thesis option. The choice of option is guided by the student's interests and goals, the graduate advisory committee, and the requirements of the university. Faculty in the program are drawn from the disciplines of Alaska native studies, anthropology, economics, English, geography, history, library science, political science, and psychology

### **Faculty**

- Cole, Terrence M. -- 1988 -- Northern economic history; social history of the circumpolar north. Associate Professor; University of Washington '83, Ph.D. (History)
- Ellana, Linda J. -- 1986 -- Ecology and economics of northern hunters and gatherers; field methods; kinship and demography. Associate Professor; University of Connecticut '83, Ph.D. (Anthropology)
- Erickson, Karen -- 1991 -- History of relations between Russia and Finland; Finnish foreign policy; comparative strategic interests in the north. Assistant Professor; Harvard University '76, Ph.D. (Political Science)
- Falk, Marvin W. -- 1975 -- Cartography of the Arctic; historical documentation; European history. Associate Professor; University of Iowa '76, Ph.D. (Library Science)
- Gladden, James N. -- 1985 -- Environmental politics of the north; public policy. Associate Professor; Indiana University Bloomington '84, Ph.D. (Political Science)
- Kleinfeld, Judith S. -- 1969 -- adult development in northern frontier settings; fetal alcohol syndrome; alcohol prevention. Professor; Harvard Graduate School of Education '69, Ed.D., Program Head (Psychology)
- Korsmo, Faye -- 1992 -- Circumpolar politics, Scandinavian history and politics. Assistant Professor; University of New Mexico, Albuquerque, '92, Ph.D. (Political Science)
- McBeath, Gerald A. -- 1976 -- Comparative politics of the circumpolar north; international relations of the Arctic; education policy. Professor; University of California Berkeley '70, Ph.D. (Political Science)
- Morgan, Lael -- 1988 -- Alaska history, rural Alaska, electronic communications. Associate Professor; Boston University, '87, M.S. (Photojournalism)
- Naske, Claus-M. -- 1965 -- Alaska social economic and political history; economic development in the north; Canadian history. Professor; Washington State University '70, Ph.D. (History)
- Parrett, William -- 1979 -- Comparative education. Professor; Indiana University, '79, Ph.D.
- Pearson, Roger W. -- 1976 -- Northern agriculture; geography of the circumpolar north. Professor; University of Illinois '70, Ph.D. (Geography)
- Pierce, Richard A. -- 1988 -- Russian America, Siberia, central Asia. Professor; University of California, '56, Ph.D.
- Read, Colin L. -- 1989 -- Regional economics; transportation economics. Assistant Professor; Queen's University '88, Ph.D. (Economics)
- Ruppert, James -- 1988 -- Native American literature; film and literatures of the north; cross-cultural contact. Associate Professor; University of New Mexico '81, Ph.D. (English, Alaska Native Studies)
- Woodward, Kessler -- 1982 -- visual images of the North. Associate Professor; Idaho State University, '77, M.F.A.

### **Departmental Degrees:**

#### **Northern Studies**

#### **Northern Studies -- M.A. Degree**

##### **Admission Requirements:**

1. Complete a personal statement concerning educational and career goals.
2. Provide a writing sample.
3. Provide all university application materials, including scores from the Graduate Record Examination.

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a comprehensive examination.
3. Complete a research thesis or project.

**Course Requirements:**

Complete the following program requirements of 30 credits. At least 24 credits must be at the 600 level.

Required courses (6 credits)..... Credits

NORS 600--Perspectives of the North.....3

NORS 601--Research Methods & Sources in the North.....3

Complete four of the core courses (12 credits)

NORS 606--Science, Technology, and Development in Northern Regions  
.....3

NORS 610--Northern Indigenous People and Contemporary Issues  
.....3

NORS 614--Human Adaptation to the Circumpolar North 3

NORS 620--Images of the North .....3

NORS 625--Visual Images of the North.....3

NORS 630--Economic Issues of the Circumpolar North.....3

NORS 637--Geography of Northern Development.....3

NORS 640--Ethics and Reporting in the Far North.....3

NORS 648--Environmental Politics of the Circumpolar North  
.....3

NORS 650--Comparative Government and Politics in the Circumpolar North  
.....3

NORS 651--Justice and Social Control in the Circumpolar North  
.....3

NORS 652--International Relations of the North.....3

NORS 661--History of Alaska.....3

NORS 664--History of Russia.....3

NORS 665--Russian Eastward Expansion.....3

NORS 680--Comparative Education.....3

NORS 681--Polar Exploration and its Literature.....3

NORS 682--History of Circumpolar Research .....3

NORS 683--20th Century Circumpolar History .....3

NORS 690--Researching and Writing Public Northern History  
.....3

Electives (6 credits).....6

Electives are chosen with the approval of the graduate advisory committee. Electives may or may not relate specifically to northern studies, depending on the student's interests and professional goals.

Thesis or Project

NORS 698--Project .....6

NORS 699--Thesis ..... 6-12

**NOTE:** All required and core Northern Studies courses are offered in the evenings so that students can complete this program and still maintain employment and family responsibilities. Elective courses may be taken at other times of day.

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## ***Petroleum Engineering Department***

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437 Duckering, University of Alaska Fairbanks, Fairbanks, AK 99775-5880 (907) 474-7734

### **Degree: M.S. in Petroleum Engineering**

Petroleum engineering at the University of Alaska Fairbanks offers a unique look at the challenging problems confronting the petroleum industry. Requirements for the degree focus on many disciplines, including mathematics, physics, chemistry, geology and engineering science. In addition, courses in petroleum engineering deal with drilling, formation evaluation, production, reservoir engineering, computer simulation and enhanced oil recovery.

The curriculum at UAF was designed to prepare graduates to meet the demands of modern technology while emphasizing, whenever possible, the special problems encountered in Alaska. Located in one of the largest oil producing states in the nation, the Department of Petroleum Engineering offers one of the most modern and challenging degree programs available.

The M.S. program is intended to provide the student with an advanced treatment of petroleum engineering concepts. Students may choose either a thesis or non-thesis option. A number of generous research and teaching assistantships are available.

An interdisciplinary doctoral degree program is offered with specialization in petroleum engineering for qualified students. Contact the Graduate Program Coordinator, or the Petroleum Engineering Department for more information.

### ***Faculty***

- Chukwu, Godwin A. -- 1990 -- Drilling and drill waste disposal; production engineering; formation evaluation; non-Newtonian fluid flow modeling; natural resource utilization. Associate Professor; University of Oklahoma, Norman '89, Ph.D.; P.E.; Department Head.
- Hatzignatiou, Dimitrios G. -- 1990 -- Well test analysis; mathematical modeling; reservoir simulation; rock mechanics/reservoir stimulation; geothermal energy. Assistant Professor; University of Tulsa '90, Ph.D.
- Kamath, Vidyadhar -- 1983 -- Gas hydrates; reservoir engineering; EOR processes; gas conversion. Professor; University of Pittsburgh '83, Ph.D.
- Khataniar, Santanu - 1991 -- Reservoir simulation; enhanced oil recovery; numerical/experimental study of flow through porous media; flow visualization; production engineering. Assistant Professor; University of Texas, Austin '91, Ph.D.
- Lawal, Akanni S. -- 1993 -- Reservoir engineering; enhanced oil recovery; reservoir simulation and modeling. Research Associate Professor; University of Texas, Austin '85, Ph.D.
- Ogbe, David O. -- 1984 -- Well test analysis; reservoir simulation; reservoir engineering; mathematical modeling; formation evaluation. Associate Professor; Stanford University '84, Ph.D.; Graduate Program Coordinator.
- Patil, Shirish L. -- 1987 -- Miscible and thermal EOR; gas hydrate properties; asphaltene deposition. Instructor; University of Alaska Fairbanks '87, M.S.

### **Departmental Degrees:**

#### **Petroleum Engineering -- M.S. Degree**

##### **Degree Requirements:**

1. Applicants should possess a B.S. degree in Engineering or the Natural Sciences.
2. Comply with UAF degree requirements.
3. Pass a departmental comprehensive exam prior to submission of the thesis.
4. Write a thesis (and pass an oral defense of the thesis) or an engineering design project, detailing the research done on a project approved by the student's graduate advisory committee.

##### **Course Requirements (30 credits):**

Complete the following program requirements of 30-33 credits. At least 24 credits must be at the 600 level.

##### **Thesis Option (30 credits)**

| Core Courses (15 credits).....                                | Credits |
|---|---------|
| CE 603--Arctic Engineering .....                              | 3       |
| PETE 607--Advanced Production Engineering.....                | 3       |
| PETE 610--Advanced Reservoir Engineering .....                | 3       |
| PETE 670--Fluid Flow Through Porous Media.....                | 3       |
| PETE 684--Computational Methods in Petroleum Engineering..... | 3       |

|   |    |
|---|----|
| Electives (9 credits, with courses from each of the following groups) ..... | 9  |
| 1. Reservoir Group:   |    |
| PETE 661 -- Advanced Well Testing   |    |
| PETE 663 -- Advanced Reservoir Simulation                                   |    |
| PETE 683 -- Advanced Natural Gas Engineering                                |    |
| 2. Drilling & Production Group:   |    |
| PETE 626 -- Advanced Drilling and Completions                               |    |
| PETE 685 -- Non-Newtonian Fluid Mechanics                                   |    |
| 3. Enhanced Oil Recovery Group:   |    |
| PETE 630 -- Water Flooding  |    |
| PETE 662 -- Enhanced Oil Recovery   |    |
| PETE 665 -- Advanced Phase Behavior   |    |
| Thesis (6 credits)  |    |
| PETE 699--Thesis .....  | 6  |
| <u>Non-thesis Option</u> (33 credits)                                       |    |
| Core courses (15 credits) - see above.....                                  | 15 |
| Electives (15 credits) - see above.....                                     | 15 |
| Project (3 credits)   |    |
| PETE 698 -- Engineering Project.....  | 3  |

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## *Physics Department*

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102 Natural Sciences Facility, P.O. Box 755920, University of Alaska Fairbanks, Fairbanks, AK 99709-5920 (907) 474-7339

**Degrees:** M.S., M.A.T., and Ph.D. in *Physics*; M.S. and Ph.D. in *Atmospheric Sciences*; M.S. and Ph.D. in *Space Physics*; M.S. in *General Science*

The curriculum in the Physics Department provides opportunities for students seeking M.S., M.A.T., and Ph.D. degrees in physics, atmospheric sciences, space physics, and general science.

Graduate work is offered in various areas of physics and applied physics including many of the research areas found in the University of Alaska Fairbanks Geophysical Institute. Faculty and student research programs currently emphasize investigation of auroral, ionospheric, magnetospheric and space plasma physics, the physics and chemistry of the upper and middle atmosphere, radio wave propagation and scattering, solar-terrestrial relations, laser physics, condensed matter physics, and polar meteorology. Students will pursue their studies under the supervision of an advisory committee which will advise on the course of study to be followed.

Teaching and research assistantships are available on a competitive basis. Contact the department or individual faculty members for more information.

### *Faculty*

- Bowling, Sue Ann -- 1963 -- Climate change; climate history; anthropogenic effect on climate; air pollution. Assistant Professor; University of Alaska Fairbanks '70, Ph.D.
- Chowdhury, Ataur R. -- 1991 -- Solid state physics; magneto-optics; point defects; phase transitions. Assistant Professor; Clark University '85, Ph.D.
- Craven, John D. -- 1991 -- Magnetospheric and auroral physics. Professor; University of Iowa '69, Ph.D.
- Hallinan, Thomas J. -- 1965 -- Auroras; magnetosphere; space science. Professor; University of Alaska Fairbanks '76, Ph.D.
- Harrison, William D. -- 1972 -- Glaciers; permafrost; climate change. Professor; California Institute of Technology '66, Ph.D.
- Kan, Joseph R. -- 1972 -- Theoretical space physics. Professor; University of California, San Diego '69, Ph.D.

Kawasaki, Koji -- 1980 -- Permafrost geophysics; geomagnetic disturbance phenomena; science education. Associate Professor; University of Alaska Fairbanks '71, Ph.D.

Lee, Lou-Chuang -- 1978 -- Space plasma physics; magnetospheric physics; solar physics. Professor; California Institute of Technology '75, Ph.D.

Lynch, Amanda H. -- 1994 -- Regional climate systems modeling. Assistant Professor; Melbourne University '94, Ph.D.

Morack, John L. -- 1968 -- Science education. Professor; Oregon State University '68, Ph.D.; Department Head.

Nielsen, Hans C.S. -- 1967 -- Auroral physics; magnetospheric physics. Professor; Royal Technical University, Denmark '65, M.S.

Olson, John V. -- 1979 -- Magnetospheric physics; digital signal processing; geomagnetic measurements. Professor; University of California, Los Angeles '70, Ph.D.

Pender, John -- 1989 -- Nonlinear optics; laser spectroscopy. Assistant Professor; Stanford University '89, Ph.D.

Price, Channon P. -- 1987 -- Theoretical space plasma physics; nonlinear dynamics. Associate Professor; University of California, Santa Barbara '81, Ph.D.

Sentman, Davis D. -- 1991 -- Solar-terrestrial physics. Associate Professor; University of Iowa '76, Ph.D.

Shaw, Glenn E. -- 1971 -- Climate theory; cloud physics; atmospheric physics. Professor; University of Arizona '71, Ph.D.

Smith, Roger W. -- 1984 -- Atmospheric dynamics; solar-terrestrial relations; optical instruments. Professor; University of Exeter '67, Ph.D.

Stamnes, Knut -- 1988 -- Atmospheric physics; radiative transfer; climate theory. Professor; University of Colorado '78, Ph.D.

Watkins, Brenton J. -- 1980 -- Space physics; ionospheric physics; atmospheric science. Professor; University of Alaska Fairbanks '74, Ph.D.; Graduate Program Coordinator.

Wendler, Gerd -- 1966 -- Micrometeorological studies. Professor; University of Innsbruck '64, Ph.D.

## **Departmental Degrees:**

### **Physics**

#### **Physics -- M.S. Degree**

##### **THESIS OPTION:**

##### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based thesis and pass an oral defense of thesis.

##### **Course Requirements (30 credits):**

Complete a minimum of 30 credits of approved courses, including PHYS 699, thesis. At least 24 credits, including thesis and/or research, must be at the 600 level.

Basic courses in physics (min. 12 credits) ..... 12

PHYS 611--Mathematical Physics  
 PHYS 612--Mathematical Physics  
 PHYS 621--Classical Mechanics  
 PHYS 622--Statistical Mechanics  
 PHYS 631--Electromagnetic Theory  
 PHYS 632--Electromagnetic Theory  
 PHYS 651--Quantum Mechanics  
 PHYS 652--Quantum Mechanics

Other approved PHYS or ATM 600-level courses (min. 12 credits) ..... 12

Thesis (min. 6 credits)

PHYS 699--Thesis ..... 6-12



### **NON-THESIS OPTION (33 Credits):**

#### **Degree requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based paper (see below).

#### **Course requirements:**

Complete at least 33 credits, of which at least 30 credits must be regular course work, with 24 of these (including the basic course requirements) at the 600 level. A minimum of 3 and a maximum of 6 credits may be devoted to research (PHYS 698). The student must complete a research paper in a style which the advisory committee judges to be of publishable quality.

Basic courses (see thesis option).....12

Additional approved courses.....18

PHYS 698 -- Research.....3-6

### **Physics -- M.A.T. Degree**

Students must comply with UAF degree requirements. A minimum of 36 credits is required.

Contact the department head for specific degree requirements.

### **Physics -- Ph.D. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written and an oral comprehensive examination.
3. Demonstrate competency in a foreign language or a research tool.
4. Complete the required program as arranged by conference with the graduate advisory committee and in accordance with the Physics Department manual of *Policies and Procedures* for graduate students.

### **Atmospheric Sciences**

### **Atmospheric Sciences -- M.S. Degree**

#### **Thesis Option (30 Credits)**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based thesis and pass an oral defense of thesis.

#### **Course Requirements (30 credits):**

Complete a minimum of 30 credits of approved courses, including PHYS 699, thesis. At least 24 credits, including thesis and/or research, must be at the 600 level.

Basic courses in atmospheric sciences (min. 12 credits)..... 12

ATM 636--Physics of the Lower Atmosphere

PHYS 645--Fundamentals of Geophysical Fluid Dynamics

ATM 646--Dynamics of the Atmosphere and Ocean

ATM 656--Atmospheric Circulation, Weather, and Climate

Additional approved 600-level courses (min. 12 credits)..... 12

Thesis (min. 6 credits)

ATM 699--Thesis..... 6-12

NOTE: For specialization in ice and snow studies, with emphasis on ice physics, ice in climate, or ice in science applications, see Geology and Geophysics Department, M.S. in Geophysics (Ice and Permafrost Option) in this catalog. For specialization in atmospheric chemistry, see Research - Interdisciplinary Graduate Research Training in this catalog, and contact the Chemistry Department for more information.

### **Non-Thesis Option (33 Credits)**

#### **Degree requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based paper (see below)

#### **Course requirements:**

Complete at least 33 credits, of which at least 30 credits must be regular course work, with 24 of these (including the basic course requirements) at the 600 level. A minimum of 3 and a maximum of 6 credits may be devoted to research (PHYS 698). The student must complete a research paper in a style which the advisory committee judges to be of publishable quality.

|  |     |
|--|-----|
| Basic courses (see thesis option)..... | 12  |
| Additional approved courses.....       | 18  |
| PHYS 698 -- Research.....              | 3-6 |

### **Atmospheric Sciences -- Ph.D. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written and an oral comprehensive examination.
3. Demonstrate competency in a foreign language or a research tool.
4. Complete the required program as arranged by conference with the graduate advisory committee and in accordance with the Physics Department manual of *Policies and Procedures* for graduate students.

### **Space Physics**

### **Space Physics -- M.S. Degree**

#### **Thesis Option:**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based thesis and pass an oral defense of thesis.

#### **Course Requirements (30 credits):**

Complete a minimum of 30 credits of approved courses, including PHYS 699, thesis. At least 24 credits, including thesis and/or research, must be at the 600 level.

|  |      |
|--|------|
| Basic courses in space physics (Min. 12 credits).....          | 12   |
| PHYS 626--Fundamentals of Plasma Physics                       |      |
| PHYS 627--Advanced Plasma Physics                              |      |
| PHYS 629--Methods of Numerical Simulation in Fluids and Plasma |      |
| PHYS 672--Magnetospheric Physics                               |      |
| PHYS 673--Space Physics  |      |
| Approved physics courses (min. 12 credits).....                | 12   |
| Thesis (min. 6 credits)  |      |
| PHYS 699--Thesis.....  | 6-12 |

#### **Non-Thesis Option (33 Credits):**

#### **Degree requirements:**

1. Comply with UAF degree requirements.
2. Write a research-based paper (see below).

#### **Course requirements:**

Complete at least 33 credits, of which at least 30 credits must be regular course work, with 24 of these (including the basic course requirements) at the 600 level. A minimum of 3 and a maximum of 6 credits may be devoted to research (PHYS 698). The student must complete a research paper in a style which the advisory committee judges to be of publishable quality.

|  |     |
|--|-----|
| Basic courses (see thesis option)..... | 12  |
| Additional approved courses.....       | 18  |
| PHYS 698 -- Research.....              | 3-6 |

### **Space Physics -- Ph.D. Degree**

#### **Degree Requirements:**

1. Comply with UAF degree requirements.
2. Pass a written and an oral comprehensive examination.
3. Demonstrate competency in a foreign language or a research tool.
4. Complete the required program as arranged by conference with the graduate advisory committee and in accordance with the Physics Department manual of *Policies and Procedures* for graduate students.

### **General Science**

#### **General Science - M.S. Degree**

The M.S. in General Science is administered by the Physics Department and is designed to provide breadth in the natural sciences rather than an in-depth study of one of the disciplines within the natural sciences; as such, this is the only graduate degree in the natural sciences that might be described as truly "interdisciplinary." A candidate for this M.S. degree ordinarily pursues a course of study involving one of the disciplines within the College of Natural Sciences, and at least one other department within the university.

#### **Admission Requirements:**

1. Baccalaureate degree with a 3.0 GPA
2. Submit to the UAF Admissions and Records office:
  - a. UAF Graduate Application of Admission
  - b. Official Transcripts
  - c. Three letters of reference.
  - d. Scores from Graduate Record Examination, general test.

#### **Degree Requirements:**

1. Comply with UAF degree requirements. Complete the degree within the 7 year time limit, with no more than 9 transfer credits.
2. Pass a comprehensive examination.
3. Write a thesis or project report and pass an oral defense.

#### **Course Requirements (30 credits)**

1. Complete a minimum of 30 credits, of which 24 credits must be at the 600 level.
2. Complete General Science requirements as developed with a graduate advisory committee.

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## ***Professional Communication***

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Department of Communication, PO Box 755680, Fairbanks AK 99775-5680 (907)474-6591  
Journalism & Broadcasting Department, PO Box 756120, Fairbanks AK 99775-6120 (907)474-7995

### **Degree: M.A. in Professional Communication**

The M.A. in Professional Communication was approved in 1994 and is intended to provide advanced education for individuals in or pursuing communication related careers in public/non-profit organizations, media organizations, health care organizations, or in higher education. Students take courses that focus on written and oral communication theory and practices.

The degree has two tracks: The Journalism & Broadcasting track is pragmatically based for the practicing professional. The Communication track is both theoretically and pragmatically oriented to prepare students for the professional workplace or for doctoral study.

## ***Faculty***

### **ART**

Brody, William A. – 1967 – Professor; Claremont Graduate School '67, M.F.A.

### **COMMUNICATION**

Arundale, Robert – 1979 – Associate Professor; Michigan State University '71, Ph.D.

Brown, Jin – 1993 – Assistant Professor; University of Oklahoma '90, Ph.D.

Leipzig, John – 1982 – Associate Professor; Kent State University '80, Ph.D.

McWherter, Pamela – 1993 – Assistant Professor; Southern Illinois University '93, Ph.D.

### **ENGLISH**

Bird, Roy – 1984 – Professor; William Marsh Rice University '82, Ph.D.

Cooper, Burns G. – 1990 – Assistant Professor; University of Texas '89, Ph.D.

### **JOURNALISM & BROADCASTING**

Badger, Mark – 1982 – Assistant Professor; Cambridge University '90, M.Phil.

Brigham, Jerry – 1989 – Associate Professor; University of Oklahoma '71, M.F.A.

Clark, Claudia – 1989 – Assistant Professor; Montana State University '88, M.Ed.

Linsalata, Mark – 1990 – Assistant Professor; Columbia University '76, M.S.

Mason, Charles – 1990 – Assistant Professor; Illinois State University '88, M.S.

Morgan, Lael – 1988 – Associate Professor; Boston University '87, M.S.

Morrison, Joy – 1990 – Assistant Professor; University of Iowa '91, Ph.D.

## **Departmental Degree:**

### ***Professional Communication - M.A. Degree***

#### **Degree Requirements:**

1. Complete the general university requirements and master's degree requirements.
2. Pass a written, comprehensive examination which is to be taken no later than student's fourth semester of work.
3. Students may advance to candidacy when their advisory committee deems that they have made satisfactory progress in both academic and writing areas.
4. Pass an oral defense of the thesis.

#### **Course Requirements (30-33 credits) for Journalism & Broadcasting and Communication Tracks:**

Complete a minimum of 24 credits at the 600 level (a maximum of 6 credits of approved 300-400 level courses may be included in the 30-33 credit requirements):

#### **Required courses (15 credits):**

|   |   |
|---|---|
| ENGL 687 - Writing Professional Prose .....     | 3 |
| COMM/JB 625 - Communication Theory .....        | 3 |
| COMM/JB 601 - Communication Methodologies ..... | 3 |
| COMM/JB 699 - Thesis .....                      | 6 |

#### **Journalism & Broadcasting Track Additional Courses (15 credits):**

##### **Required Courses (9 credits):**

|   |   |
|---|---|
| JB 623 - Advanced Editing for Professionals ..... | 3 |
| JB 680 - Diversity and the Media .....            | 3 |
| ART/JB 684 - Multimedia Theory and Practice ..... | 3 |

##### **Elective Courses (6 credits):**

|   |   |
|---|---|
| JB 605 - Advanced Photography Seminar .....           | 3 |
| JB 611 - Advanced Writing for Publication .....       | 3 |
| JB 613 - Advanced Mass Media Law and Regulation ..... | 3 |
| B 633 - Public Relations Theory and Practice .....    | 3 |
| JB 640 - Ethics and Reporting .....                   | 3 |
| JB 641 - Comparative Media Systems .....              | 3 |

**Communication Track Additional Courses (15 credits):**

**Required Courses (9 credits):**

|  |   |
|--|---|
| COMM 675 - Training & Development Communication.....               | 3 |
| COMM 680 - Communication Diversity in the Professional World ..... | 3 |
| ENGL 689 - Editing Prose .....                                     | 3 |

**Elective Courses (6 credits):**

|  |   |
|--|---|
| COMM 622 - Interpersonal Interaction.....                | 3 |
| COMM 631 - Team Building .....                           | 3 |
| COMM 635 - Organizational Culture and Communication..... | 3 |
| COMM 682 - Seminar in Communication.....                 | 3 |

(Alternatively, students in either the JB or the Communication Tracks may take 300, 400, and 600 level courses in Art, Education, English, JB, Communication, Marketing, Business Administration, and Northern Studies as well as graduate level independent studies to fulfill the 6 credit elective requirement, if approved by the student's committee. Students will also be able to apply up to 6 credits of appropriate graduate level coursework from other universities in the elective area if approved by the student's committee.)

**Additional Requirement for Teaching Assistants (3 credits):**

|   |   |
|---|---|
| COMM 685 - Teaching College Communication ..... | 3 |
|---|---|

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## *Psychology Department*

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P.O. Box 756480, University of Alaska Fairbanks, Fairbanks, AK 99775-6480  
(907) 474-7007

**Degrees:** M.A. in *Community Psychology*;

The Psychology Department offers an M.A. in Community Psychology. The program is designed to meet the needs for practitioners in rural Alaska as well as other rural and cross-cultural settings in Alaska. Graduates have also become employed in settings in rural America and internationally. Of particular interest to the program is to prepare individuals who are interested in strengthening a sense of community and promoting the assets of communities as resources for primary prevention. The objectives of the program are:

1. To train masters level psychologists for rural and cross-cultural settings.
2. To place masters level psychologists in human and social service agencies in Alaska and in both rural and semi-urban areas with large cross-cultural and rural populations.
3. To provide in-service and continuing education opportunities for mental health professionals with a special emphasis on rural and cross-cultural issues.

The program prepares generalists who are capable of doing individual counseling, designing and evaluating community based interventions, facilitating social change, and who understand assessment and diagnosis. Students are expected to become cross-culturally competent in those areas critical for a rural, community psychologist. The program is practice oriented and seeks to educate reflective practitioners who can integrate theory and practice and have the requisite research skills to facilitate change at the individual and community level. The program considers prevention to be a major responsibility of the rural practitioner. Prevention and treatment are seen as inseparable tasks for the rural provider as they work to build intact communities capable of meeting human needs and enhancing the strengths and competencies of their members.

Core courses cover the content areas of counseling, prevention, assessment, and research. Students build their graduate study plan with electives available both in the psychology department and other department in the university. A full-time or part-time internship is required of all students as well as a thesis. All courses present a cross-cultural perspective.

### ***Psychology Faculty***

- Browne, Dauna -- 1989 -- Rural school counseling; college teaching/minorities. Associate Professor; University of Northern Colorado '70, Ed.D.; Graduate Program Coordinator, Guidance and Counseling.
- Conner, William--1988--Abnormal psychology, military psychology, counseling theories. Assistant Professor; University of Missouri-Columbia '83, Ph.D.
- Diehl, Carol--1982--Counseling theories, counseling applications, women's issues. Assistant Professor; West Virginia University '79, Ph.D.
- Dinges, Norman G. -- 1990 -- Cross-cultural mental health; culture and depression; stress and coping. Associate Professor; Colorado State University '70, Ph.D.
- Geist, Charles -- 1974 -- Neuroscience; animal behavior; experimental psychology. Professor; University of Montana '75, Ph.D.
- Hazel, Kelly -- 1992 --Community Psychology, systems change, cross-cultural community intervention, women's issues. Assistant Professor; Michigan State University '74, M.S.W.
- Keating, John P.--1994--Social psychology, environmental psychology. Professor; Ohio State University '72. Ph.D.
- Kleinfeld, Judith--1969--Cross-cultural psychology, educational psychology, northern studies, Fetal Alcohol Syndrome, case studies in education, research methods. Professor; Harvard University '69, Ed.D.
- Mohatt, Gerald V. -- 1983 -- Cross cultural healing and Native-American healing, psychotherapy of psychosis, cultural issues in primary prevention. Professor; Harvard University '78, Ed.D.; Director, Community Psychology Program.
- Posentti, Richard G. -- 1966 -- Neuropsychology; physiological psychology; personality theory. Associate Professor; University of Alabama '55, M.A.

### ***Other Disciplinary Faculty***

- Berman, Gerald -- 1980 -- Human services; the family; work and work organizations. Associate Professor; Case Western Reserve University '70, Ph.D.
- Rao, Nagabhushana M.S. -- 1970 -- Internal migration; family planning in developing nations. Professor; Washington State University '74, Ph.D.
- Reynolds, Janice McKenna --1988--Professor; Ohio State University '69, Ph.D.

### ***Affiliate Faculty***

- Bush, Anita--1993--Neuroscience, clinical neuropsychology, biological psychology, experimental design and analysis, statistics, cognition. Assistant Professor; University of Alaska Fairbanks '93, Ph.D.
- Booth, Thomas--1994--Abnormal psychology, military psychology, counseling theories. Assistant Professor; George Peabody College of Vanderbilt University '83, Ed.D.
- Green, Kenneth--1988--Post traumatic stress syndrome, psychological assessment, abnormal psychology. Associate Professor; Georgia State University '79, Ph.D.
- Hoffman, Penny--1995--Military psychology, rehabilitation psychology. Instructor; Florida State University '95, Ph.D.
- Ward, Penelope--1995--Health Sciences. Assistant Professor, University of Alaska Fairbanks '95, Ph.D.

### **Departmental Degrees:**

#### **Community Psychology -- M.A. Degree**

##### **Admission**

Students are accepted in the spring for the fall semester. Applications are due by March 1. Notification of admission will occur prior to the end of the spring semester. The program will accept a maximum of 10-12 students per year, with the option to accept less given limited resources.

**Admission Requirements:**

1. Completion of the baccalaureate degree from an accredited institution in counseling, psychology, sociology, social work, human services, education or related helping professions. A minimum grade point average of 3.25 and/or evidence of personal and professional suitability for community psychology work and interest in rural practice will be sought. In part, this will be inferred from the participant's academic and employment history and an interview when possible.
2. Three letters of reference will be required endorsing the applicant's admission to the community psychology program.
3. Scores from the General Test of the Graduate Record Examination (GRE) normally exceed the 50th percentile.
4. Persons who have a non-social science background may be accepted but must complete the necessary undergraduate prerequisites as delineated by their advisor prior to advancement to candidacy. These include Abnormal Psychology, Social or Community Psychology, Research Methods, and Statistics.
5. Part-time students will be accepted. The student must enroll in one core required course during the first semester.

**Degree Requirements:**

1. Comply with UAF degree requirements, .
2. Complete a written comprehensive exam which will occur typically in the spring of their second semester
3. Complete a thesis, and an oral defense of the work.
4. Complete an internship under the supervision of a qualified psychologist, mental health or human services practitioner. The internship is for either a full-time, one-semester or part-time, one-year; placements are arranged after at least 24 credits are completed.

**Course Requirements (48 credits):**

The program requires a 24 credit core of courses with a 0-12 credit internship, 6 credits for project or thesis, and 6 credits of additional electives to make up the 48 credit requirement for course work. \*By approval of committee, additional elective credits may be substituted for all or part of the 12 hours required for internship credit.

| Core Courses (24 credits).....  | Credits |
|---|---------|
| PSY 630--Community Psychology.....  | 3       |
| PSY 631--Community Psychology: Cross-Cultural Applications.....                                       | 3       |
| PSY 635--Field-based Research Methods.....  | 3       |
| PSY 638--Proseminar in Community Psychology.....  | 3       |
| PSY 660--Counseling Theories and Applications.....  | 3       |
| PSY 662--Counseling Theories and Applications II.....   | 3       |
| PSY 663--Clinical Methods & Assessment.....   | 3       |
| PSY 678--Psychological Assessment-Personality.....  | 3       |
| Internship (0-12 credits)   |         |
| PSY 690--Internship in Community Psychology.....  | 0-12    |
| Thesis (6 credits)  |         |
| PSY 699--Thesis.....  | 6       |
| Electives (6 credits from designated courses approved by committee as written in graduate study plan) |         |

*University of Alaska Fairbanks*  
*Course Listings*



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## *Accounting Courses*

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**ACCT 602**                      **3 Credits**  
**Accounting for Managers**

**Fall**  
**(3+0)**

A complete and balanced treatment of the concepts, procedures and uses of financial accounting. Coverage includes the accounting cycle, accounting principles, mass processing of transactions, internal control, inventories and merchandising operations, long-lived assets and liabilities, corporate accounting and reporting, partnership accounting, financial statements, funds flow analysis, cost systems for manufacturing operations, managerial accounting and capital budgeting. (Prerequisite: Graduate Standing.)

**ACCT 620**  
**Accounting Theory and Practice**

**3 Credits**  
**(3 + 0)**

The relation between accounting theory and practice is covered in detail. Accounting research is discussed in relation to the standards setting process in accounting. Current developments in U.S. and international accounting standards are covered. (Prerequisite: Graduate standing and ACCT 362.)

**ACCT 650**  
**Management Accounting Seminar**

**3 Credits**  
**(3+0)**

An advanced seminar designed to provide a sound understanding of the significance of management control systems for manufacturing, service, and nonprofit organizations. Topics include the planning and control process, behavior in organizations, responsibility accounting, controls for different strategies, performance measurement, capital budgeting, management compensation, multinational and service organizations, and project controls. Student participation will include problem analysis with oral and written reports on cases and projects. (Prerequisites: Graduate standing and ACCT 602.)

**ACCT 670**  
**Public Accounting Seminar**

**3 Credits**  
**(3 + 0)**

An examination of the regulatory, professional, and practice environment of Public Accountancy. The Alaskan context is emphasized with particular consideration of servicing clients from the small business and governmental sectors. Ethical considerations in public accountancy will also be highlighted. (Prerequisites: graduate standing and ACCT 452)

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## *Accounting and Information Systems Courses*

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**AIS 605**                      **3 Credits**  
**Management Information Systems**

**Spring**  
**(3+0)**

The study and application of systems concepts in producing and using information for managerial decision making. Examination of, and exposure to, strategic uses of information technology, computer hardware, and various software applications. Materials fee: \$20. (Prerequisite: Graduate standing.)

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## *Anthropology Courses*

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- ANTH 601**                      **3 Credits**                      **Alternate Fall**  
**Proseminar in Social/Cultural Anthropology**                      **(3+0)**  
 An intensive graduate level survey on the subdiscipline of social/cultural anthropology dealing with the methods and theories in the field. Special attention will be directed at examining the substantive materials resulting from social/cultural studies. Materials fee: \$10.00 (Prerequisites: Graduate standing or permission of instructor. )
- ANTH 602**                      **3 Credits**                      **As Dem. Warrants**  
**Anthropology of Art**                      **(3 + 0)**  
 Anthropological study of art in cross-cultural perspective. Social context of art production and use, cross-cultural variations in definition of an artist's role. Materials fee: \$5.00 (Prerequisites: Senior standing or permission of instructor. )
- ANTH 603**                      **3 credits**                      **As Dem Warrants**  
**Political Anthropology**                      **(3 + 0)**  
 Political systems and the law. Case studies from non-industrial societies, developing nations, and parapolitical systems or encapsulated societies, such as native peoples in the U.S. Political structures and institutions; social conflict, dispute settlement, social control and the law, political competition over critical resources; and ethnicity. Materials fee: \$5.00 (Prerequisites: ANTH 104 or permission of instructor)
- ANTH 605**                      **3 Credits**                      **Alternate Spring**  
**Archaeological Method and Theory**                      **(2 + 3)**  
 Archaeological methods and analysis as the framework for different perspectives in archaeology. Application to specific research problems. Materials fee: \$10.00 (Prerequisite: A course in archaeology or permission of the instructor.)
- ANTH 606**                      **3 Credits**                      **Alternate Spring**  
**Folklore & Mythology: Anthropological Perspective**                      **(3 + 0)**  
 Intensive introduction to anthropological theory concerning oral traditions and the verbal arts. Attention is paid to classic historical approaches, but discussion of contemporary focus on context and performance is highlighted. Students will research topics of individual interest. (Prerequisites: Upper division undergraduate anthropology course or permission of the instructor)
- ANTH 607**                      **3 Credits**                      **Alternate Spring**  
**Kinship and Social Organization**                      **(3 + 0)**  
 Forms and function of family and household organization, kinship and marriage in diverse human socio-cultural systems. Case studies from tribal and complex societies including contemporary United States. Materials fee: \$10.00 (Prerequisites: ANTH 104 or permission of instructor.)
- ANTH 608**                      **3 Credits**                      **Every Third Spring**  
**Classics in Anthropology**                      **(3+0)**  
 Landmark contributions in anthropological literature, ethnographies and theoretical works, will be discussed. Materials fee: \$5.00 (Prerequisite: Graduate standing or permission of instructors.)
- ANTH 609**                      **3 Credits**                      **Alternate Fall**  
**Anthropology of Religion**                      **(3 + 0)**  
 Religion or supernatural belief from the perspective of anthropology. Religion in the context of "primitive" society as well as its role in complex society. Religious practitioners, ritual, belief systems, and the relationship of religious behavior to other aspects of social behavior. Materials fee: \$5.00 (Prerequisite: Junior standing or permission of instructor.)

**ANTH 610**                      **3 Credits**                      **Alternate Fall**  
**Northern Indigenous Peoples and Contemporary Issues (3+0)**  
 (Same as NORS 610)

This course examines a number of issues affecting northern indigenous peoples from a comparative perspective, including perspectives from Alaska, Canada, Greenland, and the Soviet Union. Issues include the impact of the alienation of land on which these peoples depend; the relationship between their small, rural microeconomies and the larger agroindustrial market economies of which they are a part; education, language loss, and cultural transmission; alternative governmental policies towards indigenous peoples; and contrasting world views. Materials fee: \$5.00 (Prerequisites: Graduate standing or upper division with permission of instructor. )

**ANTH 611**                      **3 Credits**                      **Alternate Fall**  
**Proseminar in Archaeology**                      **(3+0)**

An intensive coverage of advanced topics in archaeological theory and techniques of data recovery and analysis. The course will emphasize both field and laboratory aspects as well as the substantive results of archaeological research. Lab fee: \$25; materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor. )

**ANTH 612**                      **3 Credits**                      **As Dem Wrnts**  
**Paleoecology**                      **(3+0)**

Advanced study of Quaternary environments. The influences of climatic change and the interrelationships of physical and biological factors on the distribution and evolution of biota including humans will be discussed. (Prerequisites: Graduate standing or permission of the instructor.)

**ANTH 613**                      **3 Credits**                      **As Dem. Wrnts**  
**Seminar: Problems in Arctic Archaeology**                      **(3+0)**

A seminar which focuses in depth upon topics of current interest in North American Arctic archaeology including Beringian prehistory, interior archaeology, coastal archaeology, past arctic adaptations, etc. Materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor.)

**ANTH 614**                      **3 Credits**                      **Alternate Spring**  
**Archaeology of Siberia**                      **(3+0)**

A thorough survey of the Paleolithic, Mesolithic, Neolithic, Bronze and Iron ages of Siberia through an examination of key archaeological sites. Data from archaeology, ethnology, linguistics and paleoanthropology will be applied to ancient population changes and the ethnogenesis of Siberian peoples. Materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor.)

**ANTH 616**                      **3 Credits**                      **As Dem. Wrnts**  
**Classics in Archaeology**                      **(3+0)**

Archaeological monographs, books, and articles which have influenced the direction of the discipline; alternately general classics and arctic region classics. Materials fee: \$5.00. (Prerequisite: Graduate standing or permission of instructor.)

**ANTH 621**                      **3 Credits**                      **Alternate Spring**  
**Proseminar in Physical Anthropology**                      **(3+0)**

An intensive graduate level survey of the subdiscipline of physical anthropology dealing with historical developments and current problems in the field. The general areas of human paleontology and human population biology will be stressed. Materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor.)

**ANTH 624**                      **3 Credits**                      **Alternate Fall**  
**Analytical Techniques**                      **(3 + 0)**  
 Classification, sampling, collection and analysis of anthropological data; parametric and nonparametric significance tests and measures of association, analysis of frequency data, estimating resemblance using multiple variables, computer simulations and analysis. Materials fee: \$5.00. (Prerequisites: Graduate standing in Anthropology. )

**ANTH 630**                      **3 Credits**                      **Alternate Spring**  
**Anthropological Field Methods**                      **(3+0)**  
 This course concentrates on the practical concerns and aspects of doing anthropological field research. Students are exposed to the relevant literature and significant discussions on the different aspects of fieldwork. In addition, students will gain practical experience in the problems, techniques and methods of fieldwork involving people from similar or distinct cultural backgrounds. The preparation of research proposals is also given attention. Materials fee: \$5.00. (Prerequisites: Graduate standing in anthropology or permission of instructor.)

**ANTH 631**

**ANTH 637**                      **3 Credits**                      **As Dem. Wrnts**  
**Methods in Ethnohistorical Research**                      **(3+0)**  
 In the seminar, students of anthropology are introduced to the methods of historical research, particularly the critical evaluation of written documents, problems of archaic language and paleography, and methods for assessing art and folklorist tradition as sources of history. Oral history and the data of language and archaeology are considered. Materials fee: \$5.00. (Prerequisites: Graduate standing in anthropology or permission of instructor.)

**ANTH 640**                      **3 Credits**                      **As Dem. Wrnts**  
**Problems in Anthropology**                      **(3+0)**  
 Examination and criticism of exemplary landmarks in the anthropological literature. The course will be devoted to a subdiscipline during each offering. Materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor.)

**ANTH 650**                      **3 Credits**                      **Every Third Spring**  
**Anthropological Perspectives on Russian America** **(3+0)**  
 An in-depth study of Russian penetration in North America, Russian institutions, and Russian impacts on the Aleut, Tlingit, and Yup'ik. Materials fee: \$5.00. (Prerequisite: Graduate standing or permission of instructor. )

**ANTH 651**                      **3 Credits**                      **As Dem. Wrnts**  
**Quaternary Seminar**                      **(3+0)**  
**(Same as GEOS 651)**  
 The seminar will involve learning about the Quaternary Period (relatively recent past – spanning the past two million years) in order to gain a better understanding of the landscape, biota, and climate of the present day. Quaternary studies are concerned with the historical dimension of the natural sciences. This seminar will range widely over diverse interdisciplinary subjects of Quaternary interest, such as paleoclimatology, paleobiogeography, vertebrate paleontology, and sedimentology. Materials fee: \$5.00. (Prerequisites: Graduate standing or permission of instructor.)

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## *Atmospheric Science Courses*

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| <b>ATM 636</b>                | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Physics of Atmospheres</b> |                  | <b>(3+0)</b>          |

Fundamental knowledge of the physics of atmospheres. Laws and concepts of physics are used to provide a quantitative description of physical processes occurring in planetary atmospheres and to investigate their physical behavior. Emphasis placed on Earth's atmosphere. Topics from kinetic theory, thermodynamics, electromagnetic theory, spectroscopy, physical chemistry and astrophysics form background for this introductory graduate course in planetary atmospheres. (Prerequisite: Graduate standing in physical sciences or permission of instructor. Next offered: 1993-94.)

|                                |                  |                         |
|--------------------------------|------------------|-------------------------|
| <b>ATM 644</b>                 | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Weather and Circulation</b> |                  | <b>(3+0)</b>            |

Fundamentals in meteorology and general circulation, including topics of atmospheric dynamics, vertical density stratification, convection, geostrophic wind, vorticity, Rossby waves, cyclone and anticyclone, synoptic meteorology, thunderstorms, monsoon, meteorological measurements, and numerical weather prediction. (Prerequisites: Graduate standing in physical sciences or permission of instructor.)

|   |                  |                         |
|---|------------------|-------------------------|
| <b>ATM 646</b>                              | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Dynamics of the Atmosphere and Ocean</b> |                  | <b>(3+0)</b>            |

The response of the atmosphere and ocean to mechanical and thermal forcing, mean circulation and thermal structure, the governing fluid equations and appropriate boundary conditions. Other topics include wave motions, cyclogenesis, frontogenesis, and heat, momentum and energy transport. (Prerequisite: Graduate standing.)

|                                   |                  |                       |
|-----------------------------------|------------------|-----------------------|
| <b>ATM 656</b>                    | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Climate and Climate Change</b> |                  | <b>(3+0)</b>          |

The climate of planet Earth and its changes with time. Radiative fluxes, greenhouse effects, energy budget, hydrological cycle, the atmospheric composition and climatic zones. Physical and chemical reasons for climatic change. (Prerequisite: Graduate standing in physical sciences)

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## *Biology Courses*

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| <b>BIOL 601</b>                 | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Radioisotopic Techniques</b> |                  | <b>(2+3)</b>            |

The use of radioisotopes in tracer type applications including licensing and legal requirements under the UAF byproduct material license; radiation safety and radiation detection; assay. Emphasis will be placed on radiotracer applications in biological sciences and the analysis and interpretation of the data from these applications. Laboratory fee: \$30.00 (Prerequisites: Graduate standing or permission of instructor for upper division undergraduates.)

|                        |                  |              |
|------------------------|------------------|--------------|
| <b>BIOL 602</b>        | <b>3 Credits</b> | <b>Fall</b>  |
| <b>Research Design</b> |                  | <b>(3+0)</b> |
| (Same as WLF 602)      |                  |              |

An introduction to the philosophy, performance and evaluation of hypothetical/deductive research in the natural sciences, with emphasis on hypothesis formulation and testing. Each student will develop a research proposal.

- BIOL 611J**                      **3 Credits**                      **Juneau, As Dem. Wrnts**  
**Fish Physiology**                      **(3+0)**  
 Physiology of the living fishes. (Prerequisites: BIOL 210 [Juneau BIOL 310], BIOL 427.)
- BIOL 614**                      **2 Credits**                      **Alternate Spring**  
**Grazing Ecology**                      **(2+0)**  
 (Same as WLF 614)  
 The dynamics of herbivory, emphasizing the grazing process, and including mechanisms of feeding, feeding behavior, habitat and plant selection, physiological influences on feeding, plant and community level responses, plant defenses against herbivory and management of grazing systems. (Prerequisites: graduate standing or approval of instructor. )
- BIOL 615**                      **3 Credits**                      **Alternate Spring**  
**Systematic and Comparative Biology**                      **(3+0)**  
 Concepts of systematic biology which are basic to a rigorous and complete understanding of modern evolutionary theory. Systematics provides the historical framework that is critical to a variety of comparative analyses in biology. Recent innovations in phylogenetic analyses will be explored. (Prerequisites: Graduate standing in biology or permission of instructor.)
- BIOL 618**                      **3 Credits**                      **Alternate Spring**  
**Biogeography**                      **(3+0)**  
 Spatial and temporal geography of plant and animal groups; emphasis on environmental and historical features controlling present patterns of distribution. (Prerequisites: Graduate standing or permission of instructor. )
- BIOL 619**                      **2 Credits**                      **Alternate Fall**  
**Marine Mammals**                      **(1+3)**  
 Evolution, systematics, morphology, physiology, ecology, and behavior of seals and whales. Laboratory fee: \$30.00. (Prerequisites: Graduate standing or permission of instructor.)
- BIOL 623**                      **3 Credits**                      **Alternate Fall**  
**Physiological Ecology of Overwintering**                      **(2+3)**  
 Investigation of the physiological and behavioral responses of animals to winter in northern environments. Exploration of the biologically relevant environmental changes that accompany winter, and comparison of alternative strategies that organisms use to cope with winter including: acclimatization, photoperiodism, hibernation, supercooling, freeze tolerance, freeze resistance, and arctic endurance. (Prerequisites: Graduate standing or permission of instructor. )
- BIOL 627**                      **3 Credits**                      **Alternate Spring**  
**Chemical Ecology**                      **(3+0)**  
 Current theory and experimentation in chemical ecology, with emphasis on chemical defenses of plants and animals. (Prerequisites: Graduate standing and permission of instructor.)
- BIOL 629**                      **3 Credits**                      **Alternate Fall**  
**Advanced Animal Behavior**                      **(3+0)**  
 Adaptive nature of behavior in relation to the physical, biological, and social environment. Current problems and controversies in the study of behavior. (Prerequisites: BIOL 441 and permission of instructor.)
- BIOL 637**                      **2 Credits**                      **Alternate Fall**  
**Modern Evolutionary Theory**                      **(2+0)**  
 Contemporary ideas and problems with the mechanics of evolution. (Prerequisites: Graduate standing or permission of instructor.)
- BIOL 638**                      **1 Credit**                      **Alternate Fall**  
**Seminar in Ecology and Evolutionary Biology**                      **(2+0)**  
 Readings and discussions of topics of current interest in ecology and evolution. (Prerequisite: Graduate Standing.)

- BIOL 642**                      **4 Credits**                      **Alternate Fall**  
**Advanced Microbiology**                      **(2 + 6)**  
(Same as BIOL 442)  
Diversity of microorganisms. Morphology, physiology, and systematics of microorganisms, particularly bacteria. Emphasis on organisms of environmental or medical interest. Laboratory fee: \$30.00. (Prerequisites: BIOL 342, CHEM 321, or permission of instructor. Next offered 1994-95)
- BIOL 645**                      **4 Credits**                      **Spring**  
**Molecular Evolution**                      **(3+3)**  
(Same as BIOL 445 & CHEM 445)  
Structure, function and evolution of hereditary molecules (nucleic acids). (Prerequisites: BIOL 262 or permission of the instructor.)
- BIOL 649J**                      **3 Credits**                      **Juneau, As Dem. Wrnts**  
**Molecular Genetics**                      **(3+0)**  
Both the development of classical molecular genetics and the examination of recent advances are followed using papers describing the original experiments. (Prerequisites: BIOL 252 [Juneau BIOL 351], CHEM 321, CHEM 324 [Juneau CHEM 351].)
- BIOL 650**                      **3 Credits**                      **Fairbanks, Alt. Fall**  
**Fish Ecology**                      **Juneau, As Dem. Wrnts**  
(Same as FISH 650)                      **(2+3)**  
The ecology of fish is examined from the community aspect. Current literature on inter- and intraspecific relationships, influence of the environment on community structure, behavior and production is emphasized. Laboratory fee: \$30.00. (Prerequisites: BIOL 473 [Juneau BIOL 423] and FISH 400. )
- BIOL 653**                      **3 Credits**                      **Alternate Fall**  
**Molecular Biology in the Real World**                      **(3 + 0)**  
(Same as BIOL 453 & CHEM 453)  
A lecture course providing in depth coverage of eukaryotic and prokaryotic gene function, including the applications of recombinant DNA technology to the biological sciences. (Prerequisites: BIOL 262, CHEM 321 or BIOL 303)
- BIOL 661**                      **4 Credits**                      **Alternate Spring**  
**Cell Biology**                      **(3 + 3)**  
(Same as BIOL 461)  
The structure and function of cells. Analysis of cellular events at the cytoplasmic level including: cell replication, functioning of the cytoskeleton, mitochondria, chloroplasts, Golgi-RER-lysosome system, hormone action, and the regulation of the internal environment of the cell. Laboratory focuses on techniques and problem solving. Laboratory fee: \$30.00 (Prerequisites: BIOL 262 or concurrent enrollment, CHEM 321 or concurrent enrollment, or permission of the instructor.)
- BIOL 663**                      **3 Credits**                      **Alternate Fall**  
**Biochemistry and Molecular Biology of Photosynthesis (3+0)**  
(Same as CHEM 663, MSL 663)  
Integrated analysis of photosynthesis. Processes to be addressed include gene expression, protein transport, membrane biogenesis, pigment synthesis, electron transport, regulation of enzyme activity, photon absorption and excitation energy transfer. Current data on environmental control of photosynthetic processes, from gene expression through photosynthetic competence, will be analyzed. (Prerequisites: CHEM 451 and MSL 650, or permission of instructor.)

- BIOL 664**                      **3 Credits**                      **Alternate Spring**  
**Algal Biology: Physiological Ecology**  
 (Same as MSL 664)                      (3+0)  
 Ecology of algae examined from a physiological perspective. Emphasis will be placed on phytoplankton, the most thoroughly characterized algae. Algal physiological ecology will be examined both from a classical viewpoint as well as from a more mechanistic approach utilizing modern techniques. (Prerequisites: MSL 650, an undergraduate plant physiology course, or permission of instructor.)
- BIOL 672**                      **3 Credits**                      **Alternate Fall**  
**Ecosystem Processes**                      (2+0+2)  
 A comparative approach to the structural and functional components of terrestrial ecosystems, emphasizing primary and secondary production and the dynamics of nutrient cycling processes. Interactions between producers, consumers, and decomposition processes and effects on the efficiencies of nutrient and energy transfers. (Prerequisites: Graduate standing and permission of the instructor.)
- BIOL 673**                      **3 Credits**                      **Alternate Spring**  
**Soil Microbiology and Biochemistry**                      (3+0)  
 (Same as NRM 673)  
 This course will examine, in depth, several (4-5) current topics in soil microbiology and biochemistry. It will be based on readings from the primary literature and discussions in class. Each student will be expected to lead at least one discussion, write a research proposal, and present the proposal to class. (Prerequisites: at least one course in soil science and one course in microbiology or permission of the instructor.)
- BIOL 675**                      **3 Credits**                      **Alternate Fall**  
**Plant Physiological Ecology**                      (2+3)  
 Physiological ecology of dormancy, germination, growth, photosynthesis, water relations and nutrition with an emphasis on northern and other stressful environments; relationship to community and ecosystem processes. Laboratory fee: \$30.00. (Prerequisites: BIOL 239; BIOL 334; BIOL 474; or permission of instructor.)
- BIOL 677**                      **3 Credits**                      **Spring**  
**Advanced Topics in Plant Ecology and Systematics** (3+0)  
 One of four topics is covered each year: 1) Current issues and concepts in plant population and community ecology. 2) Reproductive ecology - pollination, seed dispersal, breeding systems, and coevolution. 3) Plant families of the world. 4) Plant-animal interactions - evolution and ecology. (Prerequisites: BIOL 474 or permission of instructor. May be repeated for credit when topic differs.)
- BIOL 678**                      **3 Credits**                      **Alternate Spring**  
**Tropical Ecology Field Course**                      (0+3+Arr)  
 Intensive field study of the ecology of selected tropical habitats, with emphasis on ecological field methods, plant-animal interactions and ecological problems and processes unique to the tropics. Course consists of two week intensive field work between the fall and spring semesters, followed by weekly lecture/labs during the spring semester. Preregistration in the preceding fall semester is required. (Field trip cost borne by student.) (Prerequisites: BIOL 271, BIOL 239 and either BIOL 308 or BIOL 331; graduate student standing or senior with permission of instructor.)
- BIOL 680**                      **3 Credits**                      **Alternate Fall**  
**Data Analysis in Biology**                      (2+3)  
 (Same as STAT 680 & WLF 680)  
 Biological applications of nonparametric statistics, including tests based on binomial and Poisson distributions, analysis of two-way and multiway contingency tables, and tests based on ranks; multivariate statistics, including principal component analysis, ordination techniques, cluster analysis, and discriminate analysis; and time-series analyses. Introduction to the use of the computer and use of statistical packages. Each student will analyze a data set appropriate to the student's research interests. Laboratory fee: \$20. (Prerequisites: STAT 300, STAT 401 and either graduate standing in a biologically oriented field or permission of instructor.)



**BIOL 681**                      **4 Credits**                      **Fall**  
**Processes of Evolution**                      **(3+3)**  
(Same as BIOL 481)

Processes of evolutionary change are used to explore the unifying principles of the biological sciences. Develops fundamental models of population genetics relevant to basic and applied studies in ecology, plant and animal breeding, systematics, conservation biology and wildlife biology. (Prerequisites: BIOL 271, 262, STAT 200, junior standing or above or permission of instructor. STAT 200 may be taken concurrently.)

**BIOL 685**                      **3 Credits**                      **Alternate Fall**  
**Water Pollution Biology**                      **(3 + 0)**  
(Same as BIOL 480)

Water quality standards: criteria and use classifications. Effects of man-caused environmental stresses on the composition and dynamics of aquatic communities. Changes in transfers of matter and energy. Biological indices including diversity. (Prerequisite: BIOL 271, and 473 or 477, or permission of the instructor.)

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## ***Business Administration Courses***

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**BA 604**                      **3 Credits**                      **(3+0)**  
**The Legal Environment of Business**

An introduction to the legal environment of business. Topics include the judicial system, legal processes, business law, product safety and advertising, labor-management relations, business ethics, and corporate social responsibility. (Prerequisite: Graduate standing.)

**BA 607**                      **3 Credits**                      **(3+0)**  
**Human Resources Management**

The study of the effective management of human resources in organizations to include employee planning and recruiting, selection and orientation, training and career development, performance evaluation, compensation, EEO, occupational safety and health, and labor relations. (Prerequisites: Graduate standing.)

**BA 610**                      **3 Credits**                      **(3+0)**  
**Production/Operations Management**

Introduction to the field of production management with an emphasis on the design and management of efficient manufacturing and service systems. Topics include operations strategy, allocation of scarce resources, productivity, quality, product design and development, facility and distribution issues, automation, job design, materials and inventory management, scheduling, and project planning. (Prerequisites: Graduate standing.)

**BA 617**                      **3 Credits**                      **(3+0)**  
**Organizational Theory and Behavior**

A general approach to understanding behavior at individual, group, and organizational levels. Various methods are used to examine leadership, communication, group dynamics, and the structure and design of organizations. (Prerequisite: Graduate standing.)

**BA 625**                      **3 Credits**                      **(3+0)**  
**Financial Management**

A broad based introduction to the theories and techniques of corporate financial management. Topics covered include capital budgeting, cost of capital, leverage and valuation. (Prerequisites: Graduate standing.)

- BA 643** **3 Credits**  
**Marketing Management** **(3+0)**  
 A broad based introduction to the theories and techniques of corporate financial management. Topics covered include risk-return, capital budgeting, cost of capital, options, leverage and valuation. (Prerequisites: Graduate standing.)
- BA 660** **3 Credits**  
**Seminar in Production Management** **(3+0)**  
 An advanced seminar that explores classic and current issues and topics associated with production activities in manufacturing and services. Cases, readings, and projects are used to explore how companies worldwide have achieved advances in productivity, quality and flexibility. (Prerequisite: BA 610.)
- BA 670** **3 Credits**  
**Seminar in Multinational Business Management** **(3+0)**  
 An advanced seminar expanding management education from the domestic to the international arena. Concentration is given to the strategy and structure of the multinational enterprise; the industrial developing and command economies in transition; the movement of capital, people, product and technology across national borders; and the socio-cultural influences on international trade and investment.
- BA 675** **3 Credits**  
**Practical Quantitative Methods for Business Decision Making(3 + 0)**  
 The objective of this course is to provide the student with an in-depth treatment of quantitative research methods in an applied context. Hence the focus of the course is not the mathematical derivations and properties of statistical techniques, but rather the usefulness of those techniques to the managerial decision making process. Research skills are presented as a set of tools that enable managers to make better decisions. (Prerequisites: Completion of foundation classes and graduate standing.)
- BA 680** **3 Credits**  
**Seminar in Finance** **(3+0)**  
 An advanced seminar covering the principles of investing in marketable securities from the individual's perspective, the determination of value, analysis of growth, technical analysis, CAPM, and portfolio management. (Prerequisite: BA 625.)
- BA 683** **3 Credits**  
**Seminar in Marketing** **(3+0)**  
 An advanced seminar covering marketing institutions, systems, policies, and practices. Review of marketing constituents in economic development, marketing theory, and current problems. (Prerequisites: BA 643.)
- BA 685** **3 Credits**  
**International Finance** **(3+0)**  
 Advanced examination of exchange rate behavior, risk analysis and control, and direct and indirect foreign investment. (Prerequisites: BA 625 and BA 680.)
- BA 690** **3 Credits**  
**Corporate Strategy** **(3+0)**  
 An integrative approach to strategy formation and implementation (decision-making) to achieve organization goals. Students will be introduced to theoretical perspectives and associated methodologies directed towards resolving the unstructured problems and opportunities which confront general managers at the highest levels of an organization. BA 690 is an advanced seminar taken during the student's last spring semester.
- BA 691** **3 Credits**  
**Advanced Topics in Business** **(3+0)**  
 An advanced course providing necessary training in developing managers' ability to excel in specialized areas of business such as entrepreneurship and risk management. (Prerequisite: Graduate standing.)

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## *Chemistry Courses*

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- CHEM 602**                      3 Credits                      Alternate Fall  
**Advanced Inorganic Chemistry**                      (3+0)  
Advanced topics in inorganic chemistry. Topic Areas: solid state chemistry, bioinorganic chemistry, X-ray diffraction, thermodynamic aspects, physical methods, unusual oxidation states, etc. Variable content. May be repeated for credit. (Prerequisite: CHEM 402 or 431.)
- CHEM 606**                      3 Credits                      Alternate Fall  
**Atmospheric Chemistry**                      (3+0)  
Chemistry of the lower atmosphere (troposphere and stratosphere) including photochemistry, kinetics, thermodynamics, box modeling, biogeochemical cycles, and measurement techniques for atmospheric pollutants; study of important impacts to the atmosphere which result from anthropogenic emissions of pollutants, including acid rain, the "greenhouse" effect, urban smog, and stratospheric ozone depletion. (Prerequisites: CHEM 332 or equivalent or permission of instructor.)
- CHEM 608**                      3 Credits                      Alternate Spring  
**Global Chemical Cycles**                      (3+0)  
The course discusses the current understanding of global chemical cycles and the uncertainties associated with our knowledge. We will look at some of the experimental techniques used to investigate chemical cycles on a global scale. Critical review of recent scientific literature will help us to understand the uncertainties and difficulties involved in quantifying global scale cycles. The course will deal with the interaction and exchange of chemicals between the atmosphere and Earth's surface (both land and ocean), chemical reservoirs, and the implications for Global Change.
- CHEM 612**                      3 Credits                      Alternate Fall  
**Environmental Analytical Chemistry**                      (3+0)  
Advanced topics in analytical chemistry as applied to environmental chemistry. This includes discussion of instrumental methods used in the determinative step of analysis and strategies of experimental design, sampling, calibration, ultratrace analyses, sample preparation, and quality control. (Prerequisite: CHEM 332, 412 or permission of the instructor. )
- CHEM 621**                      3 Credits                      Alternate Fall  
**Enzymology & Bio-Organic Chemistry**                      (3+0)  
A lecture course emphasizing applications of the methods and concepts of physical organic chemistry to enzyme-catalyzed reactions. (Prerequisite: CHEM 451).
- CHEM 622**                      3 Credits                      Alternate Fall  
**Environmental Organic Chemistry**                      (3+0)  
Role of organic compounds and their transformations in the environment. Topics include biogeochemical cycles of natural and synthetic organics, pollutant chemistry in atmospheric, terrestrial and aquatic systems, geochemistry of fossil fuel formation. (Prerequisite: CHEM 322.)
- CHEM 631**                      3 Credits                      Alternate Spring  
**Environmental Physical Chemistry**                      (3+0)  
Application of thermodynamic, kinetic, and spectroscopic theories in understanding environmental chemical problems in natural water systems and the atmosphere. (Prerequisite: CHEM 332.)
- CHEM 632**                      3 Credits                      Alternate Spring  
**Molecular Spectroscopy**                      (3+0)  
Application of quantum mechanics to molecular bonding and spectroscopy. Variable content. May be repeated for credit. (Prerequisite: CHEM 332. )

- CHEM 645**                      **4 Credits**                      **Spring**  
**Molecular Evolution**                      **(3+3)**  
 Structure, function and evolution of hereditary molecules (nucleic acids). (Prerequisite: BIOL 362.)(same as BIOL 645)
- CHEM 652**                      **3 Credits**                      **Alternate Spring**  
**Advanced Biochemistry**                      **(3+0)**  
 A lecture course where the students will study selected advanced topics in biochemistry. Variable content. May be repeated for credit. (Prerequisite: Chem 451)
- CHEM 653**                      **3 Credits**                      **Alternate Fall**  
**Molecular Biology in the Real World**                      **(3+0)**  
 A lecture course providing in depth coverage of eukaryotic and prokaryotic gene function, including the applications of recombinant DNA technology to the biological sciences. (Prerequisite: BIOL 262, CHEM 321 or BIOL 303)(same as BIOL 453)
- CHEM 654**                      **3 Credits**                      **Alternate Spring**  
**Protein Structure and Function**                      **(3+0)**  
 Contemporary topics in peptide and protein biochemistry. Topics include peptide synthesis, protein modification, comparative aspects of structure, protein engineering, enzyme and receptor function as well as molecular modeling. (Prerequisite: CHEM 451.)
- CHEM 655**                      **3 Credits**                      **Alternate Spring**  
**Environmental Biochemistry and Biotechnology** **(3+0)**  
 The thrust of the course is toward environmental biochemistry where the environment is broadly defined to include the home, the workplace and lifestyle, as well as the great out-of-doors. A major focus will be on those general properties and principles which determine how poisonous (toxic) various chemicals are. Major natural and synthetic chemicals in the environment of developed and developing countries will be reviewed. (Prerequisite: CHEM 451.)
- CHEM 660**                      **3 Credits**                      **Spring**  
**Chemical Oceanography**                      **(3+0)**  
 (Same as MSL 660)  
 An integrated study of the chemical, biological, and physical processes that determine the distribution of chemical variables in the sea. The distribution of stable and radio-isotopes are used to follow complex chemical cycles, with particular emphasis on the cycles of nutrient elements. The chemistry of carbon is considered in detail. The implications of the recently explored mid-ocean ridge vent system to ocean chemistry are examined. (Prerequisites: Graduate standing or permission of instructor.)
- CHEM 662**                      **3 Credits**                      **Fall & Spring**  
**Biochemical and Molecular Biology Research Techniques** **(0+3)**  
 A laboratory course where the student will study research techniques by rotating through three (3) laboratories during the academic year. (Prerequisite: Chem 451.)
- CHEM 663**                      **3 Credits**                      **Alternate Spring**  
**Biochemistry and Molecular Biology of Photosynthesis** **(3+0)**  
 (Same as BIOL 663, MSL 663)  
 Integrated analysis of photosynthesis. Processes to be addressed include gene expression, protein transport, membrane biogenesis, pigment synthesis, electron transport, regulation of enzyme activity, photon absorption and excitation energy transfer. Current data on environmental control of photosynthetic processes, from gene expression through photosynthetic competence, will be analyzed. (Prerequisites: CHEM 451 and MSL 650 or permission of instructor.)
- CHEM 673**                      **3 Credits**                      **Alternate Spring**  
**Microbial Biochemistry and Bioenergetics**                      **(3+0)**  
 Course seeks to develop a working knowledge of energy transduction in biological systems. Particular emphasis will be on the molecular mechanisms involved in the generation of transmembrane potentials and solute flux and how microorganisms use these processes to control their environment. (same as MSL 673)

|  |                     |                        |
|--|---------------------|------------------------|
| <b>CHEM 688</b>                                  | <b>0 - 1 Credit</b> | <b>Fall and Spring</b> |
| <b>Biochemical and Molecular Biology Seminar</b> |                     | <b>(1+0)</b>           |

A seminar on various topics related to biochemistry and molecular biology including discussions of recent literature and research results.

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## *Civil Engineering Courses*

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|---------------------------|------------------|------------------------|
| <b>CE 603</b>             | <b>3 Credits</b> | <b>Fall and Spring</b> |
| <b>Arctic Engineering</b> |                  | <b>(3+0)</b>           |

Application of engineering fundamentals to problems of advancing civilization to polar regions. Logistics, foundations on frozen ground and ice thermal aspects of structures, materials, transport, and communications, and heating and ventilating. Materials fee: \$10. (Prerequisites: Graduate standing or permission of instructor.)

|                        |                  |                         |
|------------------------|------------------|-------------------------|
| <b>CE 605</b>          | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Pavement Design</b> |                  | <b>(3+0)</b>            |

Current design techniques for flexible and rigid pavements. Materials characterization, loading considerations, empirical design methods, mechanistic design methods, rehabilitation. (Prerequisites: Graduate standing and CE 402 or consent of instructor.)

|                        |                  |                       |
|------------------------|------------------|-----------------------|
| <b>CE 617</b>          | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Control Surveys</b> |                  | <b>(3+0)</b>          |

Geodetic surveying, where the shape of the earth must be considered. Forward and inverse geodetic problems. Medium to long electronic distance measurements. Heavy emphasis on Alaska State Plane Coordinate System (Nad 83) and UTM Coordinate System. Adjustment of level nets. (Prerequisites: CE 415 or other surveying experience acceptable to instructor.)

|                                       |                  |                         |
|---------------------------------------|------------------|-------------------------|
| <b>CE 620</b>                         | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Civil Engineering Construction</b> |                  | <b>(3+0)</b>            |

Construction equipment, methods, planning and scheduling, construction contracts, management and accounting, construction estimates, costs, and project control. (Prerequisites: ESM 450 or equivalent.)

|   |                  |                       |
|---|------------------|-----------------------|
| <b>CE 622</b>                               | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Foundations and Retaining Structures</b> |                  | <b>(3+0)</b>          |

Advanced study of shallow and deep foundations, retaining structures and buried pipes. (Prerequisites: CE 422 or permission of instructor.)

|                           |                  |                       |
|---------------------------|------------------|-----------------------|
| <b>CE 625</b>             | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Soil Stabilization</b> |                  | <b>(3+0)</b>          |

Soil and site improvement using deep and shallow compaction, additives, preloading, vertical and horizontal drains, electro-osmosis and soil reinforcement. (Prerequisites CE 435 or permission of instructor.)

|   |                  |                       |
|---|------------------|-----------------------|
| <b>CE 626</b>                                   | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Applications in Geotechnical Engineering</b> |                  | <b>(3+0)</b>          |

Selected topics in geotechnical engineering studied in conjunction with case histories. (Prerequisites: CE 326, CE 422 and CE 425 or permission of instructor.)

|                               |                  |               |
|-------------------------------|------------------|---------------|
| <b>CE 627</b>                 | <b>3 Credits</b> | <b>Spring</b> |
| <b>Earthquake Engineering</b> |                  | <b>(3+0)</b>  |

Fundamentals of geotechnical earthquake engineering: wave propagation in soils; dynamic soil properties; influences of soils on ground motion; determination of soil response under strong seismic motion; causes of soil failures, soil liquefaction, soil settlement, soil-structure interaction and slope stability; analysis and design of dams, earth structures and foundation systems )

- CE 628**                      **3 Credits**                      **Alternate Fall**  
**Soil Behavior Under Load**                      **(3+0)**  
Fundamentals of soil behavior under load; pore pressure during monotonic loading; Ladd's "Simple Clay" model; densification and drained cyclic loading of sand; undrained cycle loading of soil. (Prerequisite: CE 326.)
- CE 631**                      **3 Credits**                      **Fall**  
**Advanced Structural Analysis**                      **(3+0)**  
Derivation of the basic equations governing linear structural systems. Application of stiffness and flexibility methods to trusses and frames. Solution techniques utilizing digital computers. Introduction to structural dynamics.
- CE 632**                      **3 Credits**                      **Alternate Fall**  
**Advanced Structural Design**                      **(3+0)**  
Design of complex structures and frames. Live, dead, and earthquake loadings. Structural joints, columns, connectors, ties, and struts. Application of modern materials and techniques to design. (Prerequisite: CE 431.)
- CE 637**                      **3 Credits**                      **Fall**  
**Earthquake Engineering II**                      **(3+0)**  
Fundamentals of structural earthquake engineering: strong ground motion phenomena; dynamic analysis of structural systems for seismic motion; response spectrum and time history methods, design of structural systems for lateral forces; shearwalls and diaphragms; moment-resistive frames, braced frames; current design criteria and design practice; connection details, serviceability requirement; story drift, non-structural building elements; soil-structure interaction. (Prerequisite: CE 432.)
- CE 661**                      **3 Credits**                      **Alternate Fall**  
**Advanced Water Resources Engineering**                      **(3+0)**  
Engineering hydraulics and hydrology with emphasis on statewide topics, computer modeling for runoff and groundwater studies, reservoir mechanics, fish hatchery design, and hydro-power generation. (Prerequisite: Permission of the instructor.)
- CE 662**                      **3 Credits**                      **Alternate Spring**  
**Open Channel and River Engineering**                      **(3+0)**  
Principles of open channel flow, transitions and controls, unsteady flow, river engineering, stream channel mechanics, and mechanics of sedimentation. (Prerequisite: ES 341.)
- CE 663**                      **3 Credits**                      **Alternate Years**  
**Groundwater Dynamics**                      **(3+0)**  
Fundamentals of geohydrology, hydraulics of flow through porous media, well hydraulics, groundwater pollution, and groundwater resources development. (Prerequisite: ES 341.)
- CE 676**                      **3 Credits**                      **Alternate Fall**  
**Coastal Engineering**                      **(3+0)**  
Review of deep and shallow water waves, littoral drift, coastal structures, pollution problems, and harbor seiches. (Prerequisite: ES 341.)
- CE 681**                      **3 Credits**                      **Alternate Spring**  
**Frozen Ground Engineering**                      **(3+0)**  
Nature of frozen ground, thermal properties of frozen soils, classification, physical and mechanical properties of frozen soils, sub-surface investigation of frozen ground, thaw settlement and thaw consolidation, slope stability, and principles of foundation design in frozen ground. (Prerequisite: Training or experience in soil mechanics.)

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|---|------------------|-------------------------|
| <b>CE 682</b>   | <b>3 Credits</b> | <b>Alternate Years</b>  |
| <b>Ice Engineering</b>  |                  | <b>(3+0)</b>            |
| In this course the factors governing design of marine structures, which must contend with the presence of ice are discussed. Topics include ice growth, ice structure, mechanical properties and their dependence on temperature and structure, creep and fracture, mechanics of ice sheets, forces on structures, and experimental methods. (Prerequisites: ES 331, MATH 202, training or experience in soil mechanics.) |                  |                         |
|   |                  |                         |
| <b>CE 683</b>   | <b>3 Credits</b> | <b>Alternate Fall</b>   |
| <b>Arctic Hydrology and Hydraulic Engineering</b>   |                  | <b>(3+0)</b>            |
| The course is designed to present materials on aspects of hydrology and hydraulics unique to engineering problems of the north. Although the emphasis will be on Alaskan conditions, information from Canada and other circumpolar countries will be included in the course. (Prerequisite: CE 344 or equivalent.)  |                  |                         |
|   |                  |                         |
| <b>CE 684</b>   | <b>3 Credits</b> | <b>Alternate Years</b>  |
| <b>Arctic Utility Distribution</b>  |                  | <b>(3+0)</b>            |
| Practices and considerations of utility distribution in Arctic regions. Emphasis on proper design to include freeze protection, materials, energy conservation, and system selection. (Prerequisite: ES 341 or permission of instructor.)   |                  |                         |
|   |                  |                         |
| <b>CE 685</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Topics in Frozen Ground Engineering</b>  |                  | <b>(3+0)</b>            |
| Selected frozen ground foundation engineering problems will be explored in depth including refrigerated foundations and pile foundations. (Prerequisite: CE 681.)   |                  |                         |

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## *Communication Courses*

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|--|------------------|------------------------|
| <b>COMM/JB 601</b>   | <b>3 credits</b> | <b>Alternate Years</b> |
| <b>Communication Methodologies</b>   |                  | <b>(3+0)</b>           |
| Communication 601 is a required core course for the Master's Degree in Professional Communication. The student will be introduced to the range of methodologies that are used to produce both practical and theoretic knowledge in the discipline. Both qualitative and quantitative approaches to knowledge building will be addressed. Students will learn the relationships between scientific questions, appropriate selection of methodology, and types of knowledge products.  |                  |                        |
|  |                  |                        |
| <b>COMM 622</b>  | <b>3 Credits</b> | <b>Alternate Years</b> |
| <b>Interpersonal Interaction</b>   |                  | <b>(3+0)</b>           |
| All understandings of communication study begin at the interpersonal level because this is the context in which the relation of self and the social is most clear. Interpersonal Interaction will provide students an opportunity to investigate a particular communication context of their choice (health comm., family comm., comm. and aging, conflict comm., relational comm., comm. education, etc.) and ways in which interpersonal interactions interconnect human social life at all levels of lived experience. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.) |                  |                        |
|  |                  |                        |
| <b>COMM/JB 625</b>   | <b>3 Credits</b> | <b>Alternate Years</b> |
| <b>Communication Theory</b>  |                  | <b>(3+0)</b>           |
| Communication 625 is a required course for the Master's Degree in Professional Communication. The course is designed to acquaint students with both the historical evolution of the discipline against the backdrop of the evolution of the social sciences and with the theoretical perspectives of knowledge-building that have marked that disciplinary evolution. Students will learn the contextual interconnectedness of philosophy and theory. Finally, Communication Theory will also make the essential connections between theoretical perspectives and their professional uses.                                   |                  |                        |

**COMM 631                      3 Credits                      Alternate Years**  
**Teambuilding                      (3+0)**

This course links small group communication theory and methods to professional applications. The focus of the course is on ways to create, maintain, and reward productive work teams. Face-to-face and mediated group sessions will be discussed as well as the impact of professional work groups on organizational teambuilding. Students will work with teambuilding interventions that they will be able to apply in a variety of organizational settings. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)

**COMM 635                      3 Credits                      Alternate Years**  
**Organizational Culture and Communication                      (3+0)**

Organizational Culture and Communication addresses the most contemporary perspective of communication in the organizational context. The interpretive paradigm will be examined in terms of the broad range of knowledge currently being generated by Communication scholars and other professionals who are looking more closely at the ways communication produces the social contexts in which it occurs. Human organizations and their transparency to the communication of their members is the pragmatic substance of the course. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)

**COMM 675                      3 Credits                      Alternate Years**  
**Training & Development Communication                      (3+0)**

Training & Development Communication offers students practical, current understandings of planned training, development, and transformation processes as they are applied in the organizational setting. The information and class projects will help prepare training and development specialists, consultants, and others whose interest is in this growing communication field. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)

**COMM 680                      3 Credits                      Alternate Years**  
**Communication & Diversity in the Professional World (3+0)**

Students will learn to apply case study methods to the ever-expanding problems of communication in a changing workplace. The diversity of gender, race, ethnicity, nationality, physical ability, sexual orientation, and age are reshaping the professional world at every level and Communication professionals are increasingly called upon to formulate ways of accommodating this change. The course will prepare students to address diversity and planned changes in the workplace. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)

**COMM 682                      3 Credits                      Alternate Years**  
**Seminar in Communication                      (3+0)**

Communication 682 is a capstone course, intended to provide the student an opportunity to integrate his or her graduate coursework in Professional Communication. Students will explore a variety of communication contexts by analyzing interpersonal, group, and organizational considerations related to the context they select to investigate. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)

**COMM 685                      3 Credits                      Alternate Years**  
**Teaching College Communication                      (3+0)**

This course is required of all teaching assistants who will be responsible for instruction in the Department's service course (Fundamentals of Oral Communication: Small Group Context; COMM 131x). Teaching College Communication addresses classroom communication practices in addition to emphasizing how to teach students to work in groups. Teaching Assistants will be provided with strategies and content for each of the instructional components of the basic Communication course. (Prerequisite: Enrollment in MA in Professional Communication degree or permission of instructor.)



**COMM/JB 699**

**3 Credits**

**Fall and Spring**

**Thesis**

**(0+0)**

Every candidate for the Master's Degree in Professional Communication will complete a thesis project. The requirement consists of an original piece of Communication research directed by a member of the graduate faculty in the Communication Department. The completed and accepted thesis will be presented in an appropriate public forum.

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## ***Computer Science Courses***

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**CS 605**

**3 Credits**

**Alternate Spring**

**Artificial Intelligence**

**(3+0)**

Study and writing of AI programs: expert systems, expert system shells, blackboard systems, neural networks. Representation of knowledge, pattern analysis, inference networks, neural network training. Study of software engineering aspects of AI software. (Prerequisite: Consent of CS graduate advisor. ) Next offered 1995-1996.

**CS 611**

**3 Credits**

**Alternate Fall**

**Complexity of Algorithms**

**(3+0)**

Theoretical analysis of various algorithms: topics include sorting, searching, selection, polynomial evaluation, NP completeness, decidability. (Prerequisites: consent of CS graduate advisor.) Next offered 1996-1997.

**CS 621**

**3 Credits**

**Alternate Fall**

**Advanced Systems Programming**

**(3+0)**

Multiprogramming and multiprocessing systems. File and program security. Scheduling optimization and system tuning, I/O processing, archiving and system recovery, and initialization. Study of current systems. (Prerequisites: CS 311 and CS 321.) Next offered 1996-1997.

**CS 622**

**3 Credits**

**As Dem. Wrnts**

**Performance Evaluation**

**(3+0)**

A survey of techniques of modeling and testing concurrent processes and the resources they share. Includes levels and types of system simulation, performance prediction, benchmarking and synthetic loading, hardware and software monitors. (Prerequisites: CS 321 or consent of CS graduate advisor.)

**CS 625**

**3 Credits**

**Alternate Spring**

**Data Base Systems**

**(3+0)**

Data independence, relationships, and organization. Hierarchical, network, and relational data models: canonical schema. Data description languages, query facilities, relational calculus. File organization and security, index organization, data integrity and reliability. Review of current database software packages. Design and implementation of a data base applications project. (Prerequisites: CS 311, 321. ) Next offered 1995-96.

**CS 631**

**3 Credits**

**Fall**

**Programming Language Implementation**

**(3+0)**

Formal treatment of programming language translation and compiler design. Parsing context free languages, translation specifications, machine independent code, NBF, scanners, symbol tables, parsers, and recursive descent. Programming of compiler or interpreter segments as projects. (Prerequisite: CS 331.)

**CS 641**

**3 Credits**

**Spring**

**Advanced Systems Architecture**

**(3+0)**

A study of computer systems which have been developed to make special types of processing more efficient or reliable. Examples include RISC machines and parallel machines. (Prerequisites: CS 321 or consent of CS graduate advisor.)

- CS 642**                      **3 Credits**                      **Alternate Fall**  
**Advanced Computer Networks**                      **(3+0)**  
 A study of networks of interacting computers. The problems, rationales, and possible solutions for both distributed processing and distributed databases will be examined. Major national and international protocols will be presented. (Prerequisite: consent of CS graduate advisor.) Next offered 1995-1996.
- CS 643**                      **3 Credits**                      **Fall**  
**VLSI in Computer System Design**                      **(3+3)**  
 (Same as EE 643)  
 In depth study of Very Large Scale Integrated (VLSI) circuit design techniques and VLSI design tools. Various Metal Oxide Semiconductor (MOS) devices and simple state machinery will be studied from the perspective of fabrication.
- CS 644**                      **1 Credits**                      **Spring**  
**VLSI Fabrication and Testing Practicum**                      **(1+3)**  
 (Same as EE 644)  
 Continuation of EE 643 in which the device(s) that were designed in that course are fabricated and, upon receipt from the foundry, are tested for consistency with the design parameters. (Prerequisites: EE 643/CS 643 in previous semester.)
- CS 651**                      **3 Credits**                      **Alternate Fall**  
**The Theory of Computation**                      **(3+0)**  
 Languages and formal models of algorithms: Turing machines, phrase structured grammars and recursive functions. Undecidability, the halting problem, Rice's Theorem. (Prerequisite: CS 451.) Next offered: 1995-1996.
- CS 661**                      **3 Credits**                      **Alternate Fall**  
**Optimization**                      **(3+0)**  
 (Same as MATH 661)  
 Linear and nonlinear programming, simplex method, duality and dual simplex method, post-optimal analysis, constrained and unconstrained nonlinear programming, Kuhn-Tucker condition. Applications to management, physical, and life sciences. Computational work with the computer. (Prerequisites: Knowledge of calculus, linear algebra, and computer programming.) Next offered: 1996-1997.
- CS 662**                      **3 Credits**                      **As Dem. Wrnts**  
**Mathematical Software**                      **(3+0)**  
 A survey of techniques for using the computer for mathematical applications. Includes techniques for symbolic and numerical differentiation and integration, unlimited precision arithmetic, polynomial manipulations, and introduction to symbolic manipulation systems, mathematical software libraries and the computation of special functions. (Prerequisite: Consent of CS graduate advisor.)
- CS 670**                      **3 Credits**                      **Alternate Spring**  
**Computer Science for Software Engineers**                      **(3+0)**  
 An overview and survey of the theoretical underpinnings of computer science. Topics are taken from the areas of algorithms and data structures; computer architecture; computer networks, communications, and operating systems; computability and formal languages; languages and compilation. (Prerequisite: admission to the Computer Science MS program. Not required for students with a BS in Computer Science.) Next offered 1995-1996.
- CS 671**                      **3 Credits**                      **Fall**  
**Software Engineering**                      **(3+0)**  
 Software development as an engineering discipline. Project planning, proposal writing, and management. Software requirements, design, implementation, test and documentation. Additional topics from object-oriented design, real time design, and validation. (Prerequisites: Four years of experience as software practitioner or permission of instructor.)

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|---|------------------|-------------------------|
| <b>CS 672</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Software Process Improvement</b>   |                  | <b>(3+0)</b>            |
| Commonly applied methods for improving the software development process. Emphasis on the Software Engineering Institute's Capability Maturity Model (CMM), and specifically on the key process areas of Level 2 and Level 3 of that model. These include software configuration management, software quality assurance, and software standards. (Prerequisites: CS 671 or consent of the instructor.) Next offered 1996-1997. |                  |                         |
| <b>CS 681</b>   | <b>3 Credits</b> | <b>Spring</b>           |
| <b>Topics in Computer Graphics</b>  |                  | <b>(3+0)</b>            |
| Hardware, software, and techniques used in computer graphics taken from topics such as refresh, storage, raster scan technology, volume rendering, particle systems, shading, image processing, computer aided design, video effects, animation and virtual environments. Materials fee: \$10.00. (Prerequisite: CS 281 or consent of CS graduate advisor.)   |                  |                         |
| <b>CS 690</b>   | <b>3 Credits</b> | <b>Fall</b>             |
| <b>CS 691</b>   | <b>3 Credits</b> | <b>Spring</b>           |
| <b>Graduate Seminar and Project</b>   |                  | <b>(3+0)</b>            |
| A two-semester seminar in which students will, individually or in teams, work on and present the results of major programming or literature survey projects in computer science. Written and oral reports will be required. Graded pass/fail. (Prerequisites: Completion of 12 credits in graduate computer science courses or consent of CS graduate advisor. CS 690 is prerequisite for CS 691.)                            |                  |                         |

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## *Counseling Courses*

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| <b>COUN 610</b>   | <b>1 Credit</b>  | <b>Summer</b>                 |
| <b>Culture and the Counselor</b>  |                  | <b>(1+0)</b>                  |
| Students will clarify beliefs and values and develop individual theories of counseling. Focus is on expanding awareness of self and others as future members of helping professions. This course, along with COUN 611, will serve as a pre-practicum and cohort building experience. (Prerequisites: Admittance to Guidance and Counseling Program and permission of instructor. To be taken concurrently with COUN 615 Foundations.) |                  |                               |
| <b>COUN 611</b>   | <b>1 Credit</b>  | <b>Summer</b>                 |
| <b>Theory Building for Counselors</b>   |                  | <b>(1+0)</b>                  |
| To be taken in sequence with COUN 610. Students will explore relationships between cultural beliefs and values and current theories of counseling. The course extends pre-practicum and cohort building experiences. (Prerequisites: Admittance to Guidance and Counseling Program, COUN 610 and permission of instructor.)   |                  |                               |
| <b>COUN 615</b>   | <b>3 Credits</b> | <b>Summer</b>                 |
| <b>Foundations of Guidance and Counseling</b>   |                  | <b>(3+0)</b>                  |
| Introduction to the philosophies, organization, patterns and techniques that aid counselors in preparing clients for responsible decision-making in modern society. (Prerequisite: Admittance to Guidance and Counseling Program and permission of instructor.)   |                  |                               |
| <b>COUN 623</b>   | <b>4 Credits</b> | <b>Fall, Alternate Summer</b> |
| <b>Counseling Theories and Applications</b>   |                  | <b>(3+0)</b>                  |
| (Same as PSY 660)   |                  |                               |
| A survey of the major theoretical systems of counseling, including psychodynamic, cognitive, behavioral, family systems, phenomenological, existential and non-western approaches to healing and mental health. Specific application of theoretical principles will be investigated, analyzed and developed. (Prerequisites: Admittance to graduate program, COUN 615 and/or permission of instructor.)                               |                  |                               |

- COUN 628**                      **3 Credits**                      **Fall, Alternate Summer**  
**Child and Adolescent Psychology**                      **(3+0)**  
Focus on developmental processes and sequences of change that children experience within each developmental domain from birth through adolescence. (Prerequisite: Admittance to graduate program and permission of instructor.)
- COUN 629**                      **3 Credits**                      **Alternate Summer**  
**Developmental Interventions**                      **(3+0)**  
Second in a two course sequence in child and adolescent development with opportunity for limited practice in applying developmental theory to work with children and youth. Attention is placed on assisting children and youth to accomplish developmental tasks appropriate to their psychosocial growth. (Prerequisites: Admittance to graduate program, COUN 628, and permission of instructor.)
- COUN 634**                      **3 Credits**                      **As Needed**  
**Practicum in Individual Counseling**                      **(2+7)**  
Supervised practice in basic counseling skills and techniques. Supervised work with one-on-one counseling relationships. Actual practice in listening, problem identification, goal setting and session management. (Prerequisites: Admission to graduate program, COUN 623, and permission of instructor.)
- COUN 636**                      **3 Credits**                      **Fall and Spring**  
**Practicum in School Counseling**                      **(2+7)**  
Supervised practice in school settings. Focus on directed practice of particular skills relevant to the school counselor's role. Weekly seminars will cover actual and role playing situations providing opportunities to operationalize theory in counseling, interventions, and ethical issues. (Prerequisite: Admittance to Guidance and Counseling Program, COUN 634 and permission of instructor.)
- COUN 646**                      **3 Credits**                      **Summer**  
**School Counseling**                      **(3+3)**  
(Same as PSY 646)  
Topics related to the role of the school counselor such as consultation, career guidance, and culturally appropriate assessment. (Prerequisite: Admittance to Guidance and Counseling Program and permission of instructor.)
- COUN 647**                      **3 Credits**                      **Alternate Summer**  
**Professional Ethics**                      **(3+0)**  
The ethical standards of the American Psychological Association, the American Association of Counseling and Development and the National Associations of Social Workers will be examined, discussed and compared. Students will be provided with opportunities to apply these general principles to specific cases. Students will be expected to demonstrate a knowledge of the principles of these three ethical codes and an ability to apply them to their reality based manifestations. (Prerequisites: Admittance to master's program in Psychology or Counseling, and permission of instructor.)
- COUN 660**                      **3 Credits**                      **Alternate Summer**  
**Cross-Cultural Counseling**                      **(3+0)**  
(Same as PSY 661)  
An examination of cultural and ethnic variables in human nature and their effect on the counseling process. Specific focus will be placed on the nature and function of culture, cultural variables in the context of the human experience, universal and culture specific aspects of the counseling process, barriers to effective cross-cultural counseling, specific ethnic and cultural considerations, and methods of intellectual training with special emphasis on Alaskan applications. (Prerequisite: Admittance to graduate program and permission of instructor.)

**COUN 665**                      **3 Credits**                      **Fall and Spring**  
**Practicum in Counseling: Higher Education/ Agency**                      **(0+9)**  
Supervised field experience, including preparatory activities in a higher education or agency setting. This course is not open to public school counselor-trainees. (Prerequisites: COUN 623 and three approved graduate credits in the area of specialization.)

**COUN 674**                      **3 Credits**                      **Spring, Alternate Summer**  
**Group Counseling**                      **(3+0)**  
(Same as PSY 674)  
Kinds and types of groups with emphasis on methods, problems and needed skills in working with groups in a counseling situation. (Prerequisites: Admittance to graduate program, COUN 615, COUN 660, and permission of instructor.)

**COUN 690**                      **3 - 6 Credits**                      **Fall, Spring**  
**Internship**                      **(0 + 3 - 6)**  
Opportunity to perform all the activities that a regularly employed counselor would be expected to perform in an elementary or secondary school. At the completion of the internship the student will be able to demonstrate knowledge and skills needed to administer school counseling services. (3 credits required for elementary internship; 3 credits required for secondary internship; student may take both. Prerequisites: Completion of all course work and advancement to candidacy.)

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## ***Economics Courses***

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**ECON 601**                      **3 Credits**                      **Fall**  
**Microeconomic Theory I**                      **(3+0)**  
Analysis of consumer and producer theory, price determination, and welfare economics. (Prerequisites: ECON 321 or equivalent; MATH 200 or equivalent.)

**ECON 603**                      **3 Credits**                      **Spring**  
**Macroeconomic Theory I**                      **(3+0)**  
Analysis of the underlying causes of unemployment, economic instability, inflation, and economic growth. (Prerequisites: ECON 321 or equivalent; ECON 324 or equivalent; MATH 200 or equivalent.)

**ECON 623**                      **3 Credits**                      **Fall**  
**Mathematical Economics**                      **(3+0)**  
Mathematical techniques including matrix algebra, differential and integral calculus. Particular attention is given to static and comparative statics analysis and dynamic models. (Prerequisites: MATH 200 or equivalent.)

**ECON 626**                      **3 Credits**                      **Spring**  
**Econometrics**                      **(3+0)**  
Introduction to econometric theory. Single equation and multiple equation system estimation, including inference and hypothesis testing and results of assumption violation. Materials fee \$20. (Prerequisites: MATH 200 or equivalent; STAT. 401, ECON 227 or equivalent.)

**ECON 630**                      **3 Credits**                      **Spring**  
**Economic Issues of the Circumpolar North**                      **(3+0)**  
Introduction to economic methods and issues relevant to Northern Regional Studies. Topics include the optimal depletion of resources, determination of land rents and prices, factors influencing inter-regional migration and transportation, capital budgeting and benefit/cost analysis, and the economic impact of global warming. (Prerequisite: One Economics course or permission of instructor.)(Same as NORS 630)

- ECON 635                      3 Credits                      Fall**  
**Resource Economics                      (3+0)**  
The theory, methods of analysis, and current literature of natural resource economics and policy. Topics include externalities, property rights, public goods, benefit-cost analysis, amenity values and other non-market resource services, and environmental policy. (Prerequisites: ECON 321, ECON 335, or equivalent; MATH 200 or equivalent.)
- ECON 636                      3 Credits                      Spring**  
**Microeconomics II                      (3+0)**  
This course explores issues relating to the intertemporal allocations of resources. Mathematical techniques such as calculus of variations, optimal control theory, and dynamic programming are introduced and applied to the analysis of resource use over time, management of common property resources, capital investment problems, and market dynamics. (Prerequisite: ECON 635.)
- ECON 638                      3 Credits                      As needed**  
**Marine Policy Analysis                      (3+0)**  
Economic perspective on marine policy issues which may include, but are not limited to, management of commercial fisheries, sports fishery, subsistence harvest, marine pollution, recreational interests, wetlands, government policy, and other related and relevant topics. (Prerequisites: Graduate standing or permission of the instructor.)
- ECON 670                      1 Credit                      Spring**  
**Seminar in Research Methodology                      (1+0)**  
Philosophy of research and importance of the scientific method to solution of research problems. (Prerequisite: Graduate standing.)
- ECON 675                      3 Credits                      Fall**  
**Practical Quantitative Methods for Business Decision Making                      (3+0)**  
The objective of this course is to provide the student with an in-depth treatment of quantitative research methods in an *applied* context. Hence the focus of the course is not the mathematical derivations and properties of statistical techniques, but rather the usefulness of those techniques to the managerial decision-making process. Research skills are presented as a set of tools that enable managers to make better decisions. (Prerequisites: Graduate standing and completion of foundation courses.)

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## ***Education Courses***

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**NOTE:** *The Education faculty offers many of the graduate (600 level) courses in the summer, to accommodate summer graduate studies of teachers and administrators. Please consult with the program to determine which graduate courses will be taught in a given summer.*

- ED 601                      3 Credits                      Fall**  
**Introduction to Applied Social Science Research (3+0)**  
A review of the most common research paradigms, data gathering techniques and analytical tools used by social scientists in the study of human behavior and cultural institutions. Attention will be given to collaborative research models, with a focus on the translation of research results into practical application. (Prerequisite: Graduate standing in education.)
- ED 603                      3 Credits                      Spring**  
**Field Study Research Methods                      (3+0)**  
Intensive focus on considerations and techniques for conducting field research in a cross-cultural setting, with particular attention to participatory approaches and naturalistic research designs. Students must have access to a field setting in which to conduct a research project. (Prerequisite: ED 601 and ED 610, 612, 616 or 621.)

- ED 610**                      **3 Credits**                      **Fall**  
**Education and Cultural Processes**                      **(3+0)**  
 Advanced study of the function of education as a cultural process and its relation to other aspects of a cultural system. Students will be required to prepare a study in which they examine some aspect of education in a particular cultural context. (Prerequisite: the course may be taken concurrently with ED 601, ED 602 or ED 603.)
- ED 611**                      **3 Credits**                      **As Demand Warrants**  
**Learning, Thinking and Perception in Cultural Perspective**                      **(3+0)**  
 An examination of the relationship between learning, thinking and perception in multicultural contexts. Particular emphasis will be on the implications of these relationships for schooling. Content will focus on cultural influences on perception, conceptual processes, learning, memory and problem solving. Content will also reflect concern for practical teaching problems. (Prerequisite: Graduate standing in education, ED 610 recommended.)
- ED 612**                      **3 Credits**                      **Fall**  
**Cultural and Philosophical Foundations of Education**                      **(3+0)**  
 Students will be introduced to the nature of philosophical inquiry and apply a philosophical perspective to examining assumptions inherent in cultural systems and culturally organized behavior. Education as a function of culturally organized behavior is based upon assumptions which are not always explicit. The philosophical perspective provides a framework and approach for explicitly subjecting these assumptions to a analysis. (Prerequisite: Graduate standing in education.)
- ED 615**                      **3 Credits**                      **As Demand Warrants**  
**Social Organization of Classrooms and Learning**                      **(3+0)**  
 An examination of the social organization of participants (school staff and students) within the institutional framework of American Public Education with particular emphasis focused on everyday life features of the social organization that accommodate and maintain the institutional framework. Dilemmas inherent in transplanting this institutional framework and social organization to sociocultural environments different from that of their origins are also examined. (Prerequisites: ED 601, ED 610, or permission of instructor.)
- ED 616**                      **3 Credits**                      **As Dem. Wrnts**  
**Education and Socioeconomic Change**                      **(3+0)**  
 An examination of social change processes, particularly in relation to the deliberate development of new institutions and resulting forms of new consciousness. Emphasis is placed on the role of education and schooling in this development dynamic. (Prerequisite: ED 601. ED 610, or permission of instructor.)
- ED 618**                      **3 Credits**                      **As Dem. Wrnts**  
**Higher Education: Basic Understanding**                      **(3+0)**  
 Historical and philosophical foundations of higher education, both in America and abroad. Examination of curriculum development, instruction, administration, and inter-institutional cooperation, with emphasis on trends and innovations in higher education. (Prerequisites: Graduate standing and permission of the instructor.)
- ED 620**                      **3 Credits**                      **Fall**  
**Language, Literacy and Learning**                      **(3+0)**  
 The course examines the relationships among language, culture, and thinking as issues of literacy and learning. Specific areas of emphasis include linguistic relativity, discourse, role of context in communications, variant language learning strategies and styles, speech community, open and closed linguistic systems, cognitive styles, and literacy as a cultural and cognitive phenomenon. (Prerequisite: Graduate standing.)

- ED 621**                      **3 Credits**                      **Spring**  
**Cultural Aspects of Language Acquisition**                      **(3+0)**  
A focus on cultural differences in a child's acquisition of language and culture. The notion that specific language/teaching strategies are also general learning/teaching strategies are stressed. Verbal and nonverbal behavior, cultural formats for learning through interaction and social dimensions of second language acquisition are considered. (Prerequisite: Graduate standing.)
- ED 622**                      **3 Credits**                      **As Demand Warrants**  
**Issues in Literacy Assessment**                      **(3+0)**  
Provides a framework for assessment which is an outgrowth of current theories of literacy and language processes. Emphasis will be placed on assessment techniques, their strengths and weaknesses, and appropriate applications.
- ED 623**                      **3 Credits**                      **As Demand Warrants**  
**Survey of Research in Reading**                      **(3+0)**  
An analysis of theories and research in reading and their translation to instructional strategies. Survey of historical perspectives, studies in socio-psycholinguistics, imagery, engagement, reader response, comprehension, and assessment are included.
- ED 630**                      **3 Credits**                      **As Demand Warrants**  
**Curriculum Theory**                      **(3+0)**  
A comprehensive theoretical view of curriculum as a field which integrates the related phenomena in such a way that it is possible to describe, predict, explain and serve as a guide for curriculum activities. (Prerequisite: Graduate standing in education.)
- ED 631**                      **3 Credits**                      **Fall**  
**Small Schools Curriculum Design**                      **(3+0)**  
A focus on the salient issues involved with the development of effective programs of instruction in small schools including foundational design, conceptual models, organizational strategies, technical skills, current issues and trends, and their implications and application to the environment of rural Alaska. (Prerequisite: Graduate standing in education.)
- ED 632**                      **4 Credits**                      **Fall**  
**Teaching as Reflective Inquiry**                      **(3+3)**  
Reflective inquiry into the social organization and cultures of large and small schools. Motivation of teachers and stages of professional development. Context of teaching: philosophy, legal framework, school finance, history of American education and education in Alaska. Materials Fee: \$30.00 for any combination of ED 632, 634, and 451 (Prerequisites: baccalaureate degree; admission to the Education Graduate Program and Teachers for Alaska Program.)
- ED 633**                      **3 Credits**                      **As Dem. Wrnts**  
**Computer Tools for Teachers: Word Processing and Telecommunications (1+6)**  
Development of strategies for using microcomputer word processing and telecommunications to facilitate the learning of elementary and secondary school students. Methods for utilizing word processing within the regular classroom setting and exploration of the potentials of computer bulletin board systems (BBS's), information utilities, and bibliographic data bases are included. (Prerequisite: ED 275 or equivalent.)
- ED 634**                      **8 Credits**                      **Fall**  
**Teaching as Decision-Making and Invention**                      **(4+0+8)**  
Considers philosophy of education and purposes of the curriculum. Study of methods and research concerning teaching of major subject areas. Exploration of lesson design, curriculum development, social organization of classroom, evaluation and testing, and needs of students in multicultural context. Material Fee: \$30.00 for any combination of ED 632, 634, and 451. (Prerequisites: baccalaureate degree; Admission to the Education Graduate program and Teachers for Alaska.)



- ED 635**                      **3 Credits**                      **As Dem. Wrnts**  
**Strategies for Cooperating Teachers**                      **(3+0)**  
Study of effective teaching using alternative strategies appropriate to differing goals. Consideration will also be given to teaming with and/or supervising student teachers as a technique for improving instruction. (Prerequisite: Certified teacher employed in a school district.)
- ED 636**                      **3 Credits**                      **As Dem. Wrnts**  
**Improvement of Elementary Teaching**                      **(3+0)**  
Emphasis on improvement of elementary teaching: a re-evaluation of teaching practices, relating of principles of learning, instructional procedures, and recent developments in education to situations made meaningful through the student's teaching experience. (Prerequisites: Graduate standing in education and elementary teaching experience.)
- ED 640**                      **3 Credits**                      **Spring**  
**Gender and Education**                      **(3+0)**  
This course focuses on educational practices and processes and their relation to the changing situation of women in society. Schools will be examined as sites of pervasive gender socialization and discrimination as well as offering new possibilities for liberation. Topics include: the social construction of gender; patterns of access and achievement; gender as an organizing principle in schools and classrooms; and feminist agendas and strategies for change. (Prerequisite: Graduate standing.)
- ED 641**                      **3 Credits**                      **As Demand Warrants**  
**Teaching Youth at Risk**                      **(3+0)**  
Teaching Youth at Risk focuses on a comprehensive review of research related to the societal, educational, and instructional phenomenon which negatively affect achievement in school. The course will provide K-12 classroom teachers and educators, parents, community members and others interested in helping youth at risk with a thorough understanding of the depth and breadth of this crisis and the factors which characterize these youth. Participants will investigate a variety of proven strategies and approaches designed to improve classrooms, schools, community services, and other significant aspects of a troubled student's life. (Prerequisites: graduate standing)
- ED 643**                      **3 Credits**                      **Spring**  
**Reflective Inquiry into Multicultural Classrooms and Communities (1+6)**  
This field-delivered course which accompanies student teaching offers a structured opportunity for student teachers to reflect on the culture of the communities in which they are teaching and the social organization of the school. Students assess their teaching and responses to alternative motivational and pedagogical approaches in relation to the student populations where they teach. (Prerequisites: baccalaureate degree; admission to the Education Graduate Program and to Teachers for Alaska Program.)
- ED 644**                      **3 Credits**                      **Spring**  
**Designing Learning Environments**                      **(2+3)**  
This culminating course of the TFA program involves directed field work projects and brings together the student cohort group for a seminar at the conclusion of their student teaching experience. The full-week seminar features analysis and discussions of their classroom and community experiences during student teaching with additional study of issues which students found troubling and problematic. Students develop "cases" of their own student teaching experience which they discuss with the seminar group. (Prerequisites: baccalaureate degree; admission to the Education Graduate Program and Teachers for Alaska Program.)
- ED 645**                      **3 Credits**                      **As Demand Warrants**  
**Small Schools Institute**                      **(2+3)**  
A forum for experienced elementary and secondary rural school teachers. Discussions and seminars held with University and guest faculty, whose fields of expertise have direct applicability to small school concerns, will provide an environment for participants to share and refine different inter-ethnic communicative styles, culturally congruent teaching methodologies and curricula, and contextual understandings of the Native pupil's world. (Prerequisite: Recent rural Alaskan small schools teaching experience.)

- ED 660**                      **3 Credits**                      **Fall**  
**Educational Administration in Cultural Perspective (3+0)**  
The course will examine issues related to the social organization and socio-political context of schools, administrative and institutional change processes and the changing role of administrators in education, using a cross-cultural framework for analysis. (Prerequisite: Graduate standing.)
- ED 661**                      **3 Credits**                      **Fall**  
**Organizational Theory for School Administration (3+0)**  
A survey of theories of organization and analysis of their application in school administration. (Prerequisites: Acceptance into the M.Ed. program or the Type B, Principals' Certification program; completion of required courses in the 600-619 range.)
- ED 662**                      **3 Credits**                      **Spring**  
**Educational Leadership in the School and Community (3+0)**  
An analysis of processes for identifying community needs and interests and translating them into viable, responsive educational goals, and the processes for teacher - and community - participation in the ongoing revitalization of the educational program of the school. Leadership is examined in its historical and theoretical contexts. Supervision and interpersonal communications are emphasized as they relate to the leadership role. (Prerequisites: Graduate standing, completion of required courses in the 600-619 range, ED 650 and ED 651.)
- ED 663**                      **3 Credits**                      **As Demand Warrants**  
**School Law (3+0)**  
Rights and responsibilities of teachers and pupils, rulings of the Attorney General, decisions of the courts, and regulations of the State Board of Education. (Prerequisite: Graduate standing in education.)
- ED 674**                      **3 Credits**                      **Spring**  
**Program Planning and Management (3+0)**  
An examination of procedures for translating the school's approved educational program into action and monitoring its development and needs with special emphasis on financial, personnel and facilities management. (Prerequisites: Completion of required course work except ED 665 and courses in the ED 690 series.)
- ED 675**                      **3 Credits**                      **Fall and Spring**  
**Pre-internship Management Practicum (3+0)**  
Intensive familiarization with the school in which each student plans to serve his or her internship. Each student will be required to collect comprehensive information on the operation of that school. The primary focus will be on the correlation between the educational goals of the school and the role and activities of the principal. Each student will be required to develop a plan for his or her internship. (Prerequisites: Acceptance into an M.Ed. program or the Type B Certification Program; completion of all required course work except the internship and the core synthesizing courses [ED 690's]; selection by each student of a school in which to serve the internship; and the agreement of the principal to serve as a mentor.)
- ED 676**                      **3 Credits**                      **Fall and Spring**  
**Internship: Principal's Endorsement (0+9)**  
Field work as an intern in a school, under the mentorship of the school's principal. The internship will be in accordance with a plan developed by each student in ED 675, Practicum in Management. (Prerequisites: Acceptance into the M.Ed. program or Type B, Principal's Certification program; completion of all required course work except the core synthesizing course work.)
- ED 677**                      **3 Credits**                      **As Dem. Wrnts**  
**Public School Finance (3+0)**  
Contemporary basis for raising and distributing federal, state and local education funds; problems of school financing in Alaska. (Prerequisite: Graduate standing in education.)

- ED 679**                      **3-6 Credits**                      **As Demand Warrants**  
**Internship: Superintendent's Endorsement**                      **(0+9)**  
Field work in an appropriate educational or agency setting. Each student will complete an approved field study project. (Prerequisites: Approval of student's advisory committee and admission to candidacy for the Ed.S. degree in School Administration.)
- ED 680**                      **3 Credits**                      **Fall**  
**Comparative Education**                      **(3+0)**  
Analysis of international systems of public education; issues addressed include social context, ethnicity, gender, ideology, international power, level of development, current issues and problems and efforts toward reform. (Prerequisite: Graduate standing.)
- ED 689**                      **3 Credits**                      **Fall and Spring**  
**Proseminar in Applied Educational Research**                      **(1+6)**  
Application of social science research methods to the description and analysis of a research topic. The topic chosen will be the substance of each student's synthesizing paper. Advisory committee chairs will participate and assist their respective students. (Prerequisites: Acceptance into an M.Ed. program; completion of all required core entry courses [ED 619-660]; and completion of at least nine credits in the area of concentration.)
- ED 690**                      **3 Credits**                      **Spring**  
**Seminar in Cross-Cultural Studies**                      **(3+0)**  
Investigation of current issues in cross-cultural contexts. Opportunity for students to synthesize their prior graduate studies and research. Seminar is taken near the terminus of a graduate program. (Prerequisites: Advancement to candidacy, permission of student's graduate committee.)
- ED 691**                      **3 Credits**                      **Spring**  
**Contemporary Issues in Education**                      **(3+0)**  
A critical overview of the current status of the field of education. Students will participate in a thorough investigation of select problems, trends, and issues that presently characterize the institution of public education. Seminar sessions will focus on student research regarding the development, present impact and potential implications of each topic discussed. (Prerequisites: Graduate standing.)

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## ***Electrical Engineering Courses***

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- EE 603**                      **3 Credits**                      **Alternate Fall**  
**Advanced Electric Power Engineering**                      **(3+0)**  
Selected advanced topics in electric power generation, transmission, utilization, optimization, stability, and economics. (Prerequisite: EE 404 or permission of instructor.)
- EE 604**                      **3 Credits**                      **Alternate Fall**  
**Electric Power Systems Transients** (3+0)  
Power system transient analysis, use of the Electromagnetic Transients Program (EMTP), insulation coordination, transient recovery voltage phenomena, and resonance conditions. (Prerequisite: EE 406 or permission of instructor.)
- EE 605**                      **3 Credits**                      **Alternate Spring**  
**Power System Stability and Control**                      **(3+0)**  
Advanced power system stability analysis, including generator steady state and dynamic models, voltage and power control equipment, load models, network constraints, numerical methods, supplemental control via power system stabilizers and static var systems, and software tools. (Prerequisite: EE 406.)

- EE 606**                      **3 Credits**                      **Alternate Spring**  
**Electric Power System Protection**                      **(3+0)**  
Principles and applications of electric power systems protective relaying. Topics include fault analysis, relay types, instrumentation transformers, protection schemes, grounding, stability, and computer aided design. (Prerequisite: EE 404, EE 406, or permission of instructor.)
- EE 610**                      **3 Credits**                      **Alternate Fall**  
**Linear Systems**                      **(3+0)**  
Methods of representation and analysis for discrete time and continuous time. Topics include deterministic, random, continuous and discrete inputs, two sided Laplace and Z-transforms, discrete and fast Fourier transformers, and state variable theory. (Prerequisites: EE 354, MATH 302 or permission of instructor.)
- EE 632**                      **3 Credits**                      **As Dem. Wrnts**  
**Quantum Electronics**                      **(3+0)**  
Principles of operation of microwave tubes, microwave semiconductor devices, parametric amplifiers, nonlinear elements, and ferromagnetics. (Prerequisite: EE 332 or permission of instructor.)
- EE 634**                      **3 Credits**                      **Alternate Fall**  
**Microwave Design I**                      **(2+3)**  
Analysis, design, fabrication, and measurement of passive microwave componenets and circuits using microstrip construction techniques. Theoretical and computer-aided design of transmission lines, power dividers, hybrids, directional couplers, and filters. (Prerequisite: EE 312, EE 332, and EE 334 or permission of instructor. Next offered: Fall 1995)
- EE 635**                      **3 Credits**                      **Alternate Spring**  
**Microwave Design II**                      **(2+3)**  
Analysis and design of solid-state microwave circuits. Amplifier and oscillator circuits are designed and fabricated using microstrip construction techniques and computer-aided design tools. (Prerequisite: EE 634 or permission of instructor. Next offered: Spring 1996)
- EE 643**                      **4 Credits**                      **Fall**  
**VLSI in Computer System Design**                      **(3+3)**  
In-depth study of Very Large Scale Integrated (VLSI) circuit design techniques and VLSI design tools. Various Metal Oxide Semiconductor (MOS) devices and simple state machinery will be studied from the perspective of fabrication.(Same as CS 643)
- EE 644**                      **2 Credits**                      **Spring**  
**VLSI Fabrication and Testing Practicum**                      **(1+3)**  
Continuation of EE 643 in which the device(s) that were designed in that course are fabricated and, upon receipt from the foundry, are tested for consistency with the design parameters. (Prerequisites: EE 643/CS 643 in previous semester.)(Same as CS 644)
- EE 652**                      **3 Credits**                      **Alternate Spring**  
**Adaptive Systems and Neural Networks**                      **(3+0)**  
Self-optimizing systems whose performance is improved through contact with their environments. Feedback models for least mean square error adaptation processes. Multiple-layer adaptive neural networks. Competitive learning backpropagation, self organization, associative memory. (Prerequisites: EE 451 or equivalent.)
- EE 656**                      **3 Credits**                      **Alternate Spring**  
**Space Systems Engineering**                      **(3+0)**  
(Same as ESM 656, ME 656)  
A multi-disciplinary team of students will perform a preliminary design study of a major space system. Design considerations will include requirements for project management, spacecraft design, power, attitude control, thermal control, communications, computer control and data handling. The students will present their final design in a written report and a public seminar. (Prerequisites: Graduate standing or permission of instructor.)

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|---|------------------|-------------------------|
| <b>EE 662</b>   | <b>3 Credits</b> | <b>Alternate Fall</b>   |
| <b>Digital Communication Theory</b>   |                  | <b>(3+0)</b>            |
| Probability in communication systems, power spectral density, baseband formatting, bandpass modulation and demodulation, link analysis, coding, and channel models. (Prerequisite: EE 461 or permission of instructor. Next Offered: Fall 1996)   |                  |                         |
| <b>EE 664</b>   | <b>3 Credits</b> | <b>As Dem. Wrnts</b>    |
| <b>Data Communication Techniques</b>  |                  | <b>(3+0)</b>            |
| Examination of techniques used in modern data communications systems. Analysis and design of data networks. Routing, traffic control, and error control techniques. (Prerequisites: EE 464 or permission of instructor.)  |                  |                         |
| <b>EE 665</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Antennas</b>   |                  | <b>(3+0)</b>            |
| Fundamental principles of antenna theory. Application to the analysis, design, and measurement of many different antenna structures. (Prerequisites: EE 312 and EE 461 or consent of instructor. Next offered: Spring 1997)   |                  |                         |
| <b>EE 668</b>   | <b>3 Credits</b> | <b>Alternate Fall</b>   |
| <b>Microwave Systems Engineering</b>  |                  | <b>(3+0)</b>            |
| Design principles in microwave systems. S-parameter representation applied to components. Sources, noise, antennas. Analysis of operational systems. (Prerequisites: EE 311 and either EE 312 or EE 461 or permission of instructor. Next offered: Fall 1995)   |                  |                         |
| <b>EE 669</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Radiowave Propagation</b>  |                  | <b>(3+0)</b>            |
| A study of the effects of the earth, atmosphere, ionosphere, and atmospheric hydrometeors such as raindrops, snow, and hail on the propagation of radiowaves. Satellite to earth propagation effects will be emphasized. (Prerequisites: EE 461 and either graduate standing or consent of instructor. Next offered: Spring 1996) |                  |                         |
| <b>EE 671</b>   | <b>3 Credits</b> | <b>As Dem. Wrnts</b>    |
| <b>Digital Control Systems</b>  |                  | <b>(3+0)</b>            |
| Study of digital control theory. Topics will include signal conversion, Z-transforms, state variable techniques, stability, time and frequency domain analysis and system design. (Prerequisites: EE 471 or permission of instructor.)  |                  |                         |

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## ***Engineering and Science Management Courses***

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|---|------------------|--------------|
| <b>ESM 601</b>  | <b>3 Credits</b> | <b>Fall</b>  |
| <b>Engineers in Organizations</b>   |                  | <b>(3+0)</b> |
| The course offers a variety of management activities of special importance to engineering and scientific organizations, including organizational structures, planning, monitoring, directing, and controlling. In addition the tools of management are reviewed including schools of management theory, communications, conflict management and total quality management. Focus on developing managerial skills in Engineers and Scientists. Material Fee: \$20.00 (Prerequisite: B.S. degree in engineering or physical science or consent of instructor.) |                  |              |
| <b>ESM 605</b>  | <b>3 Credits</b> | <b>Fall</b>  |
| <b>Engineering Economy</b>  |                  | <b>(3+0)</b> |
| The science of fiscal decision-making with applications to capital investment selection. Graduate level studies of capital investment analysis techniques, including present worth, annual cash flow and rate of return. Applications to replacement problems, benefits/cost analysis and capital budgeting. Consideration of impacts of depreciation accounting, income taxes and inflation. Materials fee: \$20.00. (Prerequisite: Graduate standing.)  |                  |              |

- ESM 608**                      **3 Credits**                      **Every Third Semester**  
**Legal Principles for Engineering Management**      (3+0)  
A course devoted to those aspects of law specifically related to technical management. Contracts, sales, real property, business organization, labor, patents, and insurance. Materials Fee: \$20.00 (Prerequisite: Graduate standing.)
- ESM 609**                      **3 Credits**                      **Spring**  
**Project Management**                                      (3+0)  
Organizing, planning, scheduling and controlling projects. Use of CPM and PERT; computer applications. Case studies of project management problems and solutions. Materials Fee: \$20.00 (Prerequisite: Graduate standing in Engineering or Science Management or permission of instructor. )
- ESM 620**                      **3 Credits**                      **Every Third Semester**  
**Statistics for ESM.**                                      (3+0)  
Forecasting applications and techniques - technological, time series, judgmental and regression; decision trees; Bayesian statistics; utility theory with trade-offs between expected value and risk in decision making; bidding strategies; data analysis. Materials Fee: \$20.00 (Prerequisites: STAT. 301 and MATH 202.)
- ESM 621**                      **3 Credits**                      **Spring**  
**Operations Research**                                      (3+0)  
Mathematical techniques for aiding technical managers in decision making. Linear programming, transportation problem, assignment problem, network models, PERT/CPM, inventory models, waiting line models, computer simulation, dynamic programming, Emphasis on use of techniques in actual technical management situations. Computer applications. Materials Fee: \$20.00
- ESM 623**                      **3 Credits**                      **Fall and Spring**  
**Computer Programming for Engineering Managers**      (3+0)  
Basic FORTRAN programming, with applications to engineering problems. (Not offered for credit toward the M.S. in Engineering Management or Science Management.)
- ESM 656**                      **3 Credits**                      **Alternate Spring**  
**Space Systems Engineering**                              (3+0)  
(Same as EE 656, ME 656)  
A multi-disciplinary team of students will perform a preliminary design study of a major space system. Design considerations will include requirements for project management, spacecraft design, power, attitude control, thermal control, communications, computer control and data handling. The students will present their final design in a written report and a public seminar. (Prerequisites: Graduate standing or permission of instructor.)
- ESM 684**                      **3 Credits**                      **Fall and Spring**  
**Engineering Management Project**                      (3+0)  
Individual study of an actual engineering management problem resulting in a report which includes recommendations for action.

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## *English Courses*

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- ENGL 601**                      **3 Credits**                      **Spring**  
**Bibliography, Methods, and Criticism**                      (3+0)  
A study of the basic reference works for research in literature, the methods for conducting research, and the principles of literary criticism. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 603**                      **3 Credits**                      **Alternate Fall**  
**Studies in British Literature: Old and Middle English**      (3+0)  
Variable subject matter in significant topics in Anglo-Saxon and Middle English literature. (Prerequisite: Graduate standing or permission of the instructor. )

- ENGL 604**                      **3 Credits**                      **Alternate Fall**  
**Studies in British Literature: Renaissance and 17th Century** (3+0)  
Variable subject matter in significant topics in 16th and 17th-Century British literature. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 606**                      **3 Credits**                      **Alternate Fall**  
**Studies in British Literature: Restoration and 18th Century** (3+0)  
Variable subject matter in significant topics in British literature of the Restoration period and the 18th Century. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 607**                      **3 Credits**                      **Alternate Fall**  
**Studies in British Literature: 19th Century** (3+0)  
Variable subject matter in significant topics in British literature of the Romantic and Victorian periods. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 608**                      **3 Credits**                      **Alternate Spring**  
**Studies in British Literature: 20th Century** (3+0)  
Variable subject matter in significant topics in modern British literature. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 609**                      **3 Credits**                      **Alternate Spring**  
**Early American Literature** (3+0)  
Variable subject matter in significant topics in American literature of the colonial and early national periods. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 611**                      **3 Credits**                      **Alternate Fall**  
**Nineteenth-Century American Literature** (3+0)  
Variable subject matter in significant topics in American literature of the nineteenth century. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 612**                      **3 Credits**                      **Alternate Spring**  
**Modern American Literature** (3+0)  
Variable subject matter in significant topics in modern American literature. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 615**                      **3 Credits**                      **Alternate Spring**  
**Contemporary Literature** (3+0)  
Variable subject matter in significant topics in post-World War II literature. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 620**                      **3 Credits**                      **Alternate Spring**  
**Images of the North** (3+0)  
(Same as NORS 620)  
Interdisciplinary approaches to the variety of images created about and by the people and environment of the circumpolar North. The course will analyze conceptualizations of the north as expressed in a number of media such as film, art, literature, travel journals, and oral tradition employing methodologies from many disciplines. (Prerequisites: Graduate standing or permission of the instructor.)
- ENGL 651**                      **3 Credits**                      **As Dem. Wrnts**  
**Internship in Publishing** (3+1)  
Internship experience in all aspects of desktop publishing, including author contact, editing, proofreading, use of desktop publishing programs, graphics coordination, and development of printing specifications, including paper and ink selections, type faces, and binding. (Prerequisites: Graduate standing or permission of the instructor.)

- ENGL 671** Credits Arr. Fall and Spring  
**Writers' Workshop**  
 The writing of verse, fiction, drama, or non-fiction prose in accordance with the individual student's needs and the instructor's specialization. Depending on available staff, the workshop may be limited during any semester to work in a particular genre. Materials fee \$10. (Prerequisites: At least two courses from among ENGL 481, 482, 483, 484 and permission of instructor, or, permission of the head of the Department of English and the instructor.)
- ENGL 673** 3 Credits As Dem. Wrnts  
**Professional Writing Workshop**  
 Advanced study in the writing of professional prose. Students will write their areas of specialization. Materials fee: \$10.00. (Prerequisites: Graduate standing or permission of the instructor.)
- ENGL 681** 3 Credits Every Third Semester  
**Forms of Poetry** (3+0)  
 Intensive study of the forms and techniques of poetry writing. Includes readings and poetry writing exercises. Materials fee: \$10.00. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 682** 3 Credits Every Third Semester  
**Forms of Fiction** (3+0)  
 Advanced study in narrative technique through analysis of selected fiction and the students' own writing. Variable content in terms of the writers to be studied, and the kinds of narrative writing to be assigned. Materials fee: \$10.00. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 683** 3 Credits As Dem. Wrnts  
**Forms of Drama** (3+0)  
 Advanced study in dramatic technique through analysis of selected plays and the students' own writing. Variable content in terms of the playwrights to be studied, and the kinds of dramatic writing to be assigned. materials fee: \$10.00. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 684** 3 Credits Every Third Semester  
**Forms of Non-Fiction Prose** (3+0)  
 Intensive study of the forms and techniques of non-fiction. Includes readings and writing exercises. Materials fee: \$10.00. (Prerequisite: Graduate standing or permission of the instructor.)
- ENGL 685** 3 Credits Fall  
**Teaching College Composition** (3+0)  
 An investigation into current practice and theory with demonstrations and reports on pedagogy. Required of all teaching assistants in English. Materials fee: \$10.00. (Prerequisite: Graduate standing.)
- ENGL 687** 3 Credits Alternate Fall  
**Writing Professional Prose** (3+0)  
 Intensive study in the forms and techniques of professional prose, including collaborative writing, writing for corporations, and writing for public purposes. Content may vary according to the needs of the individual students and the readings assigned. Materials fee: \$10.00. (Prerequisites: Graduate standing or permission of the instructor.)
- ENGL 688** 3 Credits Alternate Spring  
**Audiovisual Script Writing** (3+0)  
 Advanced training in elements of story, visual imagery, dialogue, pacing, continuity, manuscript format, composing shots and scenes, and writing camera directions. Materials fee: \$10.00. (Prerequisites: Graduate standing or permission of the instructor.)



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|----------------------|------------------|-------------------------|
| <b>ENGL 689</b>      | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Editing Prose</b> |                  | <b>(3+0)</b>            |

Intensive and detailed study of editing standards appropriate to non-fiction prose in a variety of disciplines and publications. Practice in editing manuscripts is an integral part of the course. Materials fee: \$10.00. (Prerequisites: Graduate standing or permission of the instructor.)

|                         |                     |                        |
|-------------------------|---------------------|------------------------|
| <b>ENGL 692</b>         | <b>Credits Arr.</b> | <b>Fall and Spring</b> |
| <b>Graduate Seminar</b> |                     |                        |

Intensive study of selected topics in the discipline.

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## ***Environmental Quality Engineering Courses***

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|---|------------------|-----------------------|
| <b>EQE 641</b>                                    | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Environmental Quality Science Measurements</b> |                  | <b>(2+3)</b>          |

Theory and laboratory procedures for determining quality of water supplies. Natural water quality, pollution loads, and water and waste-water treatment plant parameters. Familiarization with Standard Methods for the Examination of Water and Waste-water. Experiments on unit processes of treatment systems are included along with consideration for solid waste air pollution monitoring. Laboratory fee: \$20. (Prerequisite: Permission of instructor.)

|  |                  |                         |
|--|------------------|-------------------------|
| <b>EQE 642</b>                               | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Modeling for Environmental Management</b> |                  | <b>(3+0)</b>            |

Processes of mathematical model development and applications of existing models for environmental management. Lectures will deal with model conceptualization, identification of model structure, formulation, computational representation, calibration, parameter estimation, and sensitivity testing as they relate to environmental simulation. Computer assignments will be used to demonstrate working models and to develop student projects. Water quality parameters including recreational, industrial and agricultural uses will be examined. (Prerequisite: Graduate standing or permission of instructor, FORTRAN programming.)

|                                 |                  |                         |
|---------------------------------|------------------|-------------------------|
| <b>EQE 643</b>                  | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Air Pollution Management</b> |                  | <b>(3+0)</b>            |

Air pollution topics include the quantity and quality of atmospheric emissions and their effects on the human environment. Identification and location of sources, measurement of quality and conformance with standards. Legal considerations of Clean Air Act and Amendments and local regulations. Evaluation of stationary and moving sources. Meteorology and modeling requirements. Control mechanisms for gases and particulates; and engineering economics. (Prerequisite: Graduate standing or permission of instructor.)

|   |                  |                         |
|---|------------------|-------------------------|
| <b>EQE 644</b>                          | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Environmental Management and Law</b> |                  | <b>(3+0)</b>            |

Topics of environmental impact statements, environmental law (local, state and federal), and environmental quality. Impact from projects of mining, highways, airports, pipelines, industrial development, water, wastewater and solid waste, and others - theoretical considerations and case studies. (Prerequisite: Graduate standing or permission of the instructor.)

|   |                  |                         |
|---|------------------|-------------------------|
| <b>EQE 645</b>                                | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Unit Processes - Chemical and Physical</b> |                  | <b>(3+0)</b>            |

Theory and design of chemical and physical unit processes for water and wastewater. Sedimentation, coagulation/flocculation, filtration, ion exchange, adsorption/absorption, gas transfer, and other special topics. Some unit process demonstrations and experiments. Emphasis on arctic applications, design and engineering economics. (Prerequisite: Graduate standing or permission of instructor.)

**EQE 646**                      **3 Credits**                      **Alternate Fall**  
**Unit Processes - Biological**                      **(3+0)**  
Study of the theoretical and applied aspects of wastewater treatment by biological processes including activated sludge, trickling filters, lagoons, sludge digestion and processing, septic tanks, analysis and design, nutrient removal processes, biology of polluted waters, economics, state, and federal regulations. (Prerequisite: Graduate standing or permission of the instructor.)

**EQE 647**                      **3 Credits**                      **Alternate Fall**  
**Biotechnology**                      **(3+0)**  
(Same as NRM 607)  
Theory and application of bioconversion and bioengineering processes for foods, agriculture, pharmaceuticals, and industrial chemicals. The use of microbiological methods (recombinant DNA, immobilized enzymes and cells, hybridomas, and mutation and selection) for the production of conventional bioproducts and in the development of new bioproducts. (Prerequisites: BIOL 442 and CHEM 322.)

**EQE 648**                      **3 Credits**                      **Alternate Fall**  
**Solid Waste Management**                      **(3+0)**  
Management concepts for solid waste (refuse) from domestic, commercial and industrial generators. Emphasis on resource recovery (RCRA) and topics include collection, transfer, processing and disposal. Disposal techniques include landfilling and incineration and procession options examine baling, composting and shredding. Engineering economics, hazardous and toxic wastes and arctic applications are stressed. Emphasis on design, engineering economics and arctic applications. (Prerequisite: Graduate standing or permission of instructor.)

**EQE 649**                      **3 Credits**                      **Fall**  
**Hazardous and Toxic Waste Management**                      **(3+0)**  
(Same as GE 649)  
Course provides in-depth coverage of hazardous and toxic substance management including legal, economic and technical issues. Instruction will be conducted through interdisciplinary faculty. Topics will include characterization of hazardous materials, economics of toxics minimization, hazardous materials use, storage and disposal, technical aspects of landfill siting, and selection and design of treatment technologies. Includes case studies of current waste management issues. (Prerequisites: Graduate standing or permission of instructor, GE 420 or CE 344 or equivalent.)

**EQE 650**                      **3 Credits**                      **Spring**  
**Advanced Hazardous Waste Management**                      **(3+0)**  
Advanced topics of hazardous and toxic waste management which will build on material covered in EQE 649. Subjects include RCRA/SARA/TSCA; TSD's, PRP's, regulations such as bioremediation. (Prerequisites: EQE 649 with a minimum grade of B.)

**EQE 658**                      **3 Credits**                      **Alternate Fall**  
**Energy and the Environment**                      **(3+0)**  
(same as ME 658)  
Basic concepts of energy supply, demand, production of heat, and power impacts of energy use on the environment. Extensive discussion of mitigation technologies and strategies for meeting energy needs while preserving environmental quality. (Prerequisites: Graduate standing or permission of instructor.)

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## ***Geological Engineering Courses***

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**GE 630**                      **3 Credits**                      **Alternate Fall**  
**Advanced Applied Mining Geology**                      **(2+3)**  
Investigative procedures used in mining geology from preproduction to terminal phases of an operation. Models ranging from open-pit to deep underground mining will be examined. Methods of mapping, sampling, on-going evaluation, and geotechnical aspects of water and ground control are examined. (Prerequisites: GE 435, GEOS 432, and GEOS 432L.)

- GE 631**                      **3 Credits**                      **Spring**  
**Electron Microprobe Methods**                      **(2+3)**  
Applications of electron micro-analysis to mineralogy, petrology, and mineral exploration development, evaluation, and processing. Physics of x-rays, x-ray spectrometry, and measurement; qualitative and quantitative elemental analysis using wave length and energy dispersive spectra. (Prerequisite: MPR 418B.)
- GE 633**                      **3 Credits**                      **Fall**  
**Fluid Inclusion Methods in Mineral and Petroleum Exploration**                      **(2+3)**  
Study of fluid inclusions in minerals. Thermodynamics, chemical and physical properties of fluids trapped in rock forming minerals or petroleum bearing rocks. Laboratory work includes sample preparation, thermometric and direct-current plasma emission spectrographic analysis. (Prerequisite: CHEM 331.)
- GE 635**                      **3 Credits**                      **Spring**  
**Geostatistical Ore Reserve Estimation**                      **(2+3)**  
(Same as MIN 635)  
Introduction to the theory and application of geostatistics in the mining industry. Review of conventional methods of ore reserve estimation, sampling design and computer applications. Review of classical statistics, log normal distributions and global estimation. Presentation of fundamental geostatistical concepts including: variogram, estimation variance, block variance, kriging, geostatistical simulation. Emphasis on the practical application to mining. (Prerequisites: MIN 408 or equivalent, STAT 451 or equivalent.)
- GE 649**                      **3 Credits**                      **Every Fifth Semester**  
**Hazardous and Toxic Waste Management**                      **(3+0)**  
(Same as EQE 649)  
In-depth coverage of hazardous and toxic substance management including legal, economic, and technical issues; taught by an interdisciplinary faculty group using case studies of current waste management issues. Topics include characterization of hazardous materials; economics of toxics minimization; hazardous materials use, storage and disposal; technical aspects of landfill siting; and selection and design of treatment technologies. (Prerequisites: Graduate standing or permission of instructor, GE 420 or CE 344 or equivalent.)
- GE 666**                      **3 Credits**                      **Alternate Fall**  
**Advanced Engineering Geology**                      **(2+3)**  
The interaction between geology and engineering case histories, student reports. (Prerequisites: Graduate standing, GE 365 and GE 372 or permission of instructor.)
- GE 668**                      **3 Credits**                      **Alternate Spring**  
**Tunneling Geotechniques**                      **(3+0)**  
Tunnel design, case histories, student report. (Prerequisites: Graduate standing in geological engineering or permission of instructor.)
- GE 671**                      **3 Credits**                      **Alternate Spring**  
**Engineering Application of Digital Image Processing**                      **(2+3)**  
Quantitative methods of utilizing digital image processing and engineering information system. Applications include, but are not limited to, evaluation of the engineering properties of geo-materials, characterization of joint-surface conditions, enhancement of photoelastic stress patterns, and identification of critical slope failure surfaces. (Prerequisite: GE 471 or equivalent or permission of instructor.)
- GE 692**                      **1 Credit**                      **Fall and Spring**  
**Graduate Seminar**                      **(1+0)**  
Topics in geological engineering explored through talks, group discussions, and guest speakers with a high level of student participation. (Prerequisites: Graduate standing or permission of instructor.)

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## *Geoscience Courses*

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- GEOS 600**                      **4 Credits**                      **Fall**  
**Introduction to X-ray Spectrometry**                      **(2+6)**  
 Theory of x-ray spectrometry and quantitative chemical analysis; mechanics of microprobe and X-ray equivalent instruction, is required for use of the Cameca SX-50 at UAF. (Prerequisites: Graduate standing in the sciences or engineering; PHYS 212, STAT 300, and GEOS 417; or permission of instructor.)
- GEOS 602**                      **3 Credits**                      **Alternate Fall**  
**Geophysical Fields**                      **(3+0)**  
 Introduction to the application of potential theory to fields of geophysical interest, namely heat flow, gravity magnetics, and geoelectricity. Emphasis will be placed on methods for solving classes of problems, and the geophysical interpretation of solutions. (Prerequisites: MATH 421/422, General Physics, or instructor approval.)
- GEOS 603**                      **1 - 2 Credits**                      **As Dem. Wrnts**  
**Advanced Field Mapping**                      **(0+3) - (1+3)**  
 Practical experience in advanced field mapping techniques with accompanying instruction in the regional and local geology of the study area. (Prerequisite: GEOS 351.)
- GEOS 604**                      **3 Credits**                      **Alternate Fall**  
**Intermediate Seismology**                      **(3+0)**  
 Sources of ground motion including focal mechanisms, magnitude and propagation of waves within the earth. Measurement of seismic data by analog and digital techniques and subsequent treatment of seismic data by various techniques including inversion.
- GEOS 605**                      **3 Credits**                      **Fall**  
**Geochronology**                      **(3+0)**  
 The application of the most commonly used radiometric dating methods to geologic problems. Fundamentals of the K-Ar, Rb-Sr, fission-track, U-Th-Pb and C methods. Laboratory training in K-Ar and fission-track dating techniques. (Prerequisite: Graduate standing or permission of instructor.)
- GEOS 606**                      **2 Credits**                      **Alternate Spring**  
**Volcanology**                      **(2+0)**  
 Physical processes of volcanism. Specific topics to be discussed include global tectonic setting, physical properties of magmas, eruption mechanisms, volcanic hazards, volcano geophysics. Special emphasis will be on explosive volcanism and its products, the pyroclastic rocks. Geochemistry and petrology will not be emphasized in this course. (Prerequisite: permission of instructor.)
- GEOS 607**                      **2 Credits**                      **Spring**  
**Advanced Paleomagnetism**                      **(1+3)**  
 An advanced course in the theory and practice of paleomagnetism including the basic magnetic properties of rocks, paleomagnetic techniques, and interpretation of paleomagnetic data. (Prerequisite: Senior or graduate standing.)
- GEOS 609**                      **2-4 Credits**                      **Fall and Spring**  
**Advanced Geomorphology**                      **(2-4+0-3)**  
 An advanced course providing a detailed treatment of geomorphology. Specific topics to be covered in different semesters include A. quantitative geomorphology, B. landscape evolution, C. periglacial geology, and D. geomorphology of Alaska. Each time the course is offered only one topic will be considered. (Prerequisites: GEOS 304 or permission of instructor.)

- GEOS 610**                      **3 Credits**                      **Alternate Spring**  
**Advanced Seismology**                      **(3+0)**  
 Characteristics of seismic sources; general properties of seismic wave forms; near field and far field of seismic radiation; characteristics of seismic wave propagation media; free oscillations of the earth. (Prerequisites: Math. 421, PHYS 312, elementary course in basic seismology or permission of instructor.)
- GEOS 611**                      **3 Credits**                      **Fall**  
**Advanced Structural Geology and Tectonics**                      **(3+0)**  
 An advanced course providing an in-depth treatment of specific aspects of structural geology and tectonics. Topics to be considered in different semesters include: (A) tectonics and sedimentation, (B) mountain belts of the world, (C) structural analysis, (D) structural geology of a specific tectonic setting (such as fold-and-thrust belts or rifts), and (E) other special topics in structural geology or tectonics. (Prerequisites: GEOS 314 or equivalent and graduate standing or permission of instructor.)
- GEOS 612**                      **3 Credits**                      **Alternate Fall**  
**Geologic Evolution of Alaska**                      **(3+0)**  
 An overview of the geological provinces of Alaska and neighboring continental and oceanic regions. Emphasis will be on the geologic history and tectonic evolution of Alaska. (Prerequisites: GEOS 214, 314, 321, and 322, or equivalents.)
- GEOS 613**                      **3 Credits**                      **Alternate Spring**  
**Global Tectonics**                      **(3+0)**  
 An advanced course dealing with tectonic theory. Emphasis on plate tectonics with discussions of the evidence supporting the plate hypothesis and the interaction of plates both past and present.
- GEOS 614**                      **3 Credits**                      **Alternate Spring**  
**Ice Physics**                      **(3+0)**  
 A survey of the physics of ice. Topics will include the crystal structure and properties of ice, high pressure phases, hydrogen bonding, mechanical properties, thermal properties, electrical and acoustic properties, nucleation and growth, optical properties, and surface properties (adhesion, friction). (Prerequisites: MATH 421/422, General Physics, Materials Science and/or Solid State Physics recommended.)
- GEOS 615**                      **3 Credits**                      **Fall**  
**Sea Ice**                      **(3+0)**  
 A study of sea ice in the natural environment including sea ice properties and processes on the microscale and the macroscale, freezing processes and sea ice growth, ice decay, and ice dynamics. (Prerequisite: Permission of the instructor.)
- GEOS 616**                      **3 Credits**                      **Alternate Spring**  
**Permafrost**                      **(3+0)**  
 The study of the occurrence, thickness, environmental problems, and mass and energy transport of permafrost, including soil and ice interaction, freezing and thawing processes, and mechanical and electrical properties and processes. (Prerequisite: Permission of the instructor.)
- GEOS 617**                      **3 Credits**                      **Alternate Fall**  
**Glaciers**                      **(3+0)**  
 The mechanisms responsible for the existence, motion and variations of present day glaciers and ice sheets, the paleoclimate information which they contained, and their role in engineering hydrology. (Prerequisite: Permission of instructor.)
- GEOS 620**                      **3 Credits**                      **Alternate Fall**  
**Geodynamics**                      **(3+0)**  
 Applications of continuum mechanics and heat flow theory to geophysical, geologic and glaciological problems. Topics such as post-glacial rebound, non-Newtonian fluid flow, thermal convection, stress-relaxation and the rheology of earth materials will be discussed. (Prerequisites: MATH 421/422, GEOS 419 or equivalent, or instructor approval.)

- GEOS 621**                      **3-4 Credits**                      **As Dem. Wrnts**  
**Advanced Petrology**                      **(2-3+3-6)**  
An advanced course providing a detailed treatment of various aspects of petrology. Specific topics to be considered in different semesters include: (A) metamorphic petrology, (B) igneous petrology, and (C) igneous and metamorphic petrography. Each time the course is offered, only one topic will be presented. Laboratory fee for each course: \$15. (Prerequisites: GEOS 214, 316.)
- GEOS 635**                      **1-4 Credits**                      **As Dem. Wrnts**  
**Advanced Economic Geology**                      **(1-4+0-3)**  
An advanced course providing an in-depth treatment of various aspects of economic geology. Specific topics will be considered in different semesters. They include: (A) ore microscopy, (B) industrial minerals, (C) economics of minerals, (D) geochemistry of ore deposits, (E) modern fossil fuel exploration, and (F) detailed study of particular ore deposit type. Only one topic will be presented at a time. (Prerequisite: Permission of instructor.)
- GEOS 637**                      **4 Credits**                      **As Dem. Wrnts**  
**Rock-Forming Minerals**                      **(3+3)**  
Examination of the rock-forming minerals; their structure and composition. Application of mineral data to problems in geochemistry, petrology and ore deposits. Laboratory involves analysis of minerals by various analytical techniques. (Prerequisites: GEOS 213, GEOS 417, GEOS 621C or equivalent, or instructor approval.)
- GEOS 640**                      **4 Credits**                      **Alternate Spring**  
**Petrology of Carbonate Rocks**                      **(3+3)**  
Origin, depositional environments, diagenesis and classification of limestones, dolostones and related rocks. (Prerequisite: GEOS 401 or permission of instructor.)
- GEOS 643**                      **3 Credits**                      **Alternate Fall**  
**Sandstone Depositional Environments**                      **(3+0)**  
An advanced course stratigraphy treating the hydrodynamics, sediment dispersal patterns, and preservation potential of modern terrigenous clastic depositional environments and criteria for recognizing their ancient counterparts in the geologic record. (Prerequisites: GEOS 321, GEOS 322.)
- GEOS 647**                      **3 Credits**                      **As Dem. Wrnts**  
**Advanced Sedimentology and Stratigraphy**                      **(3+0)**  
An advanced course dealing with various topics in sedimentology and stratigraphy. Specific offerings to be presented at various times include: (A) sequence stratigraphy and sea-level analysis, (B) sandstone petrology, (C) thermal maturation and geohistory analysis of sediments. (Prerequisite: GEOS 322.)
- GEOS 649**                      **3 Credits**                      **As Dem. Wrnts**  
**Geomorphology of the Unglaciaded Arctic and Subarctic**                      **(3+0)**  
A study of the processes that shape northern landscapes and of the distinctive morphology that they produce. Application to environmental planning, soils engineering, ecology and paleoecology, Quaternary history, and economic geology. (Prerequisite: GEOS 101 and 304 desirable, but not required.)
- GEOS 650**                      **3 Credits**                      **As Dem. Wrnts**  
**Paleoecology of Beringia**  
Reconstruction of landscape, climate, biota and ecology of Beringia between 40,000 and 8,000 years ago through literature surveys. (Prerequisite: Permission of instructor.)
- GEOS 651**                      **3 Credits**                      **As Dem. Wrnts**  
**Quaternary Seminar**                      **(Same as ANTH 651) (3+0)**  
The seminar will involve learning about the Quaternary Period (relatively recent past -- spanning the past two million years) in order to gain a better understanding of the landscape, biota, and climate of the present day. Quaternary studies are concerned with the historical dimension of the natural sciences. This seminar will range widely over diverse interdisciplinary subjects of Quaternary interest, such as paleoclimatology, paleobiogeography, vertebrate paleontology, and sedimentology. (Prerequisites: Graduate standing or permission of instructor.)

- GEOS 652**                      **3 Credits**                      **Alternate Fall**  
**Quaternary Vegetation History**                      **(2+3)**  
 Reconstruction and interpretation of past vegetation during the Quaternary period (2 MY - present), as determined from palynology and related methods. Emphasis on the contribution of historical vegetation studies to modern ecology, landscape evolution (natural and anthropogenic), and paleoclimatology. Laboratory projects focus on Alaskan problems. (Prerequisites: BIOL 271 or BIOL 472 or BIOL 474 or GEOS 401 or permission of instructor.)
- GEOS 661**                      **3 Credits**                      **Alternate Spring**  
**Microwave Active Remote Sensing**                      **(3+0)**  
 Principles of operation of side-looking and synthetic aperture radar systems, methodology of image construction, signal processing for error compensation, image optimization. (Prerequisites: PHYS 331 or equivalent.)
- GEOS 662**                      **3 Credits**                      **Alternate Fall**  
**Microwave Scattering from Land, Sea and Ice**                      **(3+0)**  
 Physical mechanisms of microwave scattering from terrain and sea surfaces; microwave dielectric properties of natural earth materials; random surface scatter and emission; active microwave sensing of the ocean, the land and vegetative, snow, and ice covered surfaces. (Prerequisites: PHYS 331 or equivalent.)
- GEOS 670**                      **1 - 3 Credits**                      **Fall**  
**Selected Topics in Volcanology**                      **(1 - 3 +0)**  
 Survey course in subjects relating to volcanology. Possible subjects include, but are not limited to, eruption dynamics, geophysics of eruptions, volatiles in volcanic systems, modeling volcanic systems. May be repeated for credit. (Prerequisites: GEOS 621, GEOS 417.)
- GEOS 675**                      **2 Credits**                      **Spring**  
**Presentation Techniques in the Geosciences**                      **(1+3)**  
 Development of oral and written presentation skills in the geological sciences with emphasis on the critical analysis of both peers and the instructor(s). Oral and written presentations of abstracts, resumes, proposals and reports. Materials fee: \$15.00. (Prerequisite: Graduate standing in Geology.)

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## ***Journalism & Broadcasting Courses***

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- COMM/JB 601**                      **3 credits**                      **Alternate Years**  
**Communication Methodologies**                      **(3+0)**  
 Communication 601 is a required core course for the Master's Degree in Professional Communication. The student will be introduced to the range of methodologies that are used to produce both practical and theoretic knowledge in the discipline. Both qualitative and quantitative approaches to knowledge building will be addressed. Students will learn the relationships between scientific questions, appropriate selection of methodology, and types of knowledge products.
- JB 605**                      **3 Credits**                      **Alternate Year**  
**Advanced Photography Seminar**                      **(2+3)**  
 Advanced discussion of photojournalism and photographic topics with field, studio, and darkroom sessions. Topics will range from the photographic essay to the history of photography and working in series. Weekly classroom meeting will be supplemented by field, studio, and darkroom sessions. (Prerequisites: Completion of two or more of JB 402, JB 403, JB 404 and permission of the instructor.)

- JB 611**                      **3 Credits**                      **Spring**  
**Advanced Writing for Publication**                      **(3+3)**  
 An intensive writing course focused on producing books and in-depth magazine features. Emphasis will be on writing, editing, and research. The business and legal aspects of becoming an author will also be covered. (Prerequisites: JB 311 or JB 301 or comparable upper division English courses or permission of instructor.)
- JB 613**                      **3 Credits**                      **Alternate Year**  
**Advanced Mass Media Law & Regulation**                      **(3+0)**  
 Seminar on current issues, legal opinions, and legislative actions which directly affect the mass media. Special emphasis on technological evolution, corporate growth, and deregulation of administrative media law. (Prerequisites: JB 413. May be taken concurrently with permission of instructor.)
- JB 623**                      **3 Credits**                      **Fall**  
**Advanced Editing for Professionals**                      **(3+0)**  
 A case study approach to contemplating and resolving clashes over such day-to-day newsroom concerns as naming crime victims, attracting a larger readership, squelching errors, eliminating sexist language, and fending off libel suits while holding authorities accountable for their actions. (Prerequisites: Graduate or upper-class standing.)
- COMM/JB 625**                      **3 Credits**                      **Alternate Years**  
**Communication Theory**                      **(3+0)**  
 Communication 625 is a required course for the Master's Degree in Professional Communication. The course is designed to acquaint students with both the historical evolution of the discipline against the backdrop of the evolution of the social sciences and with the theoretical perspectives of knowledge-building that have marked that disciplinary evolution. Students will learn the contextual interconnectedness of philosophy and theory. Finally, Communication Theory will also make the essential connections between theoretical perspectives and their professional uses.
- JB 633**                      **3 Credits**                      **Alternate Year**  
**Public Relations Theory and Practice**                      **(3+0)**  
 Course examines theory, practice, and research in public relations. Emphasis on public relations in business, industry, government institutions, and nonprofit organizations, as well as the role of public relations in American mass media. (Prerequisites: Graduate standing and in some cases special permission by instructor.)
- JB 640**                      **3 Credits**                      **Fall**  
**Ethics and Reporting in the Far North**                      **(3+0)**  
 Historical overview of media coverage of the northern frontier with focus on journalistic ethics. Comparison made to media climate in third world countries.
- JB 641**                      **3 Credits**                      **Alternate Year**  
**Comparative Media Studies**                      **(3+0)**  
 Historical development of different mass communication systems around the globe. The relationship between press philosophies and their practical implementation. Mass communication systems of selected countries as representative examples of generalized systems. (Prerequisites: Graduate standing, JB 601, and JB 625.)
- JB 680**                      **3 Credits**                      **Fall**  
**Diversity and Media**                      **(3+0)**  
 Examination of how women and minorities are portrayed in the mass media, the employment of women and minorities in the media, as well as how accurately the media reflects our society demographically. Presented from a feminist, multi-cultural perspective using a broad feminist analysis encompassing issues of gender as well as class, race, age, and sexual orientation. (Prerequisites: Graduate standing, JB 625, and JB 601.)



**JB/ART 684**                      **3 Credits**                      **Spring**  
**Multi Media Theory and Practice**                      **(3+3)**  
 Study of theory and techniques needed to produce multi media with a special project for some university or community agency as the required final. Industry is still debating the definition of multi media but for the purpose of this course we define it as computer based, user-driven products with audio, visual, and text components and also video or film where appropriate. (Prerequisites: Understanding of computer graphics [programs like Illustrator, Freehand, Etc.] plus some mastery of a specialty like writing, art, or television production.)

**COMM/JB 699**                      **3 Credits**                      **Fall and Spring**  
**Thesis**                      **(0+0)**  
 Every candidate for the Master's Degree in Professional Communication will complete a thesis project. The requirement consists of an original piece of Communication research directed by a member of the graduate faculty in the Communication Department. The completed and accepted thesis will be presented in an appropriate public forum.

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## *Marine Science and Limnology Courses*

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**MSL 610**                      **3 Credits**                      **Spring**  
**Marine Biology**                      **(3+0)**  
 A study of the biology of the major plant and animal groups in the sea and their roles in pelagic and benthic systems. Physical, chemical, and geological features affecting marine organisms. The role of bacteria in the sea. The basic biology and adaptations of selected species of zooplankton and nekton. The benthos -- shore biota, shelf and deepsea organisms: basic biology, trophic roles, and adaptations of selected species. (Prerequisites: Degree in biology or permission of instructor. Highly recommended: courses in invertebrate zoology, ichthyology, vertebrate zoology.)

**MSL 611**                      **5 Credits**                      **Alternate Summer**  
**Field Problems in Marine Biology**                      **(0+Arr)**  
 Study of pelagic and benthic ecosystems emphasizing distribution, abundance and ecology of dominant species. Students will also complete a research project of their own choosing. Five-week course offered at the Kasitsna Bay Laboratory. (Prerequisites: Graduate standing or permission of instructor; invertebrate zoology or equivalent.)

**MSL 615**                      **3 Credits**                      **Alternate Fall**  
**Physiology of Marine Organisms**                      **(3+0)**  
 A study of the physiological systems of and adaptation to the marine environment, intertidal, pelagic, and deep benthos environment and energy flows will be discussed. (Prerequisite: Graduate standing or permission of instructor.)

**MSL 619**                      **3 Credits**                      **Alternate Spring**  
**Biology of Marine Mammals**                      **(3+0)**  
 This course is intended to provide a graduate-level introduction to a broad range of research and conservation topics associated with marine mammals. Topics include physiological adaptations, phylogeny and evolution, behavior, ecology, population dynamics and conservation. (Prerequisites: Concurrent or previous enrollment in MSL 615 and upper division ecology and statistics courses.)

**MSL 620**                      **4 Credits**                      **Fall**  
**Physical Oceanography**                      **(3+3)**  
 Physical description of the sea, physical properties of sea water, methods and measurements, boundary processes, currents, tides and waves, and regional oceanography. (Prerequisite: Math 202, PHYS 103X or PHYS 211X, science or engineering degree, or permission of instructor.)

- MSL 621**                      **3 Credits**                      **Alternate Fall**  
**Polar Marine Science**                      **(3+0)**  
Physical, biological, chemical and geological oceanography of the polar oceans with emphasis on comparing and contrasting the Arctic and Antarctic. (Prerequisites: MSL 620, 630, 650, 660, or concurrent registration, or permission of instructor.)
- MSL 622**                      **3 Credits**                      **Alternate Spring**  
**Satellite Oceanography**                      **(3+0)**  
A broad introduction to both the theory and practice of satellite oceanography. We will cover the full spectrum of sensors and platforms used in oceanographic research. Topics will range from first principles of orbital dynamics and radiative transfer needed for remote sensing to the actual analysis of satellite imagery using current techniques and algorithms. Students will have the opportunity to acquire and apply satellite imagery to a problem of their choice. (Prerequisite: MSL 620 and 650 or upper division or graduate study in science and consent of instructor.)
- MSL 625**                      **2 Credits**                      **Spring**  
**Shipboard Techniques**                      **(1+3)**  
A comprehensive introduction to modern oceanographic shipboard sampling and analysis techniques. (Prerequisite: Graduate standing or permission of instructor.)
- MSL 629**                      **3 Credits**                      **Alternate Fall**  
**Methods of Numerical Simulation in Geophysical Fluid Dynamics**                      **(3+0)**  
Fundamentals of computer simulation, including time and spatial differencing and stability theory applied to partial differential equations describing dynamical processes in the ocean and atmosphere. Numerical approximation schemes for the geophysical fluid dynamics will be analyzed through equations of motion, continuity and transport. Special consideration will be given to the description of the frictional processes in the turbulent flow and transport/diffusion phenomena. Includes laboratory practice. (Prerequisites: Math 310, 421, 422 or equivalent; baccalaureate degree in physics, engineering, mathematics or equivalent; experience with FORTRAN.)
- MSL 630**                      **3 Credits**                      **Spring**  
**Geological Oceanography**                      **(3+0)**  
Topography and structure of the ocean floor. Theory of plate tectonics. Geology of ocean basins, continental slope, shelf and coastal environments. Major sediment types and distributions. Sediment transport and deposition. Paleooceanography. (Prerequisite: Introductory college geology or permission of instructor.)
- MSL 640**                      **3 Credits**                      **Alternate Spring**  
**Fisheries Oceanography**                      **(3+0)**  
Oceanography of marine processes affecting commercially important fisheries (finfish and shellfish). Interactions between fisheries resources and physical, biological, geological and chemical oceanography, as well as climatological, and meteorological conditions. Topics include recruitment, transport, natural mortality, predator-prey relationships, competition, distribution and abundance. Emphasis is on early life history of fishes. Applications to world's commercial fisheries are cited. (Prerequisite: MSL 620 and 650 or permission of instructor; recommended FISH 400.)
- MSL 650**                      **3 Credits**                      **Fall**  
**Biological Oceanography**                      **(3+0)**  
A survey of biological processes emphasizing organic matter synthesis and transfer including topics essential to a basic understanding of contemporary biological oceanography. Primary and secondary production, standing stocks, distribution, and structure and dynamics of phytoplankton and zooplankton populations. The transfer of organic matter to higher trophic levels, food webs, nutrient cycling, especially but not exclusively nitrogen, phosphorus and silicon, microbiological process relevant to nutrient cycling, and heterotrophic production, benthic communities coastal ecosystems, the influence of organisms on the composition of seawater, particularly with reference to oxygen and carbon dioxide regimes. Aspects of regional oceanography. (Prerequisites: Introductory college biology and chemistry.)

- MSL 651**                      **5 Credits**                      **Alternate Summer**  
**Biology and Ecology of Marine Invertebrates**    **(3+9)**  
 Advanced understanding of marine invertebrates in an evolutionary and ecological context. Animals studied according to habitat phylogenetic relationships. Field and laboratory work at the Kasitsna Bay Laboratory on Kachemak Bay. Students will be required to write a research proposal related to the course subject matter. (Prerequisites: graduate standing, one year of biology and permission of instructor. Basic courses in ecology and invertebrate zoology recommended.)
- MSL. 652**                      **2 Credits**                      **Alternate Spring**  
**Marine Ecosystems**                      **(2+0)**  
 Understanding ecosystems of the sea in the context of evaluating the impact of human activities. The course focuses on current concepts, trends and perspectives rather than being a survey. (Prerequisites: BIOL 472, MSL 650, and MSL 620 or permission of instructor.)
- MSL 660**                      **3 Credits**                      **Spring**  
**Chemical Oceanography**                      **(3+0)**  
 (Same as CHEM 660)  
 An integrated study of the chemical, biological, and physical processes that determine the distribution of chemical variables in the sea. The distribution of stable and radio-isotopes are used to follow complex chemical cycles, with particular emphasis on the cycles of nutrient elements. The chemistry of carbon is considered in detail. The implications of the recently explored mid-ocean ridge vent system to ocean chemistry are examined. (Prerequisite: Graduate standing or permission of instructor.)
- MSL 661**                      **2 Credits**                      **Alternate Spring**  
**Isotope Techniques for Aquatic Science**                      **(2+0)**  
 An examination of the use of added or naturally occurring isotope tracers in ecological studies. Demonstration of equipment and modern techniques. (Prerequisite: MSL 660 or permission of instructor.)
- MSL 663**                      **3 Credits**                      **Alternate Spring**  
**Biochemistry and Molecular Biology of Photosynthesis** **(3+0)**  
 (Same as BIOL 663, CHEM 663)  
 Integrated analysis of photosynthesis. Processes to be addressed include gene expression, protein transport, membrane biogenesis, pigment synthesis, electron transport, regulation of enzyme activity, photon absorption and excitation energy transfer. Current data on environmental control of photosynthetic processes, from gene expression through photosynthetic competence, will be analyzed. (Prerequisites: CHEM 451 and MSL 650 or permission of instructor.)
- MSL 664**                      **3 Credits**                      **Alternate Spring**  
**Algal Biology: Physiological Ecology**                      **(3+0)**  
 (Same as BIOL 664)  
 Ecology of algae examined from a physiological perspective. Emphasis will be placed on phytoplankton, the most thoroughly characterized algae. Algal physiological ecology will be examined both from a classical viewpoint as well as from a more mechanistic approach utilizing modern techniques. (Prerequisites: MSL 650, an undergraduate plant physiology course, or permission of instructor.)
- MSL 665**                      **3 Credits**                      **Alternate Spring**  
**Microbial Biochemistry**                      **(2+3)**  
 Quantitative and mechanistic aspects of the biochemical processes that micro-organisms effect in the aquatic environment. Processes will be formulated in terms of biochemical structures and specified in terms of equations derived. Although intended for students of aquatic processes, the level is appropriate to follow the first semester course in biochemistry. Modern techniques for analysis of enzyme kinetics will provide the foundation for consideration of the processes of membrane transport. (Prerequisites: Biochemistry or equivalent; permission of instructor.)

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| <b>MSL 670</b>   | <b>2 Credits</b> | <b>Alternate Fall</b> |
| <b>Nutrient Dynamics</b>   |                  | <b>(2+0)</b>          |
| The dynamics of nitrogen, phosphorus and silicon cycles of the world oceans and the specific processes which transfer nutrients between ecosystems compartments will be studied. Analytical techniques employed in measurement of nutrient transfer rates will also be studied. (Prerequisites: MSL 660 or 650 or permission of instructor.) |                  |                       |
| <b>MSL 680</b>   | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Physical-Chemical Limnology</b>   |                  | <b>(3+0)</b>          |
| A comprehensive course in physical and chemical limnology covering the basic processes and cycles in freshwater systems, including a consideration of arctic and subarctic lakes. (Prerequisites: Graduate standing, calculus, quantitative analysis or permission of instructor.)   |                  |                       |

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## *Mathematics Courses*

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| <b>MATH 600</b>  | <b>1 Credit</b>                | <b>Fall &amp; Spring</b> |
| <b>Teaching Seminar</b>  |                                | <b>(1+0)</b>             |
| Fundamentals of teaching mathematics in a university setting. Topics may include any aspect of teaching; university regulations, class and lecture organization, testing, book selection, teaching evaluations, etc. Specific topics will vary on the basis of student and instructor interest. Individual classroom visits will also be used for class discussion. May be repeated for credit. (Prerequisite: graduate standing.)   |                                |                          |
| <b>MATH 608</b>  | <b>3 Credits</b>               | <b>As Dem. Wrnts</b>     |
| <b>Partial Differential Equations</b>  |                                | <b>(3+0)</b>             |
| First and second order differential equations, boundary value problems, and existence and uniqueness theorems. Green's functions, and principal equations of mathematical physics. (Prerequisite: MATH 422 or permission of instructor.)   |                                |                          |
| <b>MATH 611</b>  | <b>3 Credits</b>               | <b>Fall</b>              |
| <b>MATH 612</b>  | <b>3 Credits</b>               | <b>Spring</b>            |
| <b>Mathematical Physics</b>  | <b>(Same as PHYS 611, 612)</b> | <b>(3+0)</b>             |
| Advanced consideration of such topics as transform methods, asymptotic methods, Green's function, Sturm-Liouville theory, conformal mapping, and calculus of variations with applications to problems arising in physics. (Prerequisite: MATH 422 or consent of instructor.)   |                                |                          |
| <b>MATH 615</b>  | <b>3 Credits</b>               | <b>Alternate Spring</b>  |
| <b>Applied Numerical Analysis</b>  |                                | <b>(3+0)</b>             |
| Review of numerical differentiation and integration, and the numerical solution of ordinary differential equations. Main topics to include the numerical solution of partial differential equations: curve fitting, splines, and the approximation of functions. Supplementary topics such as the numerical method of lines, the fast Fourier transform, and finite elements may be included as time permits and interest warrants. (Prerequisites: CS 201, MATH 310, MATH 314, MATH 421, MATH 422 or consent of the instructor.) Next offered: 1995-1996. |                                |                          |
| <b>MATH 621</b>  | <b>3 Credits</b>               | <b>Alternate Fall</b>    |
| <b>Advanced Applied Analysis</b>   |                                | <b>(3+0)</b>             |
| Topics covered may include conformal mapping, Fourier, Laplace, and Z transforms and impulse functions with applications to solving differential equations which arise in science and engineering. Other topics as time permits include asymptotic expansions, local analysis, O.D.E.'s and special functions. (Prerequisites: MATH 421-422 or MATH 604 or permission of instructor.) Next offered: 1996-1997.   |                                |                          |
| <b>MATH 622</b>  | <b>3 Credits</b>               | <b>As Dem. Wrnts</b>     |
| <b>Topics in Applied Analysis</b>  |                                | <b>(3+0)</b>             |
| Topics in applied analysis to be determined at the time of registration to fit the needs of the students. (Prerequisite: permission of instructor.)  |                                |                          |

- MATH 630**                      **3 Credits**                      **As Demand Warrants**  
**Advanced Linear Algebra**                      **(3+0)**  
Vector spaces over arbitrary fields primary, rational and Jordan canonical forms, invariant subspace decompositions and multilinear algebra. (Prerequisites: MATH 308 and MATH 314.)
- MATH 631**                      **4 Credits**                      **Alternate Fall**  
**Theory of Modern Algebra I**                      **(4+0)**  
Rigorous development of groups, rings and fields. Introduction to category theory, module theory, homological algebra and Galois Theory. (Prerequisites: MATH 308 and graduate standing or permission of instructor.) Next offered: 1996-1997.
- MATH 632**                      **3 Credits**                      **Alternate Fall**  
**Theory of Modern Algebra II**                      **(3+0)**  
Advanced topics taken from group theory, category theory, ring theory, homological algebra and field theory. (Prerequisite: MATH 631.) Next offered: 1995-1996.
- MATH 641**                      **4 Credits**                      **Alternate Fall**  
**Real Analysis I**                      **(4+0)**  
General theory of Lebesgue measure and Lebesgue integration on the real line. Convergence properties of the integral. Introduction to the general theory of measures and integration. Differentiation, the product measures, and an introduction to L spaces. (Prerequisites: MATH 401-402 or permission of the instructor.) Next offered: 1995-1996.
- MATH 642**                      **3 Credits**                      **Alternate Fall**  
**Real Analysis II**                      **(3+0)**  
Theory of abstract measures and integration. Signed and vector-valued measures. The fundamental theorems of functional analysis: open mapping, closed graph, Hahn-Banach, uniform boundedness, Banach-Alaoglu, etc. Lebesgue-Stieljies integration. Probability spaces and distributions. Applications and special topics to be selected on the basis of instructor and student interest. (Prerequisite: MATH 641.) Next offered: 1996-1997.
- MATH 645**                      **4 Credits**                      **Alternate Spring**  
**Complex Analysis**                      **(4+0)**  
Analytic functions, power series, Cauchy integral theory, Residue Theorem. Basic topology of the complex plane and the structure theory of analytic functions. The Riemann mapping theorem. Infinite products. (Prerequisite: Math 641 or consent of the instructor.) Next offered: 1995-1996.
- MATH 651**                      **4 Credits**                      **Alternate Spring**  
**Topology**                      **(4+0)**  
Treatment of the fundamental topics of point-set topology. Separation axioms, product and quotient spaces, convergence via nets and filters, compactness and compactifications, paracompactness, metrization theorems, countability properties, and connectedness. Set theory as needed for examples and proof techniques. (Prerequisites: MATH 401-402 or MATH 404 or permission of instructor.) Next offered: 1996-1997.
- MATH 655**                      **3 Credits**                      **Alternate Fall**  
**Algebraic Topology**                      **(3+0)**  
Fundamentals of algebraic topology with applications to topology and geometry. The fundamental group, covering spaces, axiomatic homology, and singular homology. (Prerequisites: MATH 308 and MATH 401-402 and MATH 404 or permission of instructor.) Next offered: 1995-1996.
- MATH 660**                      **3 Credits**                      **Alternate Spring**  
**Advanced Mathematical Modeling**                      **(3+0)**  
Examination of models and procedures reflecting problems arising in the physical and social sciences. Derivation of model equations and methods for solution. Heat conduction problems, random walk processes, simplification of equations, dimensional analysis and scaling, perturbation theory, and a discussion of self-contained modules that will illustrate the principal modeling ideas. Students will develop a modeling project as part of the course requirements. (Prerequisite: Consent of instructor.) Next offered: 1996-1997.

|                     |                  |                       |
|---------------------|------------------|-----------------------|
| <b>MATH 661</b>     | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Optimization</b> |                  | <b>(3+0)</b>          |
| (Same as CS 661)    |                  |                       |

Linear and nonlinear programming, simplex method, duality and dual simplex method, post-optimal analysis, constrained and unconstrained nonlinear programming, Kuhn-Tucker conditions. Applications to management, physical, and life sciences. Computational work with the computer. (Prerequisites: Knowledge of calculus, linear algebra, and computer programming.) Next offered: 1996-1997.

|   |                  |                         |
|---|------------------|-------------------------|
| <b>MATH 663</b>                               | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Applied Combinatorics and Graph Theory</b> |                  | <b>(3+0)</b>            |

A study of combinatorial and graphical techniques for complexity analysis including generating functions, recurrence relations, theory of counting, planar directed and undirected graphs, and applications to NP complete problems. (Prerequisite: Consent of instructor.) Next offered: 1995-1996.

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## *Mechanical Engineering Courses*

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|---|------------------|-----------------------|
| <b>ME 601</b>                                 | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Finite Element Analysis in Engineering</b> |                  | <b>(3+0)</b>          |

Formulation of the finite element method. Applications to problems of engineering in solid mechanics, fluid mechanics, and heat transfer. Use and development of codes for computer solution of problems. (Prerequisites: Graduate standing in engineering, ES 201 and MATH 302 or equivalent.)

|                               |                  |                         |
|-------------------------------|------------------|-------------------------|
| <b>ME 604</b>                 | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Experimental Mechanics</b> |                  | <b>(2+3)</b>            |

Theory and application of the methods of experimental mechanics. Primary emphasis on photoelasticity, strain gages and brittle coating. Methods of collecting and processing data, and calculation of stresses and strains from such data. (Prerequisite: Graduate standing in engineering.)

|                       |                  |                      |
|-----------------------|------------------|----------------------|
| <b>ME 617</b>         | <b>3 Credits</b> | <b>As Dem. Wrnts</b> |
| <b>Power Analysis</b> |                  | <b>(3+0)</b>         |

Fundamentals of power generation including piping, pumps, fuels and combustion, steam generators, condensers, deaerators, evaporators, feedwater treatment and heating, regeneration, fuel handling, heat balance, equipment, economics, and plant layout. (Prerequisite: ME 313.)

|  |                  |                       |
|--|------------------|-----------------------|
| <b>ME 631</b>                          | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Advanced Mechanics of Materials</b> |                  | <b>(3+0)</b>          |

Theories of elasticity and plasticity for small and large deformations. Applications to engineering problems. (Prerequisites: Graduate standing in engineering, ES 331 or equivalent. )

|                                       |                  |                         |
|---------------------------------------|------------------|-------------------------|
| <b>ME 634</b>                         | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Advanced Materials Engineering</b> |                  | <b>(3+0)</b>            |

Atomic bonding, crystal structure, crystal imperfections, phases and interfaces, micro-structures, phase diagrams, phase transformation, transport and diffusion, metal deformation, fracture of materials, deterioration of materials, electronic and physical properties of materials. (Prerequisites: Graduate standing in engineering, ES 334, MATH 302 or equivalent.)

|                                 |                  |                         |
|---------------------------------|------------------|-------------------------|
| <b>ME 641</b>                   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Advanced Fluid Mechanics</b> |                  | <b>(3+0)</b>            |

Introduction to viscous flows, laminar boundary layers, turbulent boundary layers, turbulent jets and wakes, applications to heat transfer and drag. (Prerequisite: Graduate standing in engineering. )

- |  |                  |                         |
|--|------------------|-------------------------|
| <b>ME 642</b>  | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Advanced Heat Transfer</b>  |                  | <b>(3+0)</b>            |
| Heat conduction in two and three dimensions under steady and transient conditions. Free and forced convection in internal and external flows. Radiation from black and gray surfaces and gas-filled enclosures. Both analytical and numerical methods are covered. (Prerequisite: Graduate standing in engineering. Next offered: 1992-93.)  |                  |                         |
|  |                  |                         |
| <b>ME 656</b>  | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Space Systems Engineering</b>   |                  | <b>(3+0)</b>            |
| (Same as EE 656, ESM 656)  |                  |                         |
| A multi-disciplinary team of students will perform a preliminary design study of a major space system. Design considerations will include requirements for project management, spacecraft design, power, attitude control, thermal control, communications, computer control and data handling. The students will present their final design in a written report and a public seminar. (Prerequisites: Graduate standing or permission of instructor.) |                  |                         |
|  |                  |                         |
| <b>ME 658</b>  | <b>3 Credits</b> | <b>Fall</b>             |
| <b>Energy and the Environment</b>  |                  | <b>(3+0)</b>            |
| (same as EQE 658)  |                  |                         |
| Basic concepts of energy supply, demand, production of heat, and power impacts of energy use on the environment. Extensive discussion of mitigation technologies and strategies for meeting energy needs while preserving environmental quality. (Prerequisites: MATH 201, PHYS 103, CHEM 106, and at least junior standing.)  |                  |                         |
|  |                  |                         |
| <b>ME 685</b>  | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Arctic Heat and Mass Transfer</b>   |                  | <b>(3+0)</b>            |
| An introduction to the principles of heat and mass transfer with special emphasis on application to problems encountered in the Arctic such as ice and frost formation, permafrost, condensation, and heat loss in structures. (Prerequisite: CE 603.)   |                  |                         |
|  |                  |                         |
| <b>ME 687</b>  | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Arctic Materials Engineering</b>  |                  | <b>(3+0)</b>            |
| A study of engineering material performance at low temperatures. (Prerequisites: Senior or graduate standing in science or engineering and CE 603 or equivalent.)  |                  |                         |

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## *Mining Engineering Courses*

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|--|------------------|-----------------------|
| <b>MIN 621</b>   | <b>3 Credits</b> | <b>Fall</b>           |
| <b>Advanced Mineral Economics</b>  |                  | <b>(3+0)</b>          |
| Economics of mineral exploitation and utilization. International trade, state and federal policies; financial control, and research methods. (Admission by arrangement.)   |                  |                       |
|  |                  |                       |
| <b>MIN 631</b>   | <b>4 Credits</b> | <b>Alternate Fall</b> |
| <b>Research Methods in Mineral Engineering</b>   |                  | <b>(3+3)</b>          |
| Research methods including problem definition and statement, designing experiments, collecting data and interpreting them. Methods of theoretical and experimental analysis will be reviewed and examples given. (Prerequisites: MATH 302 or equivalent, MIN. 370 or CE 435 or permission of instructor. ) |                  |                       |

**MIN 635                      3 Credits                      Spring**  
**Geostatistical Ore Reserve Estimation                      (2+3)**  
 (Same as GE 635)

Introduction to the theory and application of geostatistics in the mining industry. Review of conventional methods of ore reserve estimation, sampling design and computer applications. Review of classical statistics, log normal distributions and global estimation. Presentation of fundamental geostatistical concepts including: variogram, estimation variance, block variance, kriging, geostatistical simulation. Emphasis on the practical application to mining. (Prerequisites: MIN 408 or equivalent, STAT 400 or equivalent.)

**MIN 637                      3 Credits                      Alternate Fall**  
**Mine Systems Simulation                      (2+3)**

Application of computer simulation to the analysis of static and dynamic mine systems and the development of useful programs for mine operators. Design of simulation experiments in mining engineering. (Prerequisites: MIN 409; or ESM 621 and a course in computer programming; or equivalent.)

**MIN 646                      3 Credits                      Alternate Spring**  
**Mining Engineering in the Arctic                      (3+0)**

An in-depth treatment of mining engineering problems encountered in arctic conditions. Design and construction of mine openings in frozen ground, mechanical and thermal properties of rocks at subfreezing temperatures, fragmentation and excavation of frozen ground, surface mining problems in the arctic climate, equipment maintenance, mined-land reclamation and economic evaluation of mineral properties in arctic regions. Case studies also are presented. (Prerequisites: MIN 301, MIN 302, MIN 370, MIN 445 or equivalent or permission of instructor.)

**MIN 647                      2 Credits                      Alternate Fall**  
**Advanced Underground Mine Design                      (1+3)**

Design of underground mining methods based upon the geological and physical descriptions of mineral deposits. Design and layout of underground mines. Design of room and pillar, sublevel caving, block caving and open stopping systems. Equipment selection, production scheduling, ventilation design and mining costs. Engineering drawings. (Prerequisites: MIN 301 or equivalent, MIN 302 or equivalent, MIN 370 or equivalent.)

**MIN 652                      3 Credits                      Alternate Spring**  
**Numerical Methods in Mine Ventilation                      (2+3)**

Differencing schemes for the partial differential equations of flow in mine networks, typical boundary conditions for mine ventilation systems, computer-aided solution techniques. Application to flow of fluids through porous media is covered. (Prerequisites: MIN 302 or equivalent, a course in computer science and a course in differential equations.)

**MIN 670                      3 Credits                      Alternate Spring**  
**Optimization Models in the Mineral Industry                      (3+0)**

Study of concepts and methods in analysis of systems involving single and multiple objectives, with applications to mining engineering and mine environmental systems. (Prerequisites: MIN 409 or equivalent, permission of the instructor.)

**MIN 673                      3 Credits                      Alternate Fall**  
**Advanced Rock Mechanics                      (2+3)**

The study of theoretical and experimental methods in rock mechanics. State of stress and potential failure zone around two and three dimensional structures in rock based on theoretical, numerical, experimental techniques, and failure criteria are presented. (Prerequisite: MIN 370 or equivalent.)



|                                |                  |                         |
|--------------------------------|------------------|-------------------------|
| <b>MIN 674</b>                 | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Advanced Ground Control</b> |                  | <b>(2+3)</b>            |

A study of current rock mechanic problems which are related to advances in mining and construction technologies, with particular emphasis on the importance of rock and frozen ground properties and stress evaluation in designing and monitoring stability of structures for gas, oil and radioactive materials storage, geothermal energy recovery, solution mining, and those exposed to rock outbursts and earthquakes. Rock and frozen ground properties related to other dynamic loading conditions, such as in blasting, are also discussed. (Prerequisites: MIN 370 or equivalent, MIN 673 or equivalent, or permission of instructor.)

|                           |                 |              |
|---------------------------|-----------------|--------------|
| <b>MIN 688</b>            | <b>1 Credit</b> | <b>Fall</b>  |
| <b>Graduate Seminar I</b> |                 | <b>(1+0)</b> |
| <b>(Same as MPR 688)</b>  |                 |              |

Preparation and presentation of research outlines by graduate students and participation in regularly organized Mineral Engineering Department seminars. (Prerequisite: Admission to graduate program.)

|                            |                 |               |
|----------------------------|-----------------|---------------|
| <b>MIN 689</b>             | <b>1 Credit</b> | <b>Spring</b> |
| <b>Graduate Seminar II</b> |                 | <b>(1+0)</b>  |

Presentation of graduate research by graduate students and participation in regularly organized Mineral Engineering Department seminars. (Prerequisite: Admission to graduate program.)

## ***Mineral Preparation Engineering Courses***

|                        |                  |              |
|------------------------|------------------|--------------|
| <b>MPR 601</b>         | <b>3 Credits</b> | <b>Fall</b>  |
| <b>Froth Flotation</b> |                  | <b>(2+3)</b> |

Theory and application of bulk and differential froth flotation to metallic minerals, non-metallic minerals, and coal. (Admission by arrangement.)

|                     |                  |                       |
|---------------------|------------------|-----------------------|
| <b>MPR 606</b>      | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Plant Design</b> |                  | <b>(1+6)</b>          |

Selection and design of equipment for the operation of mineral and coal beneficiation plants for specific custom and milling problems. (Admission by arrangement.)

|                        |                  |                       |
|------------------------|------------------|-----------------------|
| <b>MPR 611</b>         | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Hydrometallurgy</b> |                  | <b>(3+0)</b>          |

Study of the theoretical and engineering aspects of the processes to recover metals from different types of ores and/or scraps, in which aqueous solutions play the predominate role. (Prerequisites: MATH 202, CHEM 331 or permission of the instructor.)

|  |                  |                       |
|--|------------------|-----------------------|
| <b>MPR 612</b>                                 | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Solution Concentration and Purification</b> |                  | <b>(3+0)</b>          |

Study of the physical chemistry of reaction encountered in solution concentration and purification processes. The types of reaction discussed are cementation, solvent extraction, ion exchange and carbon absorption which are studied in terms of solution chemistry, reaction kinetics and mass transfer effects. (Prerequisites: MATH 202, CHEM 331 or permission of the instructor.)

**MPR 684**                      **3 Credits**                      **Spring**  
**Mineral Preparation Research**                      **(1+6)**  
Familiarizes students with the concept of basic research and its needs in the field of mineral beneficiation, including such research subjects as magnetic susceptibility, dielectric constants, and electrical conductivity of minerals; chemical theory and mechanism of bubble contact in flotation, and the effect of ultrasonic vibration in unit processes. (Admission by arrangement.)

**MPR 688**                      **1 Credit**                      **Fall**  
**Graduate Seminar I**                      **(1+0)**  
(Same as MIN 688)  
Preparation and presentation of research outlines by graduate students and participation in regularly organized Mineral Engineering department seminars. (Prerequisite: Admission to graduate program.)

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## ***Music Courses***

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**MUS 606**                      **1-2 Credits**                      **As Dem. Wrnts**  
**Advanced Chamber Music**                      **(0+3)-(1+3)**  
Advanced string, woodwind, brass, vocal chamber music, piano chamber music and accompanying. (prerequisite: MUS 307 or permission of instructor.)

### **Applied Music**

**MUS 661**                      **2 or 4 Credits**                      **Fall and Spring**  
**Advanced Private Lessons**  
Private instruction in piano, voice, or orchestral instruments consisting of one private lesson per week. Repeatable for credit. Private lesson fee: \$125. (Prerequisite: MUS 462 or equivalent, and by audition.)

### **Music Theory, Music History, and Music Education**

**MUS 601**                      **3 Credits**                      **Fall**  
**Introduction to Graduate Study**                      **(3+0)**  
Materials, techniques, and procedures for research in music. Examination of bibliographic sources. Required of all graduate students in Music. Students should register for this class during their first Fall semester in residence. (Prerequisites: Provisional admission to graduate study and permission of instructor.)

**MUS 607**                      **3 Credit**                      **As Dem. Warrants**  
**Seminar in Elementary and Secondary General Classroom Music**                      **(3+0)**  
Discussion of the theoretical bases for developing objectives for general and classroom music in the elementary and secondary schools. Evaluation of current curricula, methods, and materials with respect to stated objectives. Evaluative methods in music. (Prerequisite: Permission of instructor.)

**MUS 608**                      **Credits**                      **As Dem. Wrnts**  
**Seminar in Secondary Music Education**                      **(2+0)**  
Examination of current trends and problems in all aspects of secondary music education. Emphasis will be placed on curriculum development, philosophy and goals, instrumental and choral program administration, and aspects of music learning and evaluation. (Prerequisite: Permission of instructor.)

**MUS 625**                      **1-3 Credits**                      **As Dem. Wrnts**  
**Topics in Music History**                      **(1-3+0)**  
Detailed study of selected topics in music history and/or literature. Specific topic and number of credits to be announced in advance of course offering.

- MUS 631**                      **3 Credits**                      **Alternate Fall**  
**Seminar in Music Theory: History and Pedagogy (3+0)**  
 Study of 1) historical development of music theory, and 2) music theory pedagogy (current teaching practices, and survey of available teaching materials.) (Prerequisite: Permission of instructor.)
- MUS 651**                      **2-3 Credits**                      **As Dem. Wrnts**  
**Advanced Conducting and Rehearsal Techniques (2-3+0)**  
 Study of conducting style and techniques and their application to representative compositions for different instrumental and vocal mediums. Repeatable for credit. (Prerequisites: MUS 351 or equivalent and/or permission of instructor.)
- MUS 671**                      **3 Credits**                      **As Dem. Wrnts**  
**Psychology of Music**                      **(3+0)**  
 Study of the relationship of music to the human mind emphasizing such factors as musical perception, pattern recognition, psychoacoustics, and related topics. (Prerequisites: MUS 232 or equivalent and/or permission of instructor.)
- MUS 690**                      **0 Credit**                      **Fall and Spring**  
**Graduate Recital**  
 Full length solo performance recital. (Prerequisite; MUS 490 or equivalent, graduate standing in applied music study, permission of instructor.)

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## ***Natural Resources Management Courses***

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- NRM 625**                      **3 Credits**                      **Alternate Spring**  
**Advanced Ungulate Management and Production Systems (2+3)**  
 Functional biology of large herbivores (ungulates) and management of the world's grazing systems. Production strategies (cropping, herding, ranching, and farming) as they pertain to productive and/or commercial management of wild ungulates with emphasis on Alaska's species. Laboratory presents an introduction to flow charting, types of models, model design using various software, construction of a productive grazing system model, compiling a written report to explain the system designed. (Prerequisite: BIOL 105 or 106 and a wildlife or animal science course and permission of instructor.)
- NRM 630**                      **3 Credits**                      **Fall**  
**Planning Theory**                      **(3+0)**  
 Detailed analysis of principles and processes of solving complex group problems; focused on land planning in Alaska. (Prerequisite: Graduate standing or permission of instructor.)
- NRM 631**                      **3 Credit**                      **Spring**  
**Planning Practicum**                      **(3+0)**  
 Application of principles and processes through group projects focused on Alaska land or resource problems. (Prerequisite: NRM 630 or permission of instructor.)
- NRM 640**                      **3 credits**                      **Alternate Spring**  
**Simulation and Modeling in Resource Management (3+0)**  
 Introduction to and discussion of the use of simulation and modeling in natural resource management. Emphasis on concepts, strategies, and case studies. (Prerequisite: Graduate standing or permission of instructor.)

- NRM 641**                      **3 Credits**                      **Alternate Spring**  
**Natural Resource Applications of Remote Sensing (2+3)**  
 An introduction to the interpretation of remote sensing data and applications to natural resources. Course topics include a discussion of types of remote sensing data and product displays, the advantages and limitations of data types, and techniques of data interpretation for various natural resource problems. Emphasis is placed on vegetation survey and inventory, wildlife habitat, forest and range management, agriculture, geo-botanical correlations, and change detection-monitoring. Techniques include manual interpretation and computer-aided analysis. (Prerequisites: GEOS 422 or permission of instructor.)
- NRM 651**                      **3 Credits**                      **Alternate Spring**  
**Advanced Silviculture**                      **(3+0)**  
 Examines biological and environmental aspects of silviculture; addresses stand manipulation from the "silvicultural system" approach and includes regeneration, vegetation management, stand tending, "harvest" with considerations for biodiversity, "old-growth," wildlife habitat, and timber production. Ecological classification, landscape management, preharvest silvicultural prescriptions will be addressed. Must be able to participate in one weekend field trip. (Prerequisites: Consent of instructor and graduate student standing.)
- NRM 665**                      **3 Credits**                      **Alternate Spring**  
**Advanced Outdoor Recreation**                      **(3+0)**  
 Evaluation of contemporary outdoor recreation management models and the linkage between management programming and visitor response. Development of a synthesized model and testing with contemporary problems. (Prerequisite: graduate standing.)
- NRM 670**                      **3 Credits**                      **Alternate Fall**  
**Biometeorology**                      **(3+0)**  
 Radiation balance, energy balance relationships for natural and modified surfaces; physical environment in relation to biology and ecology of plants and animals; implications for resource and environmental management. (Prerequisites: Biological or physical science background and graduate standing or permission of instructor.)
- NRM 672**                      **2 Credits**                      **Alternate Fall**  
**Dynamics of Nitrogen in Forest Ecosystems**                      **(2+0)**  
 Consideration of the state and dynamics of nitrogen in the complete forest ecosystem, including its basic chemistry, measurement techniques, functions, component partition, and changes in these features with forest disturbances. (Prerequisites: Graduate status in natural resources management, wildlife-fisheries, biological sciences, or permission of instructor.)
- NRM 673**                      **3 Credits**                      **Alternate Spring**  
**Soil Microbiology and Biochemistry**                      **(3+0)**  
 This course will examine, in depth, several (4-5) current topics in soil microbiology and biochemistry. It will be based on readings from the primary literature and discussions in class. Each student will be expected to lead at least one discussion, write a research proposal, and present the proposal to class. (Prerequisites: at least one course in soil science and one course in microbiology or permission of instructors.)
- NRM 675**                      **3 Credits**                      **Alternate Fall**  
**Applied Ecosystem Science**                      **(3+0)**  
 Modern concepts of ecosystem science and their application to solving problems of land use and management. Worldwide patterns and control processes of and management implications for major ecosystems. Designed for students in biology and renewable resources management. (Prerequisites: Undergraduate major in biological sciences or renewable resources including at least one course in ecology, one approved college-level mathematics course and graduate standing or permission of instructor.)

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|--|------------------|-------------------------|
| <b>NRM 678</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Ecosystem Management</b>  |                  | <b>(3+0)</b>            |
| Ecosystem Management addresses the current concepts being debated and used to manage renewable resources. Students will, through reading, discussion, and written exercises, develop understanding and applications of the concept as well as draft definitions. Class sessions will involve lecture and discussion. (Prerequisites: graduate standing with basic biology, wildlife, natural resources, forestry background or demonstrated knowledge; or permission of instructor.)   |                  |                         |
| <b>NRM 680</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Environmental Decision Making</b>   |                  | <b>(3+0)</b>            |
| The potential and actual role of science in natural resources and environmental decision making. Explores the roles of values and analysis, and of techniques such as modeling, forecasting and technology assessment in political decisions. (Prerequisites: graduate standing or permission of instructor.)  |                  |                         |
| <b>NRM 681</b>   | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Natural Area Protection and Management</b>  |                  | <b>(3+0)</b>            |
| An examination of the emergence of programs to identify, protect, and maintain natural diversity and natural areas as a major factor in public and private resource management in the U.S. and Canada. Topics will include conservation biology principles, evolution and operating principles of natural area programs, natural area data management, natural area system administration. (Prerequisites: Basic biology [including genetics], introductory ecology, plant or animal systematics or taxonomy, introductory chemistry.) |                  |                         |
| <b>NRM 692</b>   | <b>1 Credit</b>  | <b>Fall, Spring</b>     |
| <b>Graduate Seminar</b>  |                  | <b>(0+0+1)</b>          |
| Topics in natural resources management explored through readings, student presentations, group discussions, and guest speakers; high level of student participation. (Prerequisite: graduate standing or permission of instructor.)  |                  |                         |

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## *Northern Studies Courses*

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|---|------------------|------------------------|
| <b>NORS 600</b>   | <b>3 Credits</b> | <b>Fall</b>            |
| <b>Perspectives on the North</b>  |                  | <b>(3+0)</b>           |
| <b>(Same as HIST 600)</b>   |                  |                        |
| Basic knowledge of the circumpolar north - the social, economic, political, and scientific facets of northern life. Consideration of major cultural groups of the north and their histories, the environmental settings and patterns of settlement and development in northern regions and systems of governance in different northern countries. Broad overview of the major policy issues of the north in education, justice, health care, and environmental and wildlife protection. |                  |                        |
| <b>NORS 601</b>   | <b>3 Credits</b> | <b>Fall</b>            |
| <b>Research Methods and Sources in the North</b>  |                  | <b>(3+0)</b>           |
| Development of students' research skills so they can engage in their own research on northern issues. Includes techniques of interviewing, conducting surveys, and sampling; qualitative and quantitative methods of research design; and familiarity with library sources and archival records. Each student will develop a research project.  |                  |                        |
| <b>NORS 606</b>   | <b>3 Credits</b> | <b>Alternate Years</b> |
| <b>Science, Technology &amp; Development in Northern Regions</b>  |                  | <b>(3+0)</b>           |
| This course analyzes critical northern public policy issues with scientific dimensions. It considers scientific knowledge and traditional knowledge of indigenous populations. The course emphasizes case studies of development and industrial pollutants, such as Project Chariot, Chernobyl, Red Dog Mine, Exxon Valdez, and Arctic haze. (Prerequisites: a course in basic science or engineering, and graduate standing or consent of instructor.)                                 |                  |                        |

**NORS 610**                      **3 Credits**                      **Alternate Years**  
**Northern Indigenous People and Contemporary Issues (3+0)**  
 (Same as ANTH 610)

Comparative examination of issues affecting northern indigenous people from Alaska, Canada, Greenland, and Russia. Issues include the impact of the alienation of land on which these people depend; the relationships between their small, rural micro-economies and the larger agro-industrial market economies of which they are a part; education, language loss, and cultural transmission; alternative governmental policies toward indigenous peoples and contrasting world views.

**NORS 614**                      **3 Credits**                      **Alternate Years**  
**Human Adaptation to the Circumpolar North**                      **(3+0)**  
 (Same as PSY 614)

Individual and family adaptations to the distinctive stresses and opportunities of life in northern regions. Students complete an original research project examining a topic such as successful and unsuccessful responses to northern work and economic cycles, adult development in sparsely populated frontier settings, and the social problems characteristic of northern settings.

**NORS 620**                      **3 Credits**                      **Alternate Years**  
**Images of the North**                      **(3+0)**  
 (Same as ENGL 620)

Emphasis on the variety of images created about the people and environment of the circumpolar north. Examination and interpretation of conceptualizations of the north as expressed in such different media as film, art, literature, travel journals, and oral traditions.

**NORS 625**                      **3 Credits**                      **Alternate Years**  
**Visual Images of the North**                      **(3+0)**

Examination of the two-dimensional imagery of the people and landscapes of the polar regions, centering on such issues as depiction of arctic peoples and customs by Europeans, documentary vs. artistic goals, translations from original sketches to published images, relationship of polar imagery to prevailing historical styles, and the influence of changing world views on modes of polar representation between the 16th and 20th centuries.

**NORS 630**                      **3 Credits**                      **Alternate Years**  
**Economic Issues of the Circumpolar North**                      **(3+0)**  
 (Same as ECON 630)

Introduction to economic methods and issues relevant to northern regions. Topics include the optimal depletion of resources, determination of land rents and prices, factors influencing migration and transportation, capital budgeting, and the economic impact of such problems as global warming. This course is designed for students who do not have advanced preparation in either mathematics or economics.

**NORS 637**                      **3 Credits**                      **Alternate Years**  
**Geography of Northern Development**                      **(3+0)**  
 (Same as GEOG 637)

Focus on spatial patterns of development throughout the northern world. Comparisons of development patterns in different countries and regions will be emphasized, especially alternative settlement patterns and resource development policies. Course will include case studies of contrasting settlement and resource development policies in Greenland, northern Canada, Russia, northern Scandinavia, and Iceland.

**NORS 640**                      **3 Credits**                      **Alternate Years**  
**Ethics and Reporting in the Far North**                      **(3+0)**

Historical overview of media coverage of the northern frontier with focus on journalistic ethics. A comparison is made to the media climate in third world countries.

**NORS 648                      3 Credits                      Alternate Years**

**Environmental Politics of the Circumpolar North (3+0)**

(Same as PS 648)

Overview of how environmental politics and policy as a field of study relates to the Arctic region. Analysis of various threats to the northern environment, focusing on the policy making institutions at selected Arctic rim nations, as well as strategies to deal with environmental problems in an international context. (Prerequisite: admission to the Northern Studies graduate program or permission of the instructor.)

**NORS 650                      3 Credits                      Alternate Years**  
**Comparative Government and Politics in the Circumpolar North                      (3+0)**  
(Same as PS 650)

Comprehensive survey of political systems in the circumpolar north. Focus on differences in governmental structures in northern countries and on northern politics, especially interest group development and partisan and ideological conflicts. Examination of northern policy issues in such areas as economic development, subsistence protection, environmental regulations, education, and social welfare.

**NORS 651                      3 Credits                      Alternate Years**  
**Law, Justice, and Society in the Circumpolar North                      (3+0)**  
(Same as PS 651)

This course analyzes the legal systems and constitutional frameworks of circumpolar countries, with special attention to the status of Native peoples. Questions of individual and collective rights, as well as cultural, environmental, and resource conflicts, will be considered in the context of institutions, policy-making, and legal theory.

**NORS 652                      3 Credits                      Alternate Years**  
**International Relations of the North                      (3+0)**  
(Same as PS 652)

Examination of the international strategies of circumpolar states. Consideration of theoretical and practical elements of strategy formation in major issue areas such as national security, the political economy, human rights, and scientific exchange.

**NORS 661                      3 Credits                      Alternate Years**  
**History of Alaska                      (3+0)**  
(Same as HIST 461)

Alaska from prehistoric times to the present, including major themes such as Native Alaska, colonial Alaska, military Alaska, statehood, Alaska Native Claims Settlement Act of 1971, and the Alaska National Interest Lands Act of 1980. Also available via Independent Learning.

**NORS 664                      3 Credits                      Alternate Years**  
**History of Russia                      (3+0)**  
(Same as HIST 464)

Origin and development of Russia from early times to the present. Emphasis on the nineteenth and twentieth centuries. (Prerequisites: HIST 101, 102 or permission of the instructor.)

**NORS 665                      3 Credits                      Alternate Years**  
**Russian Eastward Expansion                      (3+0)**  
(Same as HIST 465)

A history of Russian exploration, conquest and settlement in Siberia, Central Asia and the Caucasus region, including the impact of this contact on the indigenous peoples and on relations with other countries. (Prerequisites: HIST 101, 102 or permission of the instructor.)

**NORS 680**                      **3 Credits**  
**Comparative Education**  
(Same as ED 680)

**Alternate Years**  
**(3+0)**

Focus on the comparative study and analysis of international systems of public education. National issues to be addressed include social context, gender, ideology, international power, level of development, current issues and problems, and efforts toward reform. National systems to be studied include Japan, the People's Republic of China, and a variety of other national or cross-national studies to be completed by course participants.

**NORS 681**                      **3 Credits**  
**Polar Exploration and its Literature**  
(Same as HIST 481)

**Alternate Years**  
**(3+0)**

A survey of polar exploration efforts of all Western nations from A.D. 870 to the present and a consideration of the historical sources of this effort. Also available via Independent Learning.

**NORS 682**                      **3 Credits**  
**History of Circumpolar Research**  
(Same as HIST 482 and LS 482)

**Alternate Years**  
**(3+0)**

Studies the history of arctic and sub-arctic sciences through geological, biological and atmospheric sciences and the people through anthropology, ethnography, linguistics and history. Cold regions engineering and technology research in education, government and law covered. The literature and source material on these fields analyzed. (Prerequisites: HIST 110 or 115 or ANTH 242 or BIOL 104 or permission of instructor.)

**NORS 683**                      **3 Credits**  
**20th Century Circumpolar History**  
(Same as HIST 483)

**Alternate Years**  
**(3+0)**

A comparative history of the circumpolar north, including Alaska, Siberia, Scandinavia, Greenland and Canada. Focus on social, economic, political and environmental issues of the 20th century, such as exploration, aboriginal land claims, subsistence, military strategy, transportation, oil development, Arctic haze, and scientific research in the Arctic.

**NORS 690**                      **3 Credits**  
**Researching and Writing Public Northern History**  
(Same as HIST 690)

**Alternate Years**

This course enables students to work with public agencies, under the direction of the instructor, in researching and writing background papers needed by public officials in formulating public policies dealing with a wide range of topics, including, for example, resource utilization and land management. Students acquire and demonstrate research, writing, and problem solving skills

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## ***Petroleum Engineering Courses***

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**PETE 607**                      **3 Credits**  
**Advanced Production Engineering**

**Fall**  
**(3+0)**

Production system analysis, production optimization, downhole equipment design, surface facilities design, oil and gas processing, gas and oil treating systems, disposal well systems, project organization and field development. (Prerequisites: Graduate standing, PETE 407 or equivalent, permission of instructor.)

**PETE 610**                      **3 Credits**  
**Advanced Reservoir Engineering**

**Fall**  
**(3+0)**

Advanced treatment of topics in reservoir engineering including derivation and solution of the diffusivity equation, the real gas pseudo potential, and applications of materials balance equations to water influx calculations. (Prerequisite: PETE 476 or permission of instructor.)



- PETE 630**                      **3 Credits**                      **As Dem. Wrnts**  
**Water Flooding**                      **(3+0)**  
A study of the fundamental concepts and procedures for the design of waterflooding processes in petroleum reservoirs. (Prerequisites: PETE 301 and PETE 476. Last offered: Fall 1991.)
- PETE 661**                      **3 Credits**                      **Every Third Semester**  
**Advanced Well Testing**                      **(3+0)**  
Equations for transient flow of single phase fluids through porous media, extension to sample multiphase flow, isolated and developed multi-well flow, conventional drawdown and buildup analysis, log-log type curve analysis, interference testing, fractured wells, pulse tests, and drill stem tests. (Prerequisite: PETE 476 or PETE 610.)
- PETE 662**                      **3 Credits**                      **Every Third Semester**  
**Enhanced Oil Recovery**                      **(3+0)**  
Secondary and tertiary oil recovery processes, including waterflooding and chemical and thermal recovery methods. (Prerequisite: PETE 476 or PETE 610.)
- PETE 663**                      **3 Credits**                      **Every Third Semester**  
**Advanced Reservoir Simulation**                      **(3+0)**  
Mathematical description of the reservoir, history matching, and prediction for several published case studies of reservoir simulations, class project application to simulation of an Alaskan reservoir. (Prerequisites: Advanced engineering mathematics elective and PETE 610.)
- PETE 665**                      **3 Credits**                      **Every Third Semester**  
**Advanced Phase Behavior**                      **(3+0)**  
The development and application of phase equilibrium simulators to predict fluid properties for reservoir fluids. (Prerequisites: PETE 321 or permission of instructor.)
- PETE 666**                      **3 Credits**                      **As Dem. Wrnts**  
**Advanced Drilling and Completions**                      **(3+0)**  
Offshore and onshore methods of drilling and completion methods, specialty drilling environments, optimization during drilling, drilling hydraulics, use of commercial computer software as applied to drilling. (Prerequisite: Graduate standing in engineering discipline or permission of instructor.)
- PETE 670**                      **3 Credits**                      **Fall**  
**Fluid Flow Through Porous Media**                      **(3+0)**  
The study of transport phenomena in porous media and application to petroleum engineering. (Prerequisites: PETE 301 and PETE 476.)
- PETE 683**                      **3 Credits**                      **Every Third Semester**  
**Advanced Natural Gas Engineering**                      **(3+0)**  
The study of natural gas reservoir engineering and gas production practices; transient flow of real gases, gas field development, gas well testing, transportation and gas storage reservoirs. (Prerequisites: PETE 431 and PETE 476. Last offered Spring 1991.)
- PETE 684**                      **3 Credits**                      **Fall**  
**Computational Methods in Petroleum Engineering**                      **(3+0)**  
Numerical methods used in the solution of problems in drilling, production and reservoir engineering. Application of operational calculus, numerical integration, Laplace transforms, Green's functions, statistical methods, and non-linear optimization techniques to petroleum engineering. (Prerequisites: PETE 476, MATH 302, and MATH 310.)
- PETE 685**                      **3 Credits**                      **Every Third Semester**  
**Non-Newtonian Fluid Mechanics**                      **(3+0)**  
Characteristics of stress in fluids, flow models of non-Newtonian fluids (Bingham plastic fluids, fluids without yield stress), Couette flow analysis of non-Newtonian fluids, surge and swab pressure models for plugged and open-end pipes. (Prerequisites: ES 341, PETE 426 or permission of the instructor.)

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## *Physics Courses*

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**PHYS 611                      3 Credits                      Fall**

**PHYS 612                      3 Credits Spring                      (3+0)**  
**Mathematical Physics**

(Same as MATH 611-612)

Advanced consideration of such topics as transform methods, asymptotic methods, Green's function, Sturm-Liouville Theory, conformal mapping, and calculus of variations with applications to problems arising in physics. (Prerequisites: Permission of instructor and Math 422; PHYS 611, or the equivalent, for PHYS 612.)

**PHYS 621                      3 Credits                      Alternate Fall**  
**Classical Mechanics                      (3+0)**

Lagrange's equations, two-body problem, rigid body motion, special relativity, canonical equations, transformation theory, and Hamilton-Jacobi method. (Admission by arrangement.)

**PHYS 622                      3 Credits                      Alternate Spring**  
**Statistical Mechanics                      (3+0)**

Classical and quantum statistics of independent particles, ensemble theory, and applications. (Admission by arrangement.)

**PHYS 626                      3 Credits                      Alternate Fall**  
**Fundamentals of Plasma Physics                      (3+0)**

Single charge particle motion in the electromagnetic fields, plasma kinetic theory, Vlasov equations for collisionless plasmas, magnetohydrodynamic equations, linear plasma waves and instabilities, nonlinear plasma waves and instabilities. (Prerequisite: Graduate standing.)

**PHYS 627                      3 Credits                      Alternate Spring**  
**Advanced Plasma Physics                      (3+0)**

Vlasov description of small amplitude waves in magnetized plasmas, advanced particle orbit theory, fluctuation and incoherent scattering theory, plasma discontinuities and collisionless shocks, weak turbulent theory, statistical theory of turbulence. (Prerequisite: Graduate standing.)

**PHYS 628                      3 Credits                      Alternate Fall**  
**Digital Time Series Analysis                      (3+0)**

The use of methods of time series analysis, including correlation, convolution, filtering, and multivariate techniques. Material is of general application to disciplines that obtain multiparameter data suites as part of their research, such as seismology, oceanography, meteorology, geomagnetism, and space physics. Lectures will develop basic techniques and guide the student in designing working algorithms. The student will apply algorithms to various data suites from geophysics, using the Geophysical Institute's VAX 11/780 computer. (Prerequisites: MATH 401 and 402, familiarity with FORTRAN or consent of instructor.)

**PHYS 629                      3 Credits                      Alternate Fall**  
**Methods of Numerical Simulation in Fluids and Plasma (3+0)**  
**(Same as MSL 629)**

The fundamentals of computer simulation including time and spatial differencing and stability theory applied to partial differential equations describing convective and diffusive transport in fluids. The second part of the course will be separated into two tracks: one specializing in ocean and atmospheric dynamics and the other in the plasma state of matter. (Prerequisites: MATH 310, 421, 422 or equivalent; baccalaureate degree in physics, engineering or mathematics or equivalent; for plasma physics track: baccalaureate degree in physics including PHYS 311, 312, 331, 332 or equivalent; experience with FORTRAN.)

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| <b>PHYS 631</b>               | <b>3 Credits</b> | <b>Alternate Fall</b>   |
| <b>PHYS 632</b>               | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Electromagnetic Theory</b> |                  | <b>(3+0)</b>            |
- Electrostatics, magnetostatics, Maxwell's equations, and potentials. Lorentz equations, field energy, gauge conditions, retarded potentials, waves, radiation, tensor formulations, and non-Maxwellian electrodynamics. (Permission of instructor and PHYS 631, or the equivalent, for PHYS 632. )
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| <b>PHYS 640</b>        | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Auroral Physics</b> |                  | <b>(3+0)</b>            |
- Physics of auroral phenomena: precipitation and transport of energetic particles, production of auroral optical emissions and x-rays, auroral electric fields and currents, beam plasma interactions in the ionosphere, ionospheric perturbations, geomagnetic perturbations. Principles of ground rocket and satellite-based auroral measurements including: imaging radar and radio spectroscopic and electromagnetic techniques. (Prerequisite: Graduate standing or permission of the instructor. )
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| <b>PHYS 645</b>                                   | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Fundamentals of Geophysical Fluid Dynamics</b> |                  | <b>(3+0)</b>          |
- An introduction to the mechanics of fluid systems, the fundamental processes and Navier-Stokes' equations in rotating and stratified fluids, boundary layer phenomena, turbulent flows and mixing, wave motions and applications. (Prerequisite: Graduate standing.)
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| <b>PHYS 650</b> | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Aeronomy</b> |                  | <b>(3+0)</b>          |
- The physical and chemical processes that govern the response of planetary atmospheres to solar radiation and energetic particles; neutral gas and ionic composition, energy balance, dynamical response of the thermosphere, mesosphere and stratosphere, spectroscopic emissions, electrodynamic processes and ionospheric currents, gravity waves and noctilucent clouds. (Prerequisite: Graduate standing or permission of instructor.)
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|--------------------------|------------------|-------------------------|
| <b>PHYS 651</b>          | <b>3 Credits</b> | <b>Alternate Fall</b>   |
| <b>PHYS 652</b>          | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Quantum Mechanics</b> |                  | <b>(3+0)</b>            |
- Schrodinger's equations, operator formalism, correspondence principle, central force problems, perturbation theory, quantum statistical mechanics, and applications of quantum mechanics to collision problems, radiation, and spectroscopy. (Permission of instructor and PHYS 651, or the equivalent, for PHYS 652.)
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| <b>PHYS 660</b>           | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Radiative Transfer</b> |                  | <b>(3+0)</b>            |
- The interaction of radiation with matter. The physical processes related to scattering, absorption and emission of radiation in an optical medium as well as the formulation and mathematical solution of radiative energy transport including multiple scattering in layered media. Demonstrations of how to use the theory in remote sensing applications and earth radiation budget studies (climate). (Prerequisites: Graduate standing in physical sciences or permission of the instructor.)
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| <b>PHYS 672</b>               | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Magnetospheric Physics</b> |                  | <b>(3+0)</b>          |
- Mass, momentum and energy transfer in the solar wind-magnetosphere - ionosphere interaction, electrodynamics of the magnetosphere - ionosphere coupling, auroral acceleration process, auroral kilometric radiation, geomagnetic pulsations, magnetospheric substorm phenomena and theories, generation mechanism of field-aligned currents, structures and instabilities at the magnetopause. (Prerequisite: Graduate standing.)
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| <b>PHYS 673</b>      | <b>3 Credits</b> | <b>Alternate Spring</b> |
| <b>Space Physics</b> |                  | <b>(3+0)</b>            |
- Sun spot formation, solar flare theories, solar wind, planetary bowshocks and interplanetary shocks, cosmic rays, pulsar, magnetic field reconnection concepts and theories, dynamo theories. (Prerequisite: Graduate standing. )

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## *Psychology Courses*

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**PSY 610                      3 Credits                      As Dem. Wrnts**

**Alcohol: Pharmacology and Behavior                      (3+0)**

A multidisciplinary approach to the study of alcohol abuse and alcoholism which incorporates the biomedical, epidemiological, genetic, pharmacological, psychological, social, and cultural bases. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 614                      3 Credits                      As Dem. Wrnts**

**Human Adaptation to the Circumpolar North                      (3+0)**

(Same as NORS 614)

Examines patterns of individual and family adaptation to the stresses and opportunities of northern regions. Focuses on successful and unsuccessful responses to northern conditions - the arctic climate, the northern economy, cultural diversity, and the professional opportunities and stress factors of sparsely populated frontier settings. Students will complete an original research paper. (Prerequisites: Graduate standing or permission of instructor.)

**PSY 615                      3 Credits                      As Dem. Wrnts**

**Drug Action: Physiology and Behavior                      (3+0)**

A multidisciplinary approach to the study of drugs and drug abuse which emphasizes the biomedical, epidemiological, genetic, pharmacological, psychological, and sociological factors extant in drug use and misuse. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 618    3 Credits                      As Dem. Wrnts**

**Community Treatment Alternatives                      (3+0)**

An examination of the role of community in the treatment of mental health problems among indigenous or ethnic groups. It will focus on bringing to bear the resources of the community on the healing process. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 620                      3 Credits                      As Dem. Wrnts**

**Treatment of Drug and Alcohol Dependency                      (3+0)**

An examination of the treatments available for drug and alcohol abuse. Both medical and psychological treatments will be studied. Medical treatments will include abrupt, gradual, and substituting techniques. Psychological techniques will include traditional Western therapies as well as other less traditional approaches. (Prerequisite: PSY 610 or 615; graduate standing or permission of instructor.)

**PSY 625                      3 Credits                      As Dem. Wrnts**

**Prevention of Alcohol and Drug Dependency                      (3+0)**

A study of the various ways to prevent alcohol dependency, especially among indigenous peoples or in ethnic groups. There will be an emphasis on cross-cultural approaches to the prevention of dependency. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 630                      3 Credits                      Fall**

**Community Psychology                      (3+0)**

Current status of community psychology, focusing on person-environment interactions and societal and cultural impacts upon individual and community functioning. An advanced level overview of theory, research, and practice of community psychology with particular emphasis on cross-cultural themes. Students are expected to apply their learning in a community-based experience. Aim is to empower students to contribute to effective change in their communities. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 631**                      **3 Credits**                      **Spring**  
**Community Psychology: Cross-Cultural Applications & the Ethics of Change**  
**(3+0)**

Advanced study of the application of community psychology with an emphasis on the design and evaluation of interventions which facilitate psychological competence and empowerment, prevent disorder, and promote social change. Value-context of community psychology and the ethics of intervention are examined with particular emphasis on applications to cross-cultural settings and indigenous approaches to change. Students are expected to continue and broaden their community-based experience. (Prerequisites: PSY 630 or permission of instructor)

**PSY 635**                      **3 Credits**                      **Spring**  
**Field-Based Research Methods**                      **(3+0)**

A presentation of methods used in doing cross-cultural research in community settings. The emphasis is on the formal descriptions of the interaction between persons and their environments. The course will present a wide variety of designs, analyses, and conceptual approaches appropriate to improving our general understanding of behavior in communities. Both quantitative and qualitative methods will be presented in the context of carrying out individual research projects. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 638**                      **3 Credits**                      **Fall**  
**Proseminar in Community Psychology**                      **(3+0)**

**PSY 645**                      **3 Credits**                      **As Dem. Wrnts**  
**Prevention Theories and Strategies**                      **(3+0)**

(Same as SOC 645)

Environmental and psychosocial approaches in the prevention of mental and emotional disturbances. Theories that focus on situational stress are examined, as well as methods and coping situations that can be used to reduce stress. The unique environmental problems of rural areas and problems in cases of cultural conflict are particularly noted. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 646**                      **3 Credits**                      **As Dem. Wrnts**  
**School Counseling**                      **(3+3)**

(Same as COUN 646)

Topics related to the role of the school counselor such as consultation, career guidance, and culturally appropriate assessment. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 650**                      **3 Credits**  
**Cross-Cultural Psychopathology**                      **(3+0)**

The etiology and treatment of different forms of major and minor mental illnesses across a specific group of cultures: Western, Native American, Oriental, and African. Students will learn to conceptualize madness and its diagnosis using a variety of cultural formats. (Prerequisite: PSY 345, graduate standing or permission of instructor.)

**PSY 655**                      **3 Credits**  
**Healing: Implications for Clinical/ Community Practice**                      **(3+0)**

A presentation of healing across a variety of cultures: Native American, Western, African, Polynesian, and Oriental. The course will emphasize the preparation and education of healers, their roles and work, and integration within a community. Analyses and implications for the practice of preparation for community psychology roles will be stressed. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 660**                      **4 Credits**                      **Fall**  
**Counseling Theories and Applications**                      **(3+3)**  
**(Same as COUN 623)**

A survey of the major theoretical systems of counseling, including psychodynamic, cognitive, behavioral, family systems, phenomenological, existential and non-western approaches to healing and mental health. Specific application of theoretical principles will be investigated, analyzed and developed. (Prerequisite: Graduate standing; COUN 615 and/or permission of instructor.)

**PSY 661**                      **3 Credits**                      **Spring**  
**Cross-Cultural Counseling**                      **(3+0)**  
(Same as COUN 660)

An examination of cultural and ethnic variables in human nature and their effect on the counseling process. Specific focus will be placed on the nature and function of culture, cultural variables in the context of the human experience, universal and culture specific aspects of the counseling process, barriers to effective cross-cultural counseling, specific ethnic and cultural considerations, and methods of intellectual training with special emphasis on Alaskan applications. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 662**                      **3 Credits**                      **Spring**  
**Counseling Theories & Applications II**                      **(3+0)**

This course supplements the PSY 660 course. It will provide further psychological perspectives on modern psychodynamic, family, group, and crisis intervention forms of counseling and psychotherapy. Theories and practice presented will focus on both brief forms of therapy as well as long term methods of treatment. The course will examine ways in which cross-cultural and gender factors influence the conduct of counseling and the development of theories. (Prerequisite: Graduate standing or permission of the instructor)

**PSY 663**                      **3 Credits**                      **Fall**  
**Clinical Methods and Assessment**                      **(3+0)**

Fundamentals of therapeutic interviewing. Assessment of personality style and classification of psychopathology. Introduction survey of, and experience with, psychological tests. (Prerequisite: Graduate standing in community psychology program or permission of instructor.)

**PSY 664**                      **3 Credits**                      **As Dem. Wrnts**  
**Behavior Therapy**                      **(3+0)**

A comprehensive examination of behavior therapy and its associated techniques. The philosophical and scientific basis for behavior therapy will be studied as well as specified procedures such as systematic desensitization, assertive training, behavior modification, and others. Students will practice such techniques to gain facility with the skills involved. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 665**                      **3 Credits**                      **As Dem. Wrnts**  
**Psychoanalytic Theory and Clinical Method**                      **(3+0)**

Psychoanalytic theory and the study of lives are presented to acquaint the student with the analysis of life histories or psychoanalytic perspective. Students study the therapeutic procedures of Freud, Jung, Searles, Sullivan, Lacan, and object relations theorists. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 666**                      **3 Credits**                      **As Dem. Wrnts**  
**Family and Network Therapy**                      **(3+0)**

Survey of concepts and theories of function and dysfunction in the area of couples and families as social networks. In addition, it provides an introduction to the skills necessary for one who would intervene in these systems. (Prerequisite: Graduate standing or permission of instructor.)

**PSY 667**                      **3 Credits**                      **As Dem. Wrnts**  
**Existential Psychotherapy**                      **(3+0)**

Focus on ultimate concerns rooted in the individual's existence. Theoretical and therapeutic approaches to existential issues such as death, freedom, isolation/relationship, meaning/meaningless and suffering. Euro-American, Native American and Eastern concepts and practices will be examined. (Prerequisite: Graduate standing or permission of instructor.)

- PSY 668**                      **3 Credits**                      **Spring**  
**Crisis Intervention**                      **(3+0)**  
 An overview of the development of crisis theory that examines major assumptions, characteristics, and stages of a crisis situation. Counselor training issues and descriptive intervention techniques with respect to assessing individuals in crisis will be discussed. Examining specific types of crises encountered within the community and strategies for handling those crises situations will be focused upon in depth. Class activities will include utilizing skills in brief treatment through role-playing of crises situations. (Prerequisite: Graduate standing or permission of instructor.)
- PSY 674**                      **3 Credits**                      **Spring**  
**Group Counseling**                      **(3+0)**  
 (Same as COUN 674)  
 Kinds and types of groups with emphasis on methods, problems and needed skills in working with groups in a counseling situation. (Prerequisite: Graduate standing or permission of instructor.)
- PSY 677**                      **3 Credits**                      **As Dem. Wrnts**  
**Psychological Assessment-Intelligence**                      **(3+0)**  
 A focus on methods of psychological assessment concerning intelligence. Initially the concept of intelligence will be surveyed as well as its many multicultural implications. The latter part of the course will enable students to gain familiarity with some of the more widely-used intelligence assessment procedures and be particularly concerned with minority issues and the concept of intelligence. (Prerequisite: Graduate standing or permission of instructor.)
- PSY 678**                      **3 Credits**                      **Spring**  
**Psychological Assessment - Personality**                      **(3+0)**  
 An examination of current practices, issues, and problems in the rapidly developing field of personality assessment. Particular emphasis will be paid to problems of multicultural personality concepts and evaluations. Hands-on experience will be required. (Prerequisite: Graduate standing or permission of instructor.)
- PSY 688**                      **3 Credits**                      **Fall and Spring**  
**Practicum in Community Psychology**                      **(2+7)**  
 Practicums provide for supervised experiences and weekly seminars with course instructor. The supervised experience is at an agency that will provide direct and/or participant observation and interactions for the beginning counselor along with immediate feedback concerning the experience. The weekly seminars will cover actual and role-playing situations and skills appropriate to the specific practicum, i.e., alcohol or drug abuse, community, or clinical. (Prerequisite: Graduate standing or permission of instructor.)
- PSY 690**                      **3-12 Credits**                      **Fall and Spring**  
**Internship in Community Psychology**                      **(0+40)**  
 Usually one semester. The internship would not occur until after the first year. However, it can be two summers or one-half time over a year or so or full-time for one semester in order to get 600 hours. The internship must be adequately supervised and may involve more than one site. Graded Pass/Fail. (Prerequisite: Completion of required coursework.)

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## ***Sociology Courses***

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- SOC 638**                      **3 Credits**                      **Alternate Fall**  
**Social Policy and Social Change**                      **(3+0)**  
 (Same as PSY 638)  
 Analysis of social policy issues related to community health, empowerment, and change will lead to an understanding of how spontaneous and planned social change takes place. Particular attention will focus on issues in the development of new settings in cross-cultural and rural contexts. (Prerequisite: Permission of instructor.)

|   |                  |                       |
|---|------------------|-----------------------|
| <b>SOC 645</b>                            | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Prevention Theories and Strategies</b> |                  | <b>(3+0)</b>          |
| <b>(Same as PSY 645)</b>                  |                  |                       |

Environmental and psychosocial approaches in the prevention of mental and emotional disturbances. Theories that focus on situational stress are examined, as well as methods for coping effectively with situations in order to reduce the stress. The unique environmental problems of rural areas and problems in cases of cultural conflict are particularly noted. (Prerequisite: Permission of instructor.)

## *Statistics Courses*

|                            |                  |                                   |
|----------------------------|------------------|-----------------------------------|
| <b>STAT 602</b>            | <b>3 Credits</b> | <b>Fbks, Alt. Spring</b>          |
| <b>Experimental Design</b> |                  | <b>Juneau, As Demand Warrants</b> |
|                            |                  | <b>(3+0)</b>                      |

Constructing and analyzing designs for experimental investigations; completely randomized, randomized block and Latin-square designs, split-plot design, incomplete block design, confounded factorial designs, nested designs, treatment of missing data, comparison of designs. (Prerequisites: STAT 401 or permission of instructor.) Next offered: Spring 1996

|                                     |                  |                               |
|-------------------------------------|------------------|-------------------------------|
| <b>STAT 621</b>                     | <b>3 Credits</b> | <b>Fairbanks, Alt. Fall</b>   |
| <b>Distribution-Free Statistics</b> |                  | <b>Juneau, As Dem. Wrnts.</b> |
|                                     |                  | <b>(3+0)</b>                  |

Methods for distribution-free (non-parametric) statistical estimation and testing. These methods apply to many practical situations including small samples and non-Gaussian error structures. Univariate, bivariate, and multivariate tests will be presented and illustrated using a variety of applications and data sets. (Prerequisite: STAT 200 [Juneau STAT 373], STAT 401 recommended, or permission of instructor.) Next offered: Fall 1996.

|                                  |                  |                             |
|----------------------------------|------------------|-----------------------------|
| <b>STAT 631</b>                  | <b>3 Credits</b> | <b>Fairbanks, Alt. Fall</b> |
| <b>Categorical Data Analysis</b> |                  | <b>(3+0)</b>                |

Statistical methods designed for count and categorical data. Contingency tables. Logistic and related models. Loglinear models. Repeated categorical responses. Survival data. (Prerequisite: STAT 401 or permission of Instructor.) Next Offered: Fall 1995.

|                                  |                  |                           |
|----------------------------------|------------------|---------------------------|
| <b>STAT 640</b>                  | <b>3 Credits</b> | <b>As Demand Warrants</b> |
| <b>Exploratory Data Analysis</b> |                  | <b>(2+2)</b>              |

Quantitative and graphical methods for explaining data and for presenting data to others. Computer-aided detection and analysis of patterns in data. Methods for analysis of patterns in data. Methods for validating the assumptions of common statistical tests and models. Use of computer graphics in statistical analysis. (Prerequisite: STAT 200 [Juneau STAT 273]. STAT 401 recommended, or permission of instructor.)

|                        |                  |                          |
|------------------------|------------------|--------------------------|
| <b>STAT 661</b>        | <b>3 Credits</b> | <b>Fbks, Alt. Spring</b> |
| <b>Sampling Theory</b> |                  | <b>(3+0)</b>             |

Statistical theory for sampling and sample surveys. Choice of method, power and sample size considerations, treatment of sampling and non-sampling biases. Sampling methods based on detectability. Adaptive sampling. Spatial sampling. Mark and recapture methods. The jack-knife, the bootstrap, and resampling plans. (Prerequisite: STAT 200 [Juneau STAT 273]. STAT 401 recommended, or permission of instructor. ) Next Offered: Spring 1995.



|                                 |                  |                       |
|---------------------------------|------------------|-----------------------|
| <b>STAT 680</b>                 | <b>4 Credits</b> | <b>Alternate Fall</b> |
| <b>Data Analysis in Biology</b> |                  | <b>(2+3)</b>          |
| (Same as BIOL 680)              |                  |                       |

Biological applications of nonparametric statistics, including tests based on binomial and Poisson distributions, analysis of two-way and multiway contingency tables, and tests based on ranks; multivariate statistics, including principle component analysis, ordination techniques, cluster analysis, and discriminate analysis; and time-series analyses. Introduction to the use of the computer, and use of statistical packages. Each student will analyze a data set appropriate to the student's research interests. (Prerequisites: STAT 300, 401 and either graduate standing in a biologically oriented field or permission of instructor.) Next Offered: Fall 1995.

*Note: The following courses are statistical in orientation. A course description and listing of prerequisites may be found in the appropriate departmental course listings.*

ANTH. 424/624--Analytical Techniques  
 BA 360--Operations Management  
 GEOS 430--Statistical and Data Analysis Geology  
 ECON 227--Statistical Methods  
 ECON 626--Econometrics  
 ESM. 621--Operations Research  
 FISH 601--Quantitative Fisheries Science  
 MATH 371--Probability  
 MATH 408--Mathematical Statistics  
 PSY 250--Introduction to Statistics for Behavioral Sciences  
 WLF 621--Vertebrate Population Dynamics

## *Wildlife Courses*

|                        |                  |              |
|------------------------|------------------|--------------|
| <b>WLF 602</b>         | <b>3 Credits</b> | <b>Fall</b>  |
| <b>Research Design</b> |                  | <b>(3+0)</b> |
| (Same as BIOL 602)     |                  |              |

An introduction to the philosophy, performance and evaluation of hypothetical/deductive research in the natural sciences, with emphasis on hypothesis formulation and testing. Each student will develop a research proposal.

|                     |                  |                       |
|---------------------|------------------|-----------------------|
| <b>WLF 603</b>      | <b>3 Credits</b> | <b>Alternate Fall</b> |
| <b>Biotelemetry</b> |                  | <b>(2+3)</b>          |

An introduction to the basics of radio and ultrasonic telemetry and their application to the study of the ecology, behavior and physiology of vertebrates in terrestrial freshwater and marine environments. Review of concepts, equipment demonstration and a class project to expose students to an important tool for biological fisheries and wildlife investigations. Laboratory fee: \$30.00. (Prerequisites: Graduate standing; or senior with instructor approval. )

|                |                                  |
|----------------|----------------------------------|
| <b>WLF 611</b> | <b>Credits Arr.As Dem. Wints</b> |
| <b>WLF 612</b> | <b>Credits Arr.As Dem. Wints</b> |

### **Wildlife Field Trip**

Trips to wildlife areas to acquaint students with principal animals of the state and problems involved in their management. (Admission by arrangement.)

|                        |                  |                         |
|------------------------|------------------|-------------------------|
| <b>WLF 614</b>         | <b>2 Credits</b> | <b>Alternate Spring</b> |
| <b>Grazing Ecology</b> |                  | <b>(2+0)</b>            |
| (Same as BIOL 614)     |                  |                         |

The dynamics of herbivory, emphasizing the grazing process, and including mechanisms of feeding, feeding behavior, habitat and plant selection, physiological influences on feeding, plant and community level responses, plant defenses against herbivory and management of grazing systems. (Prerequisite: Graduate standing or approval of instructor.)

- WLF 615**                      **2 Credits**                      **Alternate Fall**  
**Advanced Topics in Wildlife Management**                      **(2+0)**  
Political, economic, administrative and ecological aspects of wildlife management in northern regions. (Prerequisite: graduate standing in biology or wildlife or permission of instructor. )
- WLF 621**                      **3 Credits**                      **Alternate Spring**  
**Vertebrate Population Dynamics**                      **(2+3)**  
Assessing, describing, and interpreting the characteristics and dynamics of wild populations. Estimates of survival, mortality, and recruitment rates, and of population size, and assessment of population trends and welfare using data from sources such as hunter-kill samples, composition counts, marking and recapturing, predation, and various types of surveys. Students will proceed from simplified artificial data sets to complex real ones. Both analytic and simulation techniques will be used. Laboratory fee: \$30.00. (Prerequisites: Admission by arrangement: minimal preparation, equivalent to BIOL 271, MATH 200 and STAT 300.)
- WLF 625**                      **4 Credits**                      **Alternate Spring**  
**Analysis of Vertebrate Population**                      **(3 + 3)**  
Contemporary methods of estimation of fundamental population parameters, abundance and survival, with their implication for management. Focus will be on assumptions and methodology of estimation techniques. State-of-the-art computer applications will be employed in laboratory exercises of actual and simulated data. Laboratory fee: \$30.00 (Prerequisites: BIOL 271 and an advanced course in statistics.)
- WLF 660**                      **4 Credits**                      **Fall**  
**Nutrition and Physiological Ecology of Wildlife**                      **(3 + 3)**  
(Same as WLF 460)  
Concepts and techniques used by wildlife biologists to understand relationships between wild animals and their habitats. Techniques for constructing energy and nutrient budgets of wild animals and applications of these budgets to population level processes and habitat management. (Prerequisites: BIOL 210, 271, WLF 201.)
- WLF 680**                      **3 Credits**                      **Alternate Fall**  
**Data Analysis in Biology**                      **(2+ 3)**  
(Same as BIOL 680 & STAT 680)  
Biological applications of nonparametric statistics, including tests based on binomial and Poisson distributions, analysis of two-way and multiway contingency tables, and tests based on ranks; multivariate statistics, including principal component analysis, ordination techniques, cluster analysis, and discriminate analysis; and time-series analyses. Introduction to the use of the computer and use of statistical packages. Each student will analyze a data set appropriate to the student's research interests. Laboratory fee: \$20. (Prerequisites: STAT 300, STAT 401 and either graduate standing in a biologically oriented field or permission of instructor.)
- WLF 692**                      **1 Credit**                      **Fall and Spring**  
**Graduate Seminar**                      **(0+0+1)**  
Topics in fish and wildlife management explored through readings, talks, group discussions and guest speakers with a high level of student participation. (Prerequisite: graduate standing or permission of instructor.)

*University of Alaska Fairbanks  
Graduate School  
Forms*

**APPLICATION FOR ADVANCEMENT  
TO CANDIDACY FOR THE MASTER'S DEGREE**

Name \_\_\_\_\_ Date \_\_\_\_\_  
SSN \_\_\_\_\_

Mailing Address \_\_\_\_\_

Phone \_\_\_\_\_  
(Campus) (Home)

Degree Sought (M.S., Ph.D., etc.) \_\_\_\_\_ Degree (Major) \_\_\_\_\_

Date or semester of comprehensive exam (completed or planned): \_\_\_\_\_

Thesis \_\_\_ project \_\_\_ other \_\_\_ Provisional title: \_\_\_\_\_

GPA in 600-level courses \_\_\_\_\_ GPA in all courses in degree program \_\_\_\_\_

**I. CREDITS REQUIRED FOR DEGREE PROGRAM** Required program of coursework, research, and thesis credits based on your graduate study plan. In your graduation semester, your transcript will be reviewed to see that all these credits are included.

University of Alaska courses (Indicate grades for those courses completed; use an asterisk for those not yet complete.)

**600-level** (including thesis, project, and research credits):

| <u>Sem/Year</u> | <u>Course Dept. &amp; No.</u> | <u>Title</u> | <u>Credits</u> | <u>Grade</u> |
|-----------------|-------------------------------|--------------|----------------|--------------|
| Spring 94       | ANTH 699                      | Thesis       | 6              | DF           |

\_\_\_\_\_  
Name

**300-400-level:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Transfer courses. (Up to 9 credits may be transferred in if taken within the seven year time limit)  
(Include Year, Course No., Title, Semester Credits, Graduate/Undergraduate)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Courses are to be transferred from \_\_\_\_\_

**II. SUMMARY OF PROGRAM CREDITS**

Minimum Credits REQUIRED For Degree Program (from catalog) \_\_\_\_\_

Number of your 600-level credits \_\_\_\_\_  
(not including project/thesis/research)

Number of your Thesis \_ Project \_ Research \_ credits \_\_\_\_\_  
[NOTE: Maximum project & research cr = 6; and maximum thesis & research cr = 12]

Number of your 300-400-level credits \_\_\_\_\_  
(not including deficiency courses)

YOUR TOTAL PROGRAM CREDITS \_\_\_\_\_

**RECOMMENDED BY ADVISORY COMMITTEE MEMBERS:**

\_\_\_\_\_  
Chair

\_\_\_\_\_

Approved: \_\_\_\_\_

Department Head

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean of the Graduate School

\_\_\_\_\_  
Date

TO: Office of the Graduate School (original)

6/95

# APPLICATION FOR ADVANCEMENT TO CANDIDACY FOR PH.D. DEGREE

Date \_\_\_\_\_

Name

SSN

### Mailing Address

**Phone**

## Campus

**Home**

Ph.D. in

**Major**

**Anticipated date of completion**

**Date comprehensive examination was passed:**

**List subject areas examined on comprehensive:**

**Provisional thesis title:**

**CREDITS REQUIRED FOR DEGREE PROGRAM** Required program of coursework, research, and thesis credits based on your graduate study plan. In your graduation semester, your transcript will be reviewed to see that all these credits are included.

UNIVERSITY OF ALASKA COURSES (Indicate grades for those courses completed; use an asterisk for those not yet complete.)

**600-level (including thesis, project, and research credits):**

Sem/Year Course Dept. & No.

**Title**

## Credits

**Grade**

Spring 94

ANTH 699

## Thesis

6

DF

**CREDITS REQUIRED FOR DEGREE PROGRAM** (Cont.)

**300-400-level:**

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**TRANSFER COURSES:** (Up to 9 credits may be transferred in if taken within the ten year time limit)

(Year, Course No., Title, Semester Credits, Graduate/Undergraduate)

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Courses to be transferred from \_\_\_\_\_

**Approved:**

\_\_\_\_\_  
Chair

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\_\_\_\_\_  
Department Head

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean of the Graduate School

\_\_\_\_\_  
Date

TO: Office of the Graduate School (original)

6/95

University of Alaska Fairbanks

ANNUAL REPORT OF GRADUATE STUDENT ADVISORY COMMITTEE

\_\_\_\_\_  
Date of Committee Meeting

\_\_\_\_\_  
Name

\_\_\_\_\_  
Degree and Major

\_\_\_\_\_  
Department/Program

\_\_\_\_\_  
Phone Number

Date of admission to this program: \_\_\_\_\_

Progress in coursework (including grades):

Progress in research (give a brief resume of research topic):

Student's overall progress (*circle one*):

SATISFACTORY

CONDITIONAL\*\*

UNSATISFACTORY\*\*

\*\* Recommended Course of action for improvement (if any):

Signatures:

\_\_\_\_\_  
Advisory Committee Chair

\_\_\_\_\_  
Student

\_\_\_\_\_  
Committee Members

\_\_\_\_\_  
TO: Department or Program Head (Original)  
Dean of College or School

6/95



University of Alaska Fairbanks

APPOINTMENT OF GRADUATE ADVISORY COMMITTEE  
(also to be used for Change of Committee)

DATE \_\_\_\_\_

Appointment of committee \_\_\_\_\_

Change of committee \_\_\_\_\_

Name \_\_\_\_\_  
Last First Middle

SSN \_\_\_\_\_ Phone # \_\_\_\_\_

Degree Program \_\_\_\_\_ in \_\_\_\_\_  
(M.S., Ph.D., etc.) (Major)

Committee membership signatures:

Print Name:

Chair

Department Head

Date

Dean

Date

Dean of the Graduate School

Date

TO: Office of the Graduate School (original)

6/95

CHANGE OF GRADUATE MAJOR OR DEGREE PROGRAM

DESIRED ACTION:

1. \_\_\_\_\_ Change program within department. (Educational Leadership to Language and Literacy or M.S. to Ph.D.)
2. \_\_\_\_\_ Change departments within same School or College (M.S. Electrical Engineering to M.S. Mechanical Engineering).

NOTE: If the student has already been advanced to candidacy in the current degree program, it will be necessary to apply for candidacy in the new program. All deadlines pertaining to this procedure apply to the new degree program.

Name \_\_\_\_\_  
Last First Middle

SSN \_\_\_\_\_ Phone# \_\_\_\_\_

Present Degree Program \_\_\_\_\_ in \_\_\_\_\_  
Degree Major

Proposed Degree Program \_\_\_\_\_ in \_\_\_\_\_  
Degree Major

SIGNATURES

Student \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_  
Chair of proposed committee

\_\_\_\_\_  
Proposed Members

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Department Head of Proposed Program

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean

\_\_\_\_\_  
Date

\_\_\_\_\_  
Dean of the Graduate School

\_\_\_\_\_  
Date

TO: Office of the Graduate School (original)

6/95

## GRADUATE STUDY PLAN (GSP)

Date: \_\_\_\_\_

**This is a working document which is subject to revision as work on your degree progresses. A copy of this completed form should be submitted before the end of your second semester at UAF to your program/department and with the Office of the Graduate School.**

Name: \_\_\_\_\_ SSN: \_\_\_\_\_

Phone# \_\_\_\_\_

**Mailing Address**

### Signatures

### Advisory Committee Chair

**Degree Sought:** \_\_\_\_\_ **Major:** \_\_\_\_\_

### I. CREDITS TO BE INCLUDED IN DEGREE PROGRAM

UNIVERSITY OF ALASKA credits (coursework, research, and thesis)

**600-level (including thesis, project, and research credits):**

| <u>Semester</u> | <u>Course Dept. &amp; No.</u> | <u>Title</u> | <u>Credits</u> | <u>Grade</u> |
|-----------------|-------------------------------|--------------|----------------|--------------|
|-----------------|-------------------------------|--------------|----------------|--------------|

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Spring 94 ANTH 699 Thesis 6 DF

Name: \_\_\_\_\_

UNIVERSITY OF ALASKA credits (Cont.)  
300-400-level:

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Deficiency courses (Required courses that will not count toward your minimum credit requirement):

TRANSFER COURSES (maximum 9 semester credits)

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---



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Courses are to be transferred from \_\_\_\_\_

MINIMUM CREDITS REQUIRED FOR DEGREE PROGRAM (from catalog) \_\_\_\_\_

YOUR TOTAL PROGRAM CREDITS: graduate (min. 24 credits) \_\_\_\_\_

undergraduate \_\_\_\_\_

II. Specific subject areas in which the student will be examined on comprehensive examination.

III. Preliminary title of thesis.

IV. Estimate date of completion for the following:

-Qualifying examination (if required) \_\_\_\_\_

-Comprehensive examination \_\_\_\_\_

-Advancement to candidacy \_\_\_\_\_

-Completing course work \_\_\_\_\_

-Completion of first draft of thesis \_\_\_\_\_

-Thesis defense \_\_\_\_\_

TO: Office of the Graduate School

6/95

## REPORT ON COMPLETION OF LANGUAGE OR RESEARCH TOOL REQUIREMENT

|       |         |
|-------|---------|
| <hr/> | <hr/>   |
| Name  | Date    |
| <hr/> | <hr/>   |
|       | SSN     |
|       | <hr/>   |
|       | Phone # |

has            has not            satisfactorily completed the requirement in

(Subject)

for the \_\_\_\_\_ degree in \_\_\_\_\_  
(MA, Ph.D., etc.) (Major)

Indicate how satisfactory completion of this requirement was determined. (If the Educational Testing Service examination was used to determine Foreign Language proficiency, indicate the percentile rank earned.)

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|                 |             |
|-----------------|-------------|
| <b>Examiner</b> | <b>Date</b> |
|-----------------|-------------|

### Advisory Committee Chair

Department Head

Dean \_\_\_\_\_

TO: Office of the Graduate School (original)  
3/95

University of Alaska Fairbanks

APPLICATION FOR TEMPORARY LEAVE OF ABSENCE  
FROM GRADUATE SCHOOL

Must be submitted to the Graduate School by the last day to pay fees in the requested semester of leave.

Name \_\_\_\_\_ SSN \_\_\_\_\_

Address where you can be reached \_\_\_\_\_  
while on leave \_\_\_\_\_ Degree and Major \_\_\_\_\_

Phone \_\_\_\_\_

**NOTE:** All graduate students must be registered for at least 6 graduate credits per academic year (fall-spring-summer) to maintain enrolled status. *Students must be registered for at least 3 graduate credits in the semester in which they graduate.*

For the following reasons, I request a temporary leave of absence from my graduate studies :

I will *not* be registered during the semester(s) indicated: Fall 19 \_\_\_\_\_ Spring 19 \_\_\_\_\_

I plan to return to my studies: Fall 19 \_\_\_\_\_ Spring 19 \_\_\_\_\_ Summer 19 \_\_\_\_\_

If you fail to register in the semester indicated or extend your leave, it will be necessary for you to request reinstatement into your graduate program.

Student's Signature \_\_\_\_\_ Date \_\_\_\_\_

Recommended by committee:

Chair \_\_\_\_\_

Department Head \_\_\_\_\_ Date \_\_\_\_\_

Dean \_\_\_\_\_ Date \_\_\_\_\_

Dean of the Graduate School \_\_\_\_\_ Date \_\_\_\_\_

TO: Office of the Graduate School (original)

6/95

University of Alaska Fairbanks

REQUEST FOR OUTSIDE EXAMINER  
(Ph.D. Only)

(SUBMIT FORM TWO WEEKS IN ADVANCE OF EXAM DATE)

Date \_\_\_\_\_

Student Name: \_\_\_\_\_

Date of Exam: \_\_\_\_\_ Contact Name: \_\_\_\_\_  
Day (Thurs) Date (2/25)

Time of Exam: \_\_\_\_\_ Phone \_\_\_\_\_

Location: \_\_\_\_\_

Degree : \_\_\_\_\_ Type of Exam: (Check One)  
Oral Comprehensive \_\_\_\_\_  
Thesis Defense \_\_\_\_\_

Title of Thesis: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Committee Chair: \_\_\_\_\_ Phone \_\_\_\_\_

The presence of an "outside examiner," representing the Office of the Graduate School, is required at all Ph.D. oral examinations and is appointed by the Office of the Graduate School. The function of the outside examiner is to determine that a stringent, unbiased examination is given and that it is fairly administered and evaluated. The outside examiner should be provided with an opportunity to question the candidate during the oral examination. NOTE: The outside examiner should be given a copy of the thesis at least a week before the defense.

\*\*\*\*\*

GRADUATE SCHOOL OFFICE USE:

Outside Examiner Assigned: \_\_\_\_\_

|  | Name | Phone | Office location |
|--|------|-------|-----------------|
|--|------|-------|-----------------|

DATE

ACTION

\_\_\_\_\_ Called to notify contact person of the name of examiner

\_\_\_\_\_ Sent memo and "Report of Outside Examiner" form to outside examiner

\_\_\_\_\_ "Report of Outside Examiner" form returned

\*\*\*\*\*

TO: Office of the Graduate School - two weeks before date of exam

6/95

REPORT ON EXAMINATION

\_\_\_\_\_  
Name  
\_\_\_\_\_  
Degree and Major  
\_\_\_\_\_  
Date  
\_\_\_\_\_  
SSN  
\_\_\_\_\_  
Phone

Type of examination:  
(Check all appropriate)

Comprehensive Exam: \_\_\_\_\_

Defense of Thesis \_\_\_\_\_

Other (give type) \_\_\_\_\_

ORAL \_\_\_\_\_ WRITTEN \_\_\_\_\_

PASS: \_\_\_\_\_

FAIL: \_\_\_\_\_

CONDITIONAL PASS: \_\_\_\_\_ (indicate requirements for passing below)

Examining Committee:

\_\_\_\_\_  
Chair

\_\_\_\_\_  
Advisor (if not on exam committee)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Outside Examiner (if necessary)

\_\_\_\_\_  
Department Head

\_\_\_\_\_  
Dean

TO: Office of the Graduate School (original)

6/95



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