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, 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 1977, 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.

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.

COVER: The grandeur of Mt. McKinley, the highest mountain in the United States (20,320 feet), is captured in the painting "Evening Light" by Byron Byrdall. Mt. McKinley is located in Denali National Park in the Alaska Range, about 90 miles south of Fairbanks. This is part of Alaska's natural laboratory, in which many different types of research are possible through the University of Alaska Fairbanks. Print used with the kind permission of Byron Byrdall and Antique, Ltd.
UNIVERSITY OF ALASKA FAIRBANKS

1988 - 90 GRADUATE CATALOG

Office of the Graduate School
305 Signers' Hall
University of Alaska Fairbanks
Fairbanks, Alaska 99775-0820
(907) 474-7464
We invite you . . .

. . . to consider the Graduate School at the University of Alaska Fairbanks for your advanced studies.

As a comprehensive land-grant and sea-grant institution, UAF offers graduate programs in the natural and social sciences, humanities, and the arts. We are an exceptional institution in areas related to our unique location. The expertise of our scientists and scholars is anchored along the northern edge of the Pacific Rim and extends around the circumpolar north. We serve not only as the University for Alaska, but also as the Arctic institution for the United States and as America's "University of the North."

Although UAF is a small and young institution, it maintains a standing among the top 100 universities in the country in terms of total expenditures for research. We continue to grow and strive for increasing levels of excellence, and we are challenged by the emerging Age of the Arctic and the growing globalization of the human family.

Your decision regarding the pursuit of a graduate degree must, necessarily, be a personal one. Graduate study is a highly individualized and intensive process. It demands your initiative, because it requires creative, unstructured, and rigorous work. Even though our faculty provide advice, guidance, and support, it will be your efforts - in large measure - which ensure your success.

We hope the information contained in this catalog will lead you to pursue graduate study at UAF. Alaska provides a landscape of immense proportions and opportunities. Please write or call us at the Graduate School, or contact any of our faculty with whom you may want to study.

We stand ready to demonstrate our capabilities and to discuss your interests.

With every good wish,

Sincerely,

Luis Proenca,
Vice Chancellor for Research and
Dean of the Graduate School
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<tr>
<th>Month</th>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>September</td>
<td>3-5, Sat.-Mon.</td>
<td>Early Orientation for New Students</td>
</tr>
<tr>
<td></td>
<td>6, Tuesday</td>
<td>Registration Materials and Advisors Available</td>
</tr>
<tr>
<td></td>
<td>6-7, Tues.-Wed.</td>
<td>Registration: Course Selection</td>
</tr>
<tr>
<td></td>
<td>8-12, Thurs.-Mon.</td>
<td>Registration: Fee Payment</td>
</tr>
<tr>
<td></td>
<td>8, Thursday</td>
<td>Classes Begin</td>
</tr>
<tr>
<td></td>
<td>14, Wednesday</td>
<td>Last Day of Late Registration</td>
</tr>
<tr>
<td>October</td>
<td>14, Friday</td>
<td>Graduation Application Due</td>
</tr>
<tr>
<td>November</td>
<td>9, Wednesday</td>
<td>Last Day for Student-Initiated Withdrawals</td>
</tr>
<tr>
<td></td>
<td>24-25, Thurs.-Fri.</td>
<td>Thanksgiving Holidays</td>
</tr>
<tr>
<td>December</td>
<td>9, Friday</td>
<td>Last Day of Instruction</td>
</tr>
<tr>
<td></td>
<td>12-15, Mon.-Thurs.</td>
<td>Final Examinations</td>
</tr>
<tr>
<td></td>
<td>19, Monday, Noon</td>
<td>Grades Due to Admission and Records from Faculty</td>
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## SPRING SEMESTER, 1989

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>January</td>
<td>16-17, Mon.-Tues.</td>
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</tr>
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<td></td>
<td>16, Monday</td>
<td>Registration Materials and Advisors Available</td>
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<td>17-18, Tues.-Wed.</td>
<td>Registration: Course Selection</td>
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<td></td>
<td>19-23, Thurs.-Mon.</td>
<td>Registration: Fee Payment</td>
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<tr>
<td></td>
<td>19, Thursday</td>
<td>Classes Begin</td>
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<td></td>
<td>25, Wednesday</td>
<td>Last Day of Late Registration</td>
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<td>February</td>
<td>15, Wednesday</td>
<td>Graduation Application Due</td>
</tr>
<tr>
<td>March</td>
<td>13-17, Mon.-Fri.</td>
<td>Spring Recess</td>
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<tr>
<td>March</td>
<td>29, Wednesday</td>
<td>Last Day for Student-Initiated Withdrawals</td>
</tr>
<tr>
<td>March</td>
<td>21, Friday</td>
<td>All Campus Day (no classes)</td>
</tr>
<tr>
<td>April</td>
<td>28, Friday</td>
<td>Last Day of Instruction</td>
</tr>
<tr>
<td>May</td>
<td>1-4, Mon.-Thurs</td>
<td>Final Examinations</td>
</tr>
<tr>
<td></td>
<td>7, Sunday</td>
<td>Commencement</td>
</tr>
<tr>
<td></td>
<td>8, Monday, Noon</td>
<td>Grades Due to Admission and Records from Faculty</td>
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<table>
<thead>
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<th>Event</th>
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<tr>
<td>May</td>
<td>30, Tuesday</td>
<td>Registration for First 6-Week and 12-week Session</td>
</tr>
<tr>
<td></td>
<td>30, Tuesday</td>
<td>First 6-Week and 12-Week Sessions Begin</td>
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<td>June</td>
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<td>Registration for 3-Week Session</td>
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<tr>
<td></td>
<td>5, Monday</td>
<td>3-Week Session Begins</td>
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<td></td>
<td>23, Friday</td>
<td>Last Day of Classes for 3-Week Session</td>
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<td>July</td>
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<td>Holiday, No Classes</td>
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<td></td>
<td>7, Friday</td>
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<tr>
<td></td>
<td>10, Monday</td>
<td>Registration for Second 6-Week Session</td>
</tr>
<tr>
<td></td>
<td>10, Monday</td>
<td>Second 6-Week Session Begins</td>
</tr>
<tr>
<td></td>
<td>14, Wednesday</td>
<td>Graduation Application Due</td>
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<tr>
<td>August</td>
<td>18, Friday</td>
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<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td><strong>September</strong></td>
<td></td>
</tr>
<tr>
<td>5-6, Tues.-Wed.</td>
<td>Orientation for New Graduate Students</td>
</tr>
<tr>
<td>6, Wednesday</td>
<td>Registration Materials and Advisors Available</td>
</tr>
<tr>
<td>7-8, Thurs.-Fri.</td>
<td>Registration: Course Selection</td>
</tr>
<tr>
<td>11-14, Mon.-Thurs.</td>
<td>Registration: Fee Payment</td>
</tr>
<tr>
<td>11, Monday</td>
<td>Classes Begin</td>
</tr>
<tr>
<td>15, Friday</td>
<td>Last Day of Late Registration</td>
</tr>
<tr>
<td><strong>October</strong></td>
<td></td>
</tr>
<tr>
<td>16, Monday</td>
<td>Graduation Application Due</td>
</tr>
<tr>
<td><strong>November</strong></td>
<td></td>
</tr>
<tr>
<td>8, Wednesday</td>
<td>Last Day for Student-Initiated Withdrawals</td>
</tr>
<tr>
<td>23-24, Thurs.-Fri.</td>
<td>Thanksgiving Holidays</td>
</tr>
<tr>
<td><strong>December</strong></td>
<td></td>
</tr>
<tr>
<td>12, Tuesday</td>
<td>Last Day of Instruction</td>
</tr>
<tr>
<td>13-16, Wed.-Sat.</td>
<td>Final Examinations</td>
</tr>
<tr>
<td>18, Monday, Noon</td>
<td>Grades Due to Admission and Records from Faculty</td>
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</tbody>
</table>

## SPRING SEMESTER, 1990

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td><strong>1990</strong></td>
<td></td>
</tr>
<tr>
<td><strong>January</strong></td>
<td></td>
</tr>
<tr>
<td>15-16, Mon.-Tues.</td>
<td>Early Orientation for New Students</td>
</tr>
<tr>
<td>15, Monday</td>
<td>Registration Materials and Advisors Available</td>
</tr>
<tr>
<td>16-17, Tues.-Wed.</td>
<td>Registration: Course Selection</td>
</tr>
<tr>
<td>18-22, Thurs.-Mon.</td>
<td>Registration: Fee Payment</td>
</tr>
<tr>
<td>18, Thursday</td>
<td>Classes Begin</td>
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<tr>
<td>24, Wednesday</td>
<td>Last Day of Late Registration</td>
</tr>
<tr>
<td><strong>February</strong></td>
<td></td>
</tr>
<tr>
<td>15, Thursday</td>
<td>Graduation Application Due</td>
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<tr>
<td><strong>March</strong></td>
<td></td>
</tr>
<tr>
<td>12-16, Mon.-Fri.</td>
<td>Spring Recess</td>
</tr>
<tr>
<td>28, Wednesday</td>
<td>Last Day for Student-Initiated Withdrawals</td>
</tr>
<tr>
<td><strong>April</strong></td>
<td></td>
</tr>
<tr>
<td>20, Friday</td>
<td>All Campus Day (no classes)</td>
</tr>
<tr>
<td>27, Friday</td>
<td>Last Day of Instruction</td>
</tr>
<tr>
<td>30 Monday</td>
<td>Final Examinations</td>
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<td><strong>May</strong></td>
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<tr>
<td>1-3, Tues.-Thurs.</td>
<td>Final Examinations</td>
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<td>6, Sunday</td>
<td>Commencement</td>
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<td>7, Monday, Noon</td>
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**NOTE:** Dates are subject to change.
Archaeology field school students (front to back: Evelyn Russell, Andrew Higgs, and Sonja Matson) excavate the outer edges of the Walker Road Site located near Healy. This site is believed to contain the oldest artificial structure in Alaska, and possibly in North America. UAF photo/Sam Winch
GENERAL INFORMATION

University of Alaska Fairbanks

Special Mission
The University of Alaska Fairbanks, (UAF) is the land-grant and sea-grant institution for the state of Alaska. As the state's primary residential institution, it serves students from all areas of Alaska as well as from many other states and nations. UAF offers master's degree programs in the arts, sciences, and professions and doctoral programs in natural sciences and mathematics.

The University of Alaska Fairbanks is the state's center for basic and applied research, with particular emphasis on high latitude and Alaskan problems. In response to global and state needs, UAF has developed programs in space physics, marine science, atmospheric science, geophysics, biology, environmental sciences, and engineering. It is also deeply involved in research and instruction related to managing and developing Alaska's natural resources and protecting its environment. UAF is the state's major center for the study of Alaska Native cultures.

In addition, UAF serves as a cultural center for Interior Alaska by offering activities and programs in the creative and performing arts. Its museum and Alaska and Polar Regions library collection provide major cultural and information resources to the state.

UAF is a public coeducational institution with an enrollment of 8365 students, including 550 graduate students among the 5200 students in Fairbanks.

Location/Transportation
The city of Fairbanks is located in the interior of the state. Fairbanks is served by air, rail from Anchorage and by road. Fairbanks has a population of 35,000 and is within the Fairbanks North Star Borough with a total population of 75,000.

The University of Alaska Fairbanks is located just northwest of town, surrounded by rural residential areas. A bus line offers service between the campus, downtown, the airport, and surrounding areas. Bus service is frequent, providing reliable transportation to and from most areas.

UAF also has on-campus shuttle service between the lower campus area and the West Ridge facilities.

Accreditation/Memberships
The University of Alaska Fairbanks is accredited as an institution of higher learning by the Northwest Association of Schools and Colleges.

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

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

UAF also holds official designation as both a land-grant and sea-grant institution. In 1917, the federal government gave land-grant status to the university, and in 1980 sea-grant status was added.
UAF Governance

Students (ASUA, Associate Students of UAF), faculty (Faculty Senate) and staff (Staff Council) are represented by individual governance structures which address their concerns. The UAF Assembly provides a forum for the three individual governance bodies to address common concerns. ASUA is responsible for those issues which are uniquely student affairs issues. The Faculty Senate is responsible for those issues which are academic and faculty concerns. 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 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 every program, policy and 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 Room 101 of the Eielson Building.

The Graduate Program

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; recommends changes in graduate policy to the Graduate Council; and acts on petitions requesting changes from existing regulations.

Graduate Council

The Graduate Council is elected from the graduate faculty in each of the UAF schools and colleges. The Graduate Council meets regularly to consider and advise on matters related to UAF graduate program operations and policies. To ensure that rigor and quality are maintained in graduate programs the Council assists in monitoring student admissions, student and advisory committee performance, thesis and course quality, and will establish and monitor a system of regular program evaluation. The Council also assists in the selection and award of general university or external fellowships, assists in the establishment of a broad base of private financial support for graduate study, and assists in relations with outside agencies concerned with higher education and professional school accrediting agencies.

Graduate Degrees

Master's Degrees

Master's degrees are offered in the humanities, social sciences, computer science, mathematics, physical and natural sciences, and professional areas such as engineering, education and business administration. Students wishing to enroll for graduate studies in any of the available programs should obtain application for admission forms from the Office of Admissions and Records and follow the application procedures for graduate students.

In addition, individualized programs leading to master's degrees may be possible in certain aspects of other areas or in combinations of disciplines, such as cross-cultural studies, arctic studies, linguistics, etc. A student interested in
pursuing such an interdisciplinary program should contact the Office of the Graduate School.

Several cross-discipline master's degrees are offered through cooperating departments. The Master of Arts in Teaching is offered with emphasis in the following disciplines: biology, chemistry, geology, history, mathematics, music, and physics. The Master of Science in general science is offered in mathematics, physics, chemistry, biology, and geology. Students interested in obtaining more information about these degrees and their requirements should write to the Office of the Graduate School.

Doctor of Philosophy Degrees

The University of Alaska Fairbanks offers doctoral programs in certain areas of anthropology, mathematics, physics, geophysics, geology, biological sciences, oceanography, wildlife management, and zoology.

Prospective candidates in these or other subject areas should write to the Office of Admissions and Records for application materials. Each application is reviewed by a committee for admissions both in the light of the applicant's qualifications and the faculty and facilities available on the campus relevant to the field of projected study.

Interdisciplinary Programs

Interdisciplinary master's and doctoral degree programs may be arranged in specialized areas for which there are not established programs at UAF, or programs may be arranged for specific plans of study involving a combination of disciplines. Interdisciplinary study requires that students be mature and well-focused. Applicants must submit a proposal for the program they wish to pursue including their thesis topic and outline; recommended advisory committee members who are familiar with the proposal, qualified and willing to serve; a time-table for completion of degree requirements; and letters of recommendation. In short, what is required is a nearly complete Graduate Study Plan in advance of acceptance.

This proposal is submitted to the Office of Admissions and Records and the student's file is forwarded to the Office of the Graduate School when complete. An ad hoc faculty committee then reviews the application. Final admission requires approval by the Dean of the Graduate School. The purpose of the review is to determine if UAF has the facilities and faculty expertise capable of fulfilling the requested program in the applicant's particular area of interest, and also to determine whether the applicant's academic background indicates capability for satisfactory completion of the degree program proposed.

Interdisciplinary programs require extra responsibility and effort from both the student and the faculty. Students must carefully plan their program and maintain communications with the advisory committee throughout the course of study. Contact the Graduate School office for application information.

Specialized Programs/WICHE/WRGP

The Western Interstate Commission for Higher Education (WICHE) has selected UAF arctic, circumpolar, and cold regions studies as part of the unique or specialized graduate programs it coordinates in the western states as 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 these programs pay resident tuition at UAF. The programs included are: arctic engineering, atmospheric sciences, biology, botany, fisheries, geology, geophysics, marine biology, mining engineering, natural resources management, oceanography, space physics, wildlife management, and zoology. Contact the Graduate School office for more information.
Graduate Degrees and Programs

Ed.S.--Educational Specialist
E.M.--Engineer of Mines
M.A.--Master of Arts
M.F.A.--Master of Fine Arts
M.S.--Master of Science
M.A.T.--Master of Arts in Teaching
M.B.A.--Master of Business Administration
M.C.E.--Master of Civil Engineering
M.Ed.--Master of Education
M.E.E.--Master of Electrical Engineering
Ph.D.--Doctor of Philosophy

Anthropology, M.A., Ph.D.
Arctic Engineering, M.S.
Atmospheric Sciences, M.S., Ph.D.
Biology, M.S., M.A.T., Ph.D.
Botany, M.S.
Business Administration, M.B.A.
Chemistry, M.A., M.S., M.A.T.
Civil Engineering, M.C.E., M.S.
College Student Personnel Administration, M.Ed.
Computer Science, M.S.
Education, Ed.S.
   Cross-Cultural Studies
   Public School Administration
Education, M.Ed.
   Cross-Cultural
   Curriculum and Instruction
   Educational Administration
   Language and Literacy
Electrical Engineering, M.S., M.E.E.
Engineering Management, M.S.
English, M.A., M.F.A.
Environmental Quality Engineering, M.S.
Environmental Quality Science, M.S.
Fisheries Science, M.S.
General Science, M.S.
Geological Engineering, M.S.
Geology, M.S.
   Economic Geology
   General Geology
   Petroleum Geology
Geology, Ph.D.
Geophysics, M.S.
   Snow, Ice and Permafrost
   Geophysics
   Solid Earth Geophysics
Geophysics, Ph.D.
Geosciences, Ph.D.
Guidance and Counseling, M.Ed.
   Elementary
   Secondary
History, M.A.T.
Interdisciplinary Studies Option, M.A., M.S., Ph.D.
Marine Biology, M.S.
Mathematics, M.S., M.A.T., Ph.D.
Mechanical Engineering, M.S.
Mineral Preparation Engineering, M.S.
Mining Engineering, M.S., E.M.
Music, M.A.
   Alaska Ethnomusicology
   Music Education
   Music History
   Performance
   Theory and Composition
Music, M.A.T.
Natural Resources Management, M.S.
Oceanography, M.S., Ph.D.
Petroleum Engineering, M.S.
Physics, M.S., M.A.T., Ph.D.
Psychology, M.A.
   Community
   Resource Economics, M.S.
Science Management, M.S.
Space Physics, M.S., Ph.D.
Wildlife Management, M.S., Ph.D.
Zoology, M.S., Ph.D.
GRADUATE ADMISSIONS

Admission to Graduate Study

Graduate study seeks to prepare the student for advance work. It aims to give the student deeper insights and better understanding of fundamental principles. The graduate program is shaped to the needs of the individual student and is developed in terms of the student's experience, academic background, and aspirations. Earning an advanced degree entails more than the satisfactory completion of specified courses; students must show promise and performance in productive scholarship.

In general, students may be admitted to graduate status if they have a bachelor’s degree from an accredited institution with at least a 3.0 (B) average in their major, and if their major is deemed suitable for continuation of studies in the field of choice. Equivalent accomplishments at a foreign university may be substituted. For the purposes of admission to graduate study, all grades, including those generated from retaking a course, will be included in calculating the grade point average. Program heads will determine the adequacy of the student's preparation and whether or not departmental facilities are sufficient for the student's aims.

Students are advised that permission to enroll in graduate courses does not imply admission to graduate study. A student may not presume that such course work will necessarily be applicable to a graduate program. Admission to graduate study, when approved, does not imply advancement to candidacy for a degree. Any program has the option of refusing to recommend a student for candidacy for a degree.

Soon after the student is accepted, a faculty advisory committee will be set up to assist the student in planning and carrying out a graduate program. [See Degree Requirements]

Foreign Students

Additional admission requirements apply to international students and recent immigrants to the United States.

English Language Proficiency Policy

In addition to meeting regular admission requirements, a foreign student must be able to read, write, and speak English well enough to do graduate level work successfully.

Admission Requirements:

1. Applicants from countries where English is not the native language must present a satisfactory score on the Test of English as a Foreign Language (TOEFL). No other test can be used, nor may any other proof of English competency be substituted (such as English credits from other schools).

2. A TOEFL score is required for Permanent Residents (immigrant visa) when all the formal education of the applicant is from a country where English is not the primary language, or when the documents presented for admission do not clearly indicate the applicant's proficiency in English.

3. For graduate admission, applicants must present a TOEFL score of at least 550.

Graduate applicants who present scores below 550 may request a waiver of the TOEFL requirement from the International Student Advisor. The International Student Advisor will make such recommendations subject to final review and approval by the cognizant academic dean and the Dean of the Graduate School.

A waiver will be granted only under exceptional circumstances, at the discretion of the International Student Advisor. If a waiver is granted, it will include a requirement for enrollment in appropriate English as a foreign language (EFL) courses with a corresponding reduction in the work load in the student's major.
The International Student Advisor will determine that EFL class space is available prior to granting the waiver.

Other Requirements
In addition, when preparing the I-20 form that is necessary to obtain an F-1 (student) visa (a J-1 visa may be more appropriate for some graduate students), the university must certify to the Immigration and Naturalization Service (INS) that the prospective student has been accepted for full-time enrollment and has sufficient funds to meet estimated expenses for one academic year. Foreign students on F-1 visas must maintain a full-time course load, they may not enroll as part-time students (less than nine graduate credits).

A foreign student must sign a statement that sufficient funds are available to pay all expenses while attending UAF, as well as the amount needed for round trip transportation costs between the student’s home and Alaska. The minimum cost for attending UAF for one school year is at least $6,300 for graduate students. This amount covers all university fees, room and board on campus, and a reasonable amount of personal expenses including transportation. It does not include summer living or cold weather clothing costs. Since the issuance of an F-1 visa requires affirmation that the foreign student does not intend to make the United States a permanent residence, the student may not be considered for resident tuition fees.

Applying for Admission

When to Apply
It is recommended that prospective graduate students apply for admission at least six to nine months prior to the beginning of the semester in which they plan to enroll at UAF (twelve months for interdisciplinary degree applicants).

A person cannot make reservations for on-campus housing until the application for admission has been accepted. Therefore, we recommend that application for admission be filed at least ten months prior to the date applicants plan to enroll if they are interested in campus housing.

How to Apply -- Read Carefully
Application forms may be obtained from the Office of the Director of Admissions and Records. Applications for admission will be considered only when the following credentials have been received by the Office of the Director of Admissions and Records:

1. Application for Admission -- A $20 processing fee must accompany the completed Graduate Application for Admission form.
2. Scholastic Records -- An applicant is required to have complete official transcripts of all college credits sent to UAF in support of the application. The applicant is responsible for requesting that these transcripts be sent to the university but transcripts will not be accepted unless they are sent directly to the Director of Admissions and Records from the other college or university attended. The applicant may not submit personal copies of transcripts.
3. Letters of Recommendation -- At least three letters of recommendation are required from people capable of describing the applicant’s character and ability to undertake graduate study and research. The letters should be forwarded to the Director of Admissions and Records.
4. Ph.D. applicants must submit descriptions of their proposed graduate program and of their professional goals.
5. Results of the Graduate Record Examination (GRE) and/or other tests, when required, must be forwarded to the Office of Admissions and Records. Applicants should refer to the admission requirements of the specific degree program.
program for which they are applying to ascertain what tests, if any, are required.

6. **Graduate foreign student applicants** should also refer to the previous section on admission requirements for foreign students.

7. **Interdisciplinary master's or doctoral applicants** must submit a proposed graduate study plan and research proposal, with commitment from a UAF faculty member to chair the student's advisory committee. Contact the Office of the Graduate School for interdisciplinary application procedures.

**Conditional and Final Acceptance**

After the required credentials are received, reviewed and processed, a statement of acceptance will be mailed to the qualified applicant. It will specify the conditions under which the applicant has been admitted.

A qualified applicant can be accepted for admission while currently enrolled in the last semester of college. However, the acceptance may be conditional upon receipt of an official transcript indicating satisfactory completion of the work in progress at the time of acceptance and completion of graduation requirements.

Final acceptance to the university for the purpose of earning scholastic credit becomes complete only when all credentials have been received and accepted by the Director of Admissions and Records.

**Immunization Policy**

The University of Alaska requires the following to be supplied by all new students admitted for nine or more credits:

1. A completed health inventory form to be returned to and kept on file with the Center for Health and Counseling.
2. A report of negative tuberculin skin test on chest x-ray.
3. Written proof from a medical authority of immunity to:
   a. Rubeola (measles)
   b. Rubella
   c. Diphtheria and Tetanus
   d. Polio

Registration may be withheld for a student's second semester pending compliance with the above.
Una Swain, research assistant at the Institute of Marine Science, monitors the behavior of "Slip," the institute's ring seal, in a study of the way seals navigate under ice. UAF photo/Sam Winch
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; requirements of the major are given in the Departments and Curricula section.

General University Requirements

A graduate student must apply and be admitted to a specific degree program and, in addition, must later be admitted to candidacy for that degree and discipline major.

Credits earned 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 transferred to UAF from another institution to fulfill credit requirements for a graduate degree.

Credit by correspondence or examination, or courses taken under the credit-no credit option, may not be used in fulfilling the basic course requirements of the degree program.

A cumulative GPA of 3.00 (B) is required for good standing. An "A" or "B" grade must be earned in courses not primarily for graduate students (300 or 400); "C" will be accepted in graduate courses (600), provided the student maintains a "B" average both for all graduate courses and for 600-level courses. For the purposes of graduate study good standing and meeting degree requirements, all grades, including those generated from retaking a course, will be included in the GPA.

A graduate student must satisfactorily pass a final examination(s) according to the requirements for the degree.

A graduate student must be registered each semester 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.

Extended Registration

A student whose only remaining requirement is the completion of the final examination(s), the removal of a deferred grade from an earlier enrollment, or the completion of the thesis may extend registration by paying the appropriate fee during the regular registration period at the beginning of the semester. Upon completion of extended registration, the student is considered enrolled for the current semester. There are two categories of extended registration: 1) Off Campus -- for graduate students who are actively working toward a degree but are not in residence and do not use university facilities ($150 fee per semester); and 2) In Residence -- for students needing to use facilities and faculty advisement ($225 fee per semester). Students on extended registration in residence who are considered full-time by their department and the Graduate Office pay full-time student activity fees and medical insurance fees, and may receive certification of full-time status for deferment of student loans.

A master's student may be granted full-time status by enrolling in extended registration for one semester. An additional extension of one semester may be granted upon the approval of the student's graduate committee and department head. A Ph.D. student may be granted two semesters of full-time status by enrolling in extended registration. One additional semester may be granted upon approval by the committee and department head.

Residence credit is defined as UAF credit that is earned by a student in formal classroom instruction or in individual study or research through any unit of UAF. Transfer credit, advanced placement credit, formal service school credit,
military service credit and credit granted through nationally prepared examinations are not considered residence credit. Credit by examination earned through locally prepared tests is not normally considered residence credit.

Graduate Degree Requirements

English Requirement
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 requirements.

Catalog and Time Limits for Degrees
A student enrolled in a graduate degree program may elect to graduate under the requirements of the UAF catalog in effect in the first semester of enrollment in the degree program (the catalog of record), or the catalog in effect at graduation. All course work listed on the student’s advancement to candidacy form and all other degree requirements must be satisfactorily completed within the time limits allowed. The limit is seven years for a master’s degree and ten years for students pursuing a Ph.D.

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. Graduate education should be an intense, coordinated effort, undertaken in a relatively short time and aimed at obtaining professional skills or the ability to do original creative research and scholarly work. A graduate student must meet University standards, department standards and those set by a faculty advisory committee with expertise in the student’s study area. Graduate study cannot be a collection of random courses taken beyond the baccalaureate.

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):

1. 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.
   b. No 100-200 level credits are applicable toward degree requirements, although the advisory committee may require the removal of certain deficiencies with courses at this level.
   c. A maximum of 12 semester credits may be devoted to thesis (699) or to thesis and research (699 + 698). When a thesis is required, it must carry six or more credits. In non-thesis programs, a maximum of six credits may be devoted to research/project.
   d. A maximum of nine 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 (300-400) or at the graduate level (600), but they must have been taken after completing the baccalaureate degree and cannot have been used toward a previously earned graduate degree. Such courses must also
have been taken within the time limits specified for the master's degree.

e. Students who received their baccalaureate degrees from UAF may include in their programs credits which they reserved for graduate study during the final year of their undergraduate program, provided that the advisory committee accepts them, and provided that the courses were reserved in accordance with the policy as stated in the UAF Catalog.

2. Formulate a unified program, in cooperation with the student's advisory committee, as best fits the needs of the individual student.

a. 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.

b. In some cases, cooperative programs utilizing specific courses from other universities may be developed after a student has been admitted to graduate study at the University of Alaska Fairbanks, has prepared a graduate study plan with the advisory committee, and has received the prior approval of the advisory committee. A minimum of 12 semester credits, in addition to thesis and research, must be completed in residence at the University of Alaska Fairbanks.

c. The student's advisory committee may require that certain deficiencies be corrected. These deficiency requirements are considered to be a part of the student's overall graduate study program and must be included in the final program submitted on the Advancement to Candidacy form. If satisfied through course work, 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. The advisory committee will determine, in advance, the method ofremedying the deficiencies and the minimum level of performance to be required of the student, and this information will be included on the student's candidacy form. Grades earned in deficiency courses are not included in the grade point average. With the consent of the advisory committee, such courses may be taken under the credit/no-credit option or through credit-by-examination.

d. Correspondence courses, credit-by-examination, or courses taken under the credit/no-credit option may not be used in fulfilling the basic course requirements of the degree program. However, with the permission of the advisory committee, these procedures may be used to demonstrate certain proficiencies, i.e., for the language/research tool requirement or to satisfy deficiencies.

3. In addition to satisfactory completion of a plan of study developed in accordance with the guidelines described above, specific requirements for the master's degree are:

a. If required, pass a qualifying examination prior to advancement to candidacy.

b. If required, demonstrate proficiency in a language/research tool.

c. Pass a comprehensive (final) examination, written and/or oral.

d. If a thesis is required, pass an oral defense of thesis examination.

e. Submit an application for graduation and be registered in the semester in which the degree is to be awarded.

f. Complete all degree requirements within the 7-year time limit allowed.

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. NOTE: Students will enroll in a department or program which offers an approved M.A.T. program. The M.A.T. degree at UAF has been approved for the following subject areas: biology, chemistry, geosciences, history, mathematics, music and physics.

Admission Requirements:
1. A bachelor's degree and a teaching credential.
2. A grade point average of at least 3.00 in the baccalaureate major, teaching major, and in education courses.
3. Submission of the following to the Director of Admissions and Records:
   a. A completed university Application for Admission to Graduate Study form.
   b. A statement of goals to which the M.A.T. will contribute.
   c. Official transcripts of all previous college or university work.
   d. At least three letters of reference.
4. Additional evaluative material may be required by some departments, e.g.,
   a. Scores from the aptitude test of the Graduate Record Examination and/or scores from the advanced tests in the field of the baccalaureate major.
   b. An interview.
5. Recommendation for admission by the dean of the college or school in which the subject matter discipline is located.

Degree Requirements:
1. Complete general university requirements and master's degree requirements.
2. Complete 36 credits, of which at least 24 credits, including research, must be at the 600 level.
   Required Courses.................................................. Credits
   Ed. 601--Critique of Educational Research Methods.............. 3
   Ed. 612--Cultural and Phil. Foundations of Education........... 3
   Other required courses to be specified by the student's graduate committee may vary depending on the particular field of study. Some departments may have additional requirements.
3. Each candidate must pass a written comprehensive examination. The examining committee shall consist of 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 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. This program is limited to 1) the Public School Administration area, with particular emphasis on the Superintendent certification, and 2) a cross-cultural education program. For further information regarding this degree program contact the Department of 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. This degree generally will not be conferred upon anyone whose entire academic experience has been at the University of Alaska. 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.

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. Generally, a minimum of one and one-half years (three semesters) will be spent in residence at the University of Alaska Fairbanks.

2. 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.

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. Demonstrate competence in a foreign language or a research tool specified by the advisory committee.

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.


e. Apply for graduation and be registered in the semester in which the degree is to be awarded.

f. Complete all degree requirements within the 10-year time limit allowed.
# UAF Graduate Degree Programs

## College of Liberal Arts
### ANTHROPOLOGY
- MA Anthropology*: 30 credits
- PhD Anthropology: varies

### ENGLISH
- MA English*: 30 credits
- MFA Creative Writing*: 45 credits

### HISTORY
- MAT History: 36 credits

### MATHEMATICAL SCIENCES
- MS Computer Science: 30 credits
- MS Math*: 30-35 credits
- MAT Math*: 36 credits
- PhD Math: varies

### MUSIC
- MA Music: 30 credits
- MAT Music: 36 credits

## College of Natural Sciences
### BIOLOGY AND WILDLIFE
- MS Biology*: 30 credits
- MS Botany*: 30 credits
- MS Wildlife Management*: 30 credits
- MS Zoology*: 30 credits
- MAT Biology: 30 credits
- PhD Biology: varies

### CHEMISTRY
- MA Chemistry*: 30 credits
- MS Chemistry*: 30 credits
- MAT Chemistry: 36 credits

### GEOLOGY AND GEOPHYSICS
- MS Geology*: 30 credits
- MS Geophysics*: 30 credits
- MAT Geology*: 30 credits
- PhD Geology: varies
- PhD Geophysics: varies

### PHYSICS
- MS Physics*: 30 credits
- MS Space Physics*: 30 credits
- MS Atmospheric Science*: 30 credits
- MAT Physics*: 36 credits
- PhD Physics: varies
- PhD Space Physics: varies
- PhD Atmospheric Science: varies

## College of Rural Alaska
### BEHAVIORAL SCIENCES/HUMAN SERVICES
- MA Community Psychology: 45-48 credits
- MEd Guidance/Counseling (elementary or secondary): 36 credits
- MEd College Student Personnel Administration: 36 credits

### EDUCATION
- MEd Cross Cultural Educ: 36 credits
- MEd Curric/Instruc: 36 credits
- MEd Educ Leadership: 36 credits
- MEd Lang/Literacy: 36 credits
- EdS (x-cultural or leadership): 36 credits
Graduate School

School of Agriculture and Land Resources Management
NATURAL RESOURCES MANAGEMENT
MS Natural Resource Mgmt* 30-35

School of Engineering
CIVIL ENGINEERING
MCE 30
MS Civil Engineering 30
MS Arctic Engineering 30
MS Env Qual Engn 30-33
MS Env Qual Sci 30-33

ELECTRICAL ENGINEERING
MEE 32
MS Elec Engn 30

ENGINEERING AND SCIENCE MANAGEMENT
MS Engr Mgmt 33
MS Sci Mgmt 33

MECHANICAL ENGINEERING
MS Mech Engn 30

School of Fisheries and Ocean Sciences
MARINE SCIENCE AND LIMNOLOGY
MS Marine Biology* 30
MS Fisheries Science* 30-36
MS Oceanography* 30
PhD Oceanography varies

School of Management
BUSINESS ADMINISTRATION
MBA** 30-54

ECONOMICS MS Resource Economics* 31

School of Mineral Engineering
MINING AND GEOLOGICAL ENGINEERING
MS Geol Engn 30-33
MS Mining Engn 30-36
MS Min Prep Engn 30-33
Engineer of Mines varies

PETROLEUM ENGINEERING
MS Petroleum Engn 30-33

Interdisciplinary Studies
MA* varies
MS* varies
PhD* varies

Degree Abbreviations
EdS Educational Specialist MCE Master of Civil Engineering
EM Engineer of Mines MEd Master of Education
MA Master of Arts MEE Master of Electrical Engineering
MAT Master of Arts in Teaching MFA Master of Fine Arts
(within a discipline) MS Master of Science
MBA Master of Business Administration PhD Doctor of Philosophy

*GRE required for admission
**GMAT required for admission
Dr. Tom Kinney, associate professor of civil engineering, works on a project studying the feasibility of using geotextiles to prevent permafrost problems in Alaska highways. UAF photo/Sam Winch
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.

Research Institutes and Centers

Agricultural and Forestry Experiment Station

The research of the Agricultural and Forestry Experiment Station is directed toward increasing the production of food and wood products, and wisely using the state's lands for agriculture, forestry and recreation. Specifically, the objectives are: (1) to increase the efficiency of production systems for food and wood products, including energy conservation and the development of new lands; (2) to improve processing, transportation and marketing of food and wood products in Alaska for markets in Alaska and for export; (3) to improve resource inventories and develop land-use planning for agriculture and forestry that will enhance environmental quality; and (4) to develop resource management for improving the quality of life, including revegetation procedures, landscaping and home gardening, and outdoor recreation. Work toward these objectives is carried out in cooperation with the U.S. Department of Agriculture.

Research centers of the Agricultural and Forestry Experiment Station (AFES) are located on the UAF campus and at Palmer in the Matanuska Valley. A plant-materials center, established cooperatively by AFES and the state's Department of Natural Resources, is located near Palmer. Agronomy research is conducted within the Delta and Point MacKenzie Agricultural Projects. Research is underway in western Alaska in support of Alaska's reindeer industry. In addition, the Forest Soil Laboratory is conducting studies within various kinds of forests in Interior Alaska in cooperation with federal scientists from the Institute of Northern Forestry, U.S. Forest Service.

The Fairbanks research center of AFES has a staff representing the disciplines of agricultural engineering, agronomy, animal science, botany, economics, forestry, horticulture, outdoor recreation, plant pathology, range science and resource management. The Palmer research center has scientists in agronomy, animal science, agricultural engineering, horticulture and range science. Scientists from the Agricultural Research Service, USDA, representing the disciplines of weed and soil science work cooperatively with AFES at the Fairbanks and Palmer research centers.

Research programs at these various locations provide research opportunities for graduate students.

Alaska Cooperative Fishery and Wildlife Research Units

These units are jointly sponsored and financed by UAF, the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. The units provide financial support and guidance for graduate training in fishery and wildlife biology and management.

Research emphasis of the Fishery Unit is on the ecology and fisheries of aquatic ecosystems, alteration and contamination of Alaskan freshwaters, and evaluation and development of cold water fisheries techniques. The Wildlife Unit 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.

Most research projects of the units are field-oriented and conducted by graduate students in close cooperation with university faculty and agency biologists. Graduate work leading to both master's and doctoral degrees in regular university programs may be supported through the units.

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. Many of the staff in addition to doing research, also teach courses in the Alaska Native Language Program. The center's library houses a valuable collection of manuscripts materials in and on Alaska Native languages. It is available for by scholars and students.

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 professional 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. Opportunities are available for graduate assistants in research projects. Future research projects will address issues in the field of cross-cultural education in Alaska, and the areas of human services and rural development. Research projects will be selected which offer the greatest promise of extending our understanding of what is occurring in rural Alaskan communities and what educational and service strategies will be most helpful. Future research will strongly incorporate the perspective of community people and practitioners.

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 are divided into four major areas -- harvesting technology, seafood processing technology, training and support. 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 hopes to offer a degree program in seafood science and nutrition in the future. FITC research efforts are often coordinated with the Alaska Sea Grant College Program and the Marine Advisory Program.

Geophysical Institute

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 research program deals with phenomena that can best be studied at high altitude or which present special problems in Alaska. 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. An important aspect of much of the work is the application of existing knowledge to polar problems -- 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.

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 Ester Dome Observatory for auroral studies, the radio transmitter Sheep Creek Station, the Chena Valley Radio Facility, the Poker Flat Research Range, and a potassium-argon geochronology laboratory. In addition to these local facilities, the institute used 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.

Assistantships are available for well-qualified students to work with the Geophysical Institute faculty toward the master's and doctoral degrees.

**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 adaptations of plants, animals and human beings to past and present climates of the Arctic, is maintained but 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. The interest in humanity has largely related to anthropologic and archaeological studies of native Alaskans (present and past) and to improvements in reindeer herd management and productivity that benefit human beings in a largely natural system.

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, plus a reindeer research facility at Nome. The institute maintains the only major ecological research station in the Arctic, at Toolik Lake north of the Brooks Range. Research field camps at Eagle Summit on alpine tundra, 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.

There is a staff of approximately 75 serving the institute. The faculty have joint appointments with instructional colleges, and Institute faculty participate in
offering courses and graduate programs leading to both M.S. and Ph.D. degrees in a variety of subjects related to arctic biology.

Institute of Marine Science

The Institute of Marine Science was established in 1960 by the Alaska Legislature for the purposes of advancing oceanographic knowledge with an emphasis on problems of high-latitude seas, of training graduate students in modern oceanography and of conducting both basic and applied marine research. Subsequent expansion has included research and training in marine biology, fisheries oceanography, and special problems in limnology.

Current research projects include: studies on water circulation in the Gulf of Alaska, environmental studies at the oil pipeline terminus of Valdez, fishery systems, 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. 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 institute uses other Alaskan coastal facilities as needed. The institute's research vessel, R/V ALPHA HELIX, routinely operates in the Chukchi and Bering Seas, in Aleutian waters and in the Pacific waters adjacent to Alaska.

Financial assistance for graduate students is provided through state research assistantships and stipend support coming from agency, industry and foundation grants to the institute.

Alaska Sea Grant College Program

The Alaska Sea Grant College Program, which was established in 1970, represents a partnership between the National Sea Grant Program within the National Oceanic and Atmospheric Administration and the University of Alaska. Its purpose is to provide people with 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 Alaska Sea Grant Program administrative office is housed in the Irving II Building on the Fairbanks campus. Sea Grant funded projects can be carried out in cooperation with institutes and units on the various college campuses throughout the state.

The research program includes projects in fisheries oceanography, fisheries sciences, fisheries enhancement, fisheries allocation issues, food science and technology, and aquaculture.

Sea Grant supports continuing programs of information and advisory services. Through the Alaska Marine Advisory Program, Sea Grant supports a personal link with marine industries and coastal communities.

Institute of Northern Engineering

Formerly known as the Engineering Experiment Station/Institute of Water Resources, the Institute of Northern Engineering (INE) is an interdisciplinary organization within the School of Engineering.

INE facilities are shared with the Research Section of the Alaska Department of Transportation and Public Facilities (which investigates many important practical research problems), the Alaska Department of Natural Resources (ADGGS), and several other academic departments of the university. The school offers graduate level programs in civil, electrical, mechanical, arctic and environmental quality engineering, engineering and science management, plus interdisciplinary master's and doctoral programs (such as hydrology) tailored to the student's needs.

The Engineering Research Center (ERC) promotes research and educational programs dedicated to solving the engineering problems of Alaska and other
northern regions. Research presently encompasses a diversity of fields ranging from basic investigations of geomagnetically induced currents on power systems to the testing and evaluation of novel road-bed technologies for more cost-effective rural airfields. ERC focuses its research on the special needs of Alaskans and other peoples of the North. Cooperation with other research institutes located on campus has provided important basic information to help seek practical solutions to problems facing Alaskans.

The Water Research Center (WRC) was established in response to the Water Resources Act of 1964 to conduct research dealing with the water resources environment in Alaska. It conducts research concerning inland and coastal, surface and subsurface water - its availability, quantity, quality, movement and treatment, and its uses and abuses in Alaska. WRC also provides a strong interdisciplinary environment for graduate students, giving them considerable breadth for tackling difficult problems.

The University of Alaska Transportation Center (UATC) helps Alaskans obtain useful information and training to meet local transportation needs. The program focuses on technology related to roads, bridges, airports, seaports, railroads and public transportation.

INE disseminates information through refereed publications, newsletters, reports, workshops and seminars.

Assistantships are available for well-qualified students to pursue advanced degrees in engineering and water resources.

Juneau Center for Fisheries and Ocean Sciences
The Center for Fisheries and Ocean Sciences 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 the 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 seaweed, 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 hydroacoustics and stock estimation.

Research facilities are within the three-story Anderson Building (15,000 square feet) located on the shores of Auke Bay, approximately 12 miles north of Juneau. The building is equipped with a high quality seawater system plumbed throughout the first floor and to biological labs on the third floor. A walk-in freezer and coldroom are also located on the ground floor, which houses wet and dry lab research facilities and advanced instrumentation. A modern microcomputer lab, including graphics stations and hydroacoustics lab and image analysis station are located within the building. The center's 42-foot research vessel, R/V MAYBESO, routinely operates in inland waters in southeast Alaska. The center cooperatively operates with the National Marine Fisheries Service, a research salmon hatchery located on Auke Creek, adjacent to the grounds.

Financial assistance for graduate students is provided through research assistantships from state, federal and industry funded grants to the center.

Mineral Industry Research Laboratory
The Mineral Industry Research Laboratory was established by the 1983 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 the research branch 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. This facility is expanding to include determination of the potential for utilizing these coals in conversion processes such as liquefaction and gasification.

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.

A close relationship is maintained with the educational program which presents opportunities for graduate studies in mineral and energy related fields.

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 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 Museum is a center for the collection, preservation and dissemination of information pertaining to the north. The museum has a staff of coordinators, curators, technicians and student assistants to collect, preserve, exhibit and interpret the cultural and natural history of Alaska.

While some 100,000 people visit the exhibit area each year, the museum is more than a place to look at interesting objects. The museum is also a research center, and the staff conducts field work, teaches university courses and publishes reports. The University of Alaska Museum administers a full range of public service and educational programs. Public lectures, children's programs and museum-related workshops are offered throughout the year. An interdisciplinary display of objects and information from the museum's collections provides a unified view of Alaska's peoples, natural resources and events which have guided the development of the state.

The Aquatic Collection, established in 1970, contains over 44,000 specimens of aquatic invertebrates, fishes and algae. The research effort of the curator is directed toward a basic inventory of Alaska's marine flora and fauna. This inventory is often used as a basis for environmental impact assessments.

The Archaeological Collection contains approximately 1.5 million specimens, primarily from Alaska. Additional comparative exchange collections are available for study from other regions of North America, South America, Asia and Europe. The curator and professional staff conduct research encompassing state, national and international archaeology. A laboratory and support facilities are maintained for students, faculty and visiting scholars for conducting archaeological research.

The Ethnographic Collection contains over 14,000 objects made and used by Alaskan Native people from the turn of the century to the present. Exceptional artifacts include baskets, beadwork, ivory carvings, masks, games and toys.

The Art Collection consists of approximately 700 paintings, lithographs and prints of Alaska subjects dating from the late 19th Century to the present. The
works of Laurence, Ziegler, Heurlin, Lambert, Machetantz and Crumrine are well represented.

The Herbarium preserves and systematically stores plant specimens. It consists of over 112,000 specimens. These collections represent the United States, Scandinavia, Finland, Greenland, Canada, Japan and the Soviet Union, which provide data for comparative studies.

The Geology Collection includes minerals, Alaskan ores, cores and other geologic samples, and Alaskan gold.

The Tephrochronology Center includes holdings in arctic volcanic ash samples.

The Terrestrial Vertebrate Collection has 5,300 bird study skins and over 25,000 mammal specimens of skins, skulls and skeletons, representing most of Alaska's bird and mammal species. The collections are strongest in gamebirds, furbearers, sandpipers, passerines and rodents.

The Alaska Native Heritage Film Project produces films that document Alaska culture for instruction and public education statewide. The films are made using an approach developed by the project called "Community-Determined Film Making," in which the communities and individuals filmed play key roles in determining the content and direction of the films.

Academic and Research Support

Located on the University of Alaska Fairbanks campus are numerous research support resources, including state and federal agencies. The support units provide students with research and informational material.

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 1989. 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, phonograph disks, audiotapes, videotapes and motion picture films.

The Rasmuson Library/Media Program furnishes academic and research support to University of Alaska Fairbanks faculty and staff members. In addition, as the major research collection in the state of Alaska, the Rasmuson Library functions as a statewide resource for library collection development efforts, library automation, serials union listing, university publications distribution, Alaska information indexing and interlibrary loan transactions.

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), whose automated database contains more than 3,500,000 bibliographic records of more than 250 libraries located from Alaska to Arizona.

Interlibrary loan services are available to students and faculty members through the Information Access Services department (IAS). 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.

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
Computer Network/Computer Support Group

The UAF Computer Support Group (CSG) provides administrative and academic computing support for UAF and the GNOSIS Information Systems for the entire University of Alaska System. The UAF CSG is the primary UAF contact with the University of Alaska Computer Network, which provides extensive data communication and computing services to university units. Most administrative computing is provided for the university by the UACN. The systems are run on an IBM 4381-14 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 32 megabytes of main memory, 3.2 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 the BITNET data communication system, facilitating data transfer with several hundred other academic computers worldwide.

State and Federal Agencies

The following is a listing of the state and federal agencies involved in research and located on the Fairbanks campus.

Branch of Alaskan Geology of the U.S. Geological Survey

This branch conducts a program of geological exploration and research in Alaska. Some of the functions are geologic mapping studies and evaluation of metallic, non-metallic, coal and oil deposits; regional studies of structure and stratigraphy; detailed studies of selected type-areas; application of geology to engineering and related problems; and research in the use of new geologic methods. The Alaskan maps and geological reports are available for public use in the office.

Bureau of Mines, U.S. Department of the Interior

The Alaska Field Operation Center, with headquarters at Juneau, maintains a field office in the O'Neill Building. The field office provides support for the center's primary concern for mineral resources and environmental development. The functions that relate to this concern include surveillance and evaluation of industrial and commercial outlook for minerals and fuel deposits; studies to determine the relationship of mineral supply, demand and technology to the national economy; studies and projects concerning the relationship of the mineral industry to environmental problems; and engineering studies regarding effective mining practices.

The field office responds to diverse inquiries from the public and governmental agencies relating to mineral resources and environmental problems; assists in the monitoring of research projects that are conducted by the Mineral Industry Research Laboratory for the Bureau of Mines through contracts with the
University of Alaska Fairbanks and maintains liaison with local federal and state agencies in regard to efforts of mutual interest.

U.S. Army Cold Regions Research and Engineering Laboratories

This office provides environmental research related to Corps of Engineers projects and other construction projects, primarily in the arctic and subarctic regions of Alaska. Past projects include the study of oil spill impact, off road vehicle impact and revegetation needs in northern Alaska.

College Observatory

The College Magnetic and Seismology Observatory is operated by the Branch of Global Seismology and Geomagnetism of the U.S. Geological Survey, with the main facility on the West Ridge of the Fairbanks campus and an outpost facility near Farmers Loop. Originally constructed in 1947, the observatory has expanded to 30 buildings and operates various instruments that continuously gather data for studies in the fields of geomagnetism and seismology. From 1941 to 1946 the observatory was operated by the Department of Terrestrial Magnetism, Carnegie Institution of Washington, in cooperation with the University of Alaska, and then by the U.S. Coast and Geodetic Survey until 1948. Operation of the seismic equipment dates back to 1935.

In 1973 the observatory was transferred from the National Oceanic and Atmospheric Administration of the Department of Commerce to the U.S. Geological Survey of the Department of the Interior. The general mission of the observatory is to produce accurate and comprehensive data in the field of geomagnetism and seismology and cooperate with other scientists and organizations in making studies in various scientific disciplines within the capability of personnel and facilities. The observatory monitors seismic and magnetic activity 24 hours a day. The facility plays a major part in keeping the people of interior Alaska informed of current earthquake activity and informing scientists and organizations of the occurrence of major world magnetic events. The observatory also operates the Barrow Observatory at Barrow, Alaska.

Institute of Northern Forestry, U.S. Department of Agriculture

The institute is a unit of the U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station. Research is focused upon understanding the ecology of, and developing methods for managing, Alaska's boreal forests. Programs are underway to determine the succession of boreal forests and the effects of fire on soil, water, flora and fauna. Field work is conducted throughout the boreal forests in Alaska. The 12,500-acre Bonanza Creek Experimental Forest and the 26,000-acre Caribou-Poker Creeks Experimental Watershed provide convenient research locations for Forest Service and university students.

State Division of Geological and Geophysical Surveys

As part of the Alaska Department of Natural Resources, this division conducts cooperative investigations with university personnel and government agencies to contribute to the knowledge of Alaska's natural resources. The staff includes archaeologists, data processors, engineering geologists, geochemists, geologists, geophysicists and hydrologists.

The laboratory provides analytical services to the staff and also conducts independent research. Field programs are carried out by the scientific staff. Technical information and advice are available to prospectors, exploration companies and the general public. A variety of technical reports and maps are available.

Transportation Research Laboratory

The Alaska Department of Transportation and Public Facilities operates a research laboratory in conjunction with the School of Engineering. The university and the department jointly purchase equipment and share laboratory facilities. Engineering faculty and students are involved in research projects which include highway, airport and public facilities design, construction and maintenance, and
marine transportation issues. Graduate student thesis projects often involve Department of Transportation and Public Facilities topics.

Virology-Rabies Unit, Alaska Division of Public Health

The Northern Region Laboratory provides viral diagnostic service for the entire state of Alaska. In addition, this office is involved with limited basic and applied research into both human and zoonotic viral diseases.

Dr. Ray Highsmith, associate professor of marine science, works with research assistant Shelly Clay to identify a marine invertebrate. UAF photo/Sam Winch
FEES

Tuition

Students enrolled in undergraduate credit courses will be charged $38 per credit for residents to a maximum of $456; and $114 per credit for non-residents to a maximum of $1,368. Students enrolling in graduate credit will be charged $75 per credit for residents to a maximum of $675; and $150 per credit for non-residents to a maximum of $1,350. Maximum charge for any combination of undergraduate and graduate credits will not exceed $875 for residents and $1,350 for non-residents.

Fee Definitions

Admission Processing Fee
A fee of $20 shall be paid at the time an application for admission is submitted.

Campus Activity Fee
Students carrying eight or more credit hours (including both on- and off-campus) will be charged a flat $32 per semester student activity fee. Students living in university housing will be charged the $32 fee regardless of the number of credit hours taken. Students taking one to seven credit hours have the option of paying the fee of $32 if desired, but they are not required to do so.

Those paying the campus activity fee are entitled to use of the Patty Center recreational facilities, and are admitted at student prices to university sponsored athletic events.

Those paying the fee are also entitled to student rates at all ASUA (student government) functions and services, including movies, dances, concerts, rentals, ombudsman, book exchange, legal advice, and intramural sports; use of Wood Center facilities; and participation in student elections. Student government represents student views and concerns with the university administration, the Board of Regents, and the Alaska State Legislature.

Credit by Examination Fee
A fee of $15 per credit hour will be charged for each instance of credit examination.

Graduate Extended Registration Fee
Graduate students extending registration from previous semester must pay the graduate extended registration fee of $150 or $225.

Student Health Insurance Fee
All students who are registered for 12 or more credits, or living in any university housing, must be covered by health insurance. They may buy the Student Health Insurance offered by the university or show evidence of other insurance coverage. Students covered by other insurance can waive university coverage by submitting a university health insurance waiver form to the registration cashier at regular scheduled fee payment times. Waiver forms can be obtained from the Center for Health and Counseling. The health insurance fee is optional only to graduate students carrying nine through 11 credits. The amount of the insurance fee will be quoted at registration. The fee covers participation in a medical plan that covers accidents and sickness.

The Student Health Program is administered by the Director of the Center for Health and Counseling, under the direction of the Dean of Students. Hospital and medical treatment for extensive illness and injuries are provided in Fairbanks, under limits of coverage set forth in the student health insurance plan. Each student will be supplied with a brochure outlining the insurance coverage.
Questions pertaining to insurance coverage and claim filing should be directed to the Center for Health and Counseling staff.

A married student may secure additional insurance coverage for spouse and children if desired. Rates for such coverage will be quoted at registration. This additional coverage is for the insurance plan only and does not include services at the Center for Health and Counseling.

In addition to the insurance plan, all students enrolled for 12 credits or more, or living in any university housing, must pay a $45 health center fee. This fee is optional only to graduate students carrying nine through 11 credits. This fee covers normal health center charges during the semester, including physician, laboratory and counseling services.

**Housing Fees**

**Room Deposit**
When applying for housing, a $50 reservation/damage deposit must be returned to the Housing Office with the completed application.

**Room Rent**
Room rent, along with all other fees, is due in full at registration (see Payment of Fees).

**Meal Ticket**
When registering, each residence hall student is required to buy a meal ticket for cafeteria meals. Meal tickets become effective at the evening meal of the first day of graduate registration for each semester. For more information see Housing.

**Other Fees**

**Textbooks**
Students can expect to pay up to $250 per semester for text books depending on the discipline.

**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.

**Transcript Fee**
Official and unofficial transcripts of UAF academic records are prepared for a fee of $3 for each copy. Normal processing time is two weeks; however, at the end of a semester or at other times during the year, four weeks should be allowed for processing time.

There are times when a person is in need of a transcript sooner than one can be produced through the regular processing cycle. For a fee of $10, paid at the time the request is made, a transcript will be prepared as soon as possible, but not later than 24 hours after the request is made and the fee paid. For each additional copy of the transcript made from the same request, a $5 fee will be charged. Therefore, when a person needs immediate transcripts, the fee will be $15. All requests for transcripts must be submitted in writing. Information to be included in the request is dates and places of attendance, social security number and date of birth.

**Late Registration Fee**
Students registering later than the day designated for that purpose shall pay a late registration fee of $15 for the first working day, plus $5 for each succeeding
working day to a maximum of $65. This fee is refundable only in the event that all
classes for which the student registered are canceled.

Material Use Fees
A 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.

Parking Fee
A $75 annual fee or a $40 semester fee is charged for on-campus automobile
parking.

Preregistration Deposit
A $50 deposit is required to be paid at the time of preregistration by an
eligible student completing the process. This deposit will apply as a credit toward
the fees for the semester for which the student is preregistering.

Records Duplication Charge
Copies of documents on file in a student's folder in the Admissions and
Records Office may be obtained by that student, if time permits, upon written
request at a cost of $2 per page to a maximum charge of $10 per request. These
copies are unofficial and will bear a statement to that effect.

Residency Information -- Definition of Residency --
University of Alaska

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.

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
or 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.

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 payable prior to re-enrollment at the university.

Students who live in university residence halls may apply for deferred fees for up to one-half of their room and board costs. All other costs must be paid at registration. Requests for this deferred payment plan should be made in writing prior to the registration process. The Office of Student Affairs accepts such applications. 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.

Refunds

Refund of General University Tuition and Fees

A student who is withdrawing from courses or canceling enrollment must complete an official withdrawal and turn it in at the Office of the Director of Admissions and Records. Refunds will be made according to the following schedule:

- Full or partial refund of undergraduate and graduate credit hour fees, and non-resident tuition will be made under the following circumstances:
  1. In the event that courses for which the student is registered are canceled at UAF, the above charges 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. Full refund -- withdrawal prior to first day of instruction for the semester.
     b. 90 percent refund -- withdrawal on or after the first day of instruction or the next six calendar days thereafter.
     c. 50 percent refund -- withdrawal on or after the eighth calendar day through the 14th calendar day.
     d. No refund -- withdrawal on or after the fifteenth calendar day of the semester. The "first day of instruction for the semester" is as stated in the official university calendar and is not necessarily the first meeting date of any individual course. Weekends are included in counting days for the partial refund periods.

3. Request 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 slip, will determine the student’s eligibility for a refund.
Applications for refund may be refused unless they are made during the semester or term in which they apply.

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

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

6. Health service, health insurance premiums, music course, campus activity, laboratory, materials and miscellaneous fees shall not be subject to refund.

7. 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 Refunds
Residents withdrawing from the university or who must vacate their rooms for reasons beyond their control will be charged 10 percent of the semester room payment for each week of occupancy. Board refunds are based upon the number of days remaining in the semester during which the meal ticket will not be used, less a five-day service charge. Housing deposits are refunded less any valid assessments by the Office of Student Affairs when a person terminates occupancy. Housing deposits will be carried over for students with housing contracts to subsequent academic years.

Dr. Jenifer McBeath, associate professor of plant pathology, has developed hardy plant varieties that resist infection and are particularly well suited for the Alaskan climate. UAF photo/Sam Winch
Moqueet Syed, a master’s degree student in the department of mining engineering, considers a problem in an engineering management class.
FINANCIAL AID

The Office of Student Financial Aid exists to provide counseling and financial aid to students in need of assistance. All students are encouraged to seek general financial counseling and help in the personal management of money.

Eligibility for Aid

Most aid is based upon need as determined by a careful analysis of the applicant's budget and resources. UAF utilizes the College Scholarship Service needs analysis system and requires that the student complete a Financial Aid Form (FAF).

The financial need of a dependent student is calculated on the basis of the student's and the parent's resources. The financial need of an independent student is calculated on the basis of the student's financial resources.

To be eligible for graduate financial aid, a student must:
1. be formally accepted as a graduate student at the University of Alaska Fairbanks,
2. be in good standing throughout the tenure of the support,
3. be registered throughout the tenure of the assistantship/fellowship/award, and
4. demonstrate satisfactory progress toward a degree.

In order to remain in good standing a graduate student must maintain a cumulative grade-point average of 3.00 in courses identified on the student's advancement to candidacy, or, if not advanced, a cumulative grade-point average of 3.00 on all courses taken since admission to graduate study.

Continuation of Aid

To continue to receive financial aid, UAF requires aid recipients to be "in good standing" which means graduate students must maintain at least a 3.00 GPA to be eligible. The financial aid office monitors the academic progress of aid recipients. Both semester and cumulative GPA must be maintained for continuing eligibility. Students can expect to receive aid for a maximum of 36 semester credits for a masters degree. Doctoral candidates must follow the time frames determined by their departments and advisory committee.

Aid will be suspended for students who fail to complete the required credits with the minimum GPA or who exceed the maximum number of semesters or credit hours. Generally, students can regain eligibility for participation in student aid by completing 9 credits with at least a 3.00 GPA. Any student whose aid has been suspended may appeal that decision. A written appeal which states the reasons for the failure to maintain satisfactory progress standards and the steps taken to meet those standards in the future is required. Appeals should be directed to the Financial Aid Office, or to the appropriate dean in the case of graduate assistantships. A panel will review the appeal and the student will be notified of the decision.

Financial Aid Deadlines

Financial Aid application forms will be available in February.
All applications which are complete by June 1 will receive first consideration. Applications which are completed after June 1 will be processed as long as funds are available.

An application is complete when the Financial Aid Office has received all of the following forms:

1. UAF financial aid application.
2. Financial Aid Form (FAF). This should be completed by March 1 to meet the June 1 application deadline.
3. Financial Aid Transcripts (for transfer students only).
4. Notification of applicant's acceptance by the Admissions Office (for new students only).
5. Other financial information as required for verification of need.

Financial Aid Definitions

Full-time student -- A graduate student enrolled for a minimum of nine UAF graduate credits during a semester.
Graduate student -- A person who has received a bachelor's degree and is pursuing an advanced (master's or doctorate) degree.
Half-time student -- A graduate student enrolled for at least five UAF graduate credits but less than nine UAF graduate credits during a semester.
Without Class Standing (WCS) -- Students enrolled in classes but not formally admitted to a degree program. Students admitted WCS are not eligible for financial aid.

Who May Apply for Financial Aid?

UAF students who anticipate being short of financial resources to meet their college expenses should apply for financial aid. The student must plan to enroll on at least a half-time basis (depending upon the type of aid being applied for) during the 1988-89 academic year, in a program leading toward a degree or certificate. To receive financial aid, a student must be accepted for admission in good academic standing or currently enrolled in good academic standing and making satisfactory progress toward the degree objective. By UAF academic policy, "to be in good standing, graduate students must maintain both a cumulative and a semester GPA of 3.00 (B) or better." Students meeting satisfactory progress standards are expected to reach their degree objective within specific time/credit limits; master's degree students should earn their degree within 7 years and doctoral candidates must earn their degree within 10 years.

Federal financial aid programs (GSL/FISL) also require that the student be a U.S. citizen, national or permanent resident; a citizen of the Northern Mariana Islands, a permanent resident of the Trust Territory of the Pacific Islands; or be in the U.S. for other than temporary purposes and intending to become a permanent resident. The student must not owe a repayment on a Pell Grant or SEIG and must not be in default on GSL/FISL received for attendance at this institution.

Only course work undertaken in attendance at UAF may count toward financial aid requirements. Community college, video, correspondence and/or other college level work not offered by UAF may not be used to fulfill the full- or part-time UAF financial aid requirements.

What Kinds of Financial Aid are Available?

There are basically three types of financial aid offered for graduate students at UAF.

1. LOANS
   Educational loan programs (federal and state) allow students to borrow money to finance their education. All loans must be repaid at a later date. Loan interest rates range from four percent to nine percent. See Financial Aid Office for more details.

2. SCHOLARSHIPS AND FELLOWSHIPS
Scholarships and fellowships are available for graduate students through the University of Alaska Foundation, the UAF Alumni Association, the Vice-Chancellor for Research, and private organizations. Application procedures, deadlines, and amount of awards vary. Contact the UA Foundation or UAF Financial Aid Office for information.

3. RESEARCH and TEACHING ASSISTANTSHIPS
Research and teaching assistantships are available to students in many graduate programs. For information regarding availability of assistantships, contact the department in which you will be working toward your degree.

Loans

The Guaranteed/Federally Insured Student Loan (GSU/FISL)
The Guaranteed/Federally Insured Student Loan Program enables a student to borrow directly from a bank, credit union, savings and loan association or other participating lender who is willing to make the educational loan. The loan is guaranteed by a state or private non-profit agency, or insured by the federal government. Students who are enrolled or have been accepted for enrollment at least half-time are eligible to apply.

A graduate or professional student may borrow up to $7,500 per year, up to a total of $54,750 for graduate or professional study, including loans made at the undergraduate level. Interest rates are approximately eight percent and an origination fee may be charged. The federal government pays the interest on the loan as long as the student remains enrolled as at least a half-time student.

The loan must be repaid. Payment normally begins between six and 12 months after graduation or termination of at least half-time enrollment, and the borrower may be allowed to take up to 10 years to repay the loan. The amount of the payments depends upon the size of the debt and ability to pay, but in most cases at least $360 a year is required unless circumstances as agreed upon by the lending institution warrant a lesser amount.

Repayment may be deferred for up to three years for service in the armed forces, Peace Corps or full-time volunteer programs conducted by ACTION (which includes VISTA, University Year for ACTION, ACTION Cooperative Volunteer Programs, Volunteers of Justice and Program for Local Service). In addition, deferment is available during full-time study at an eligible institution, or for study under a graduate fellowship program. A single deferment for a period of not more than one year is also provided for students who are unable to find full-time employment.

Information and applications forms are available from the loan officer at your hometown bank. All applicants for Guaranteed/Federally Insured Student Loans must complete the University of Alaska Financial Aid Application and must be admitted to UAF in good academic standing to a certificate program or currently enrolled in good academic standing in a degree program.

Supplemental Loans for Students (SLS)
Supplemental loans for students is a federal loan program which allows all students to borrow up to $4,000 each year with an aggregate loan maximum of $20,000. Other aid must be considered when determining eligibility. Payment of interest is due monthly although repayment of principal will not begin until the student leaves school.

Parent Loan
The parent loan program was established by Congress in October 1980, to provide up to $3,000 annually and $15,000 cumulatively. The total amount borrowed by student and parent cannot exceed the total cost of education. The
interest rate is nine percent; repayment must begin within 60 days. Contact your local lending institution for more information.

Alaska Student Loans

Alaska Student Loans are restricted to applicants who have been Alaska residents for at least two years immediately prior to applying. Graduate students may borrow up to $6,500 per year. Application is made directly to Juneau. Write the Division of Student Financial Aid; Alaska Postsecondary Commission; Pouch FF; Juneau, AK 99811, for further information and application forms. Application forms are also available at Alaska high schools and Alaska postsecondary schools.

Students wishing to obtain information about their Alaska Student Loan application must contact the Alaska Student Loan Office in Juneau rather than the school's Financial Aid Office.

University Loans

University loans are short-term loans for enrolled students and are made to cover unanticipated/emergency education-related expenses. Students who have completed at least one semester as a full-time student in good standing at UAF may apply for a maximum of $500 per academic year. Interest is four percent per annum. Loans must be repaid by December 1, 1988 for students who terminate studies at the University of Alaska at the end of the fall 1988 semester; by April 15, 1989 for students leaving at the end of the spring 1989 semester; or by July 15, 1989 for students who will be returning to UAF for the fall 1989 semester.

Applicants must be in good academic standing and must have no outstanding debt with UAF. A co-signer is required and students are required to verify their need for the loan. Applications will be accepted from the first day following late registration until 30 days before the end of each semester.

Emergency Loans

Emergency loans are available to regularly enrolled full-time students whose financial need is modest and temporary. Students may borrow up to $100 maximum to be repaid within 30 days. A $2 service charge is assessed for each loan.

Applicants must be in good academic standing and must have no outstanding debt with UAF. Applications will be accepted from the first day following late registration until 30 days before the end of each semester.

For further information and forms contact:
FINANCIAL AID OFFICE
UNIVERSITY OF ALASKA FAIRBANKS
5TH FLOOR, GRUENING BUILDING
FAIRBANKS, ALASKA 99776-0770
PHONE: (907) 474-7256

Scholarships and Fellowships

Various scholarships and awards are available to UAF graduate students.

Glenn Carrington Scholarship of $1000 is awarded to a native student or a business major.

Civil Engineering Scholarship of $1000 is awarded annually preferably to a student in military science and/or an Alaska high school graduate.

Frank Moolin Engineering and Science Management Fund awards are given to graduate students in the engineering and science management program.

Albert A. Zucchini Scholarship of $1000 is awarded to an Alaskan married student studying mining and geological engineering.

Earl H. Betstline Scholarship of $1000 is awarded to a student in the School of Mineral Engineering.
Kathryn S. Patty Scholarship of $1000 is awarded to a female student in mineral engineering.

John Marooney Memorial Scholarship of $700 is awarded to a student in wildlife management by nomination of the faculty.

Ruth Croxton Memorial Fund awards are given to students studying environmental relationships in Alaska.

Elvey Memorial Award of $500 is given to students in the sciences.

Jack R. Luck Memorial Travel Fund awards are given to students in environmental physiology.

Alaska Native Student Fund awards are given to Alaska Native Students annually.

Alexandra Krauss Memorial Scholarship of $500 is awarded to a woman.

Graduate Resource Fellowship of $6,500 to $10,000 is awarded to students working on Alaskan resource problems.

Pioneers of Alaska Igloo # 4 Award is given to a student born in Alaska and son or daughter of a Pioneer.

Lowell Thomas, Jr. Scholarship is awarded to a student studying natural resources.

Angus Gavin Memorial Migratory Bird Research Fund Award of $25,000 is given to students or faculty doing research on migratory bird species.

For further information and forms contact:
UNIVERSITY OF ALASKA FOUNDATION
910 YUKON DRIVE
FAIRBANKS, AK 99775
PHONE: (907) 474-7687

Research and Teaching Assistantships

To be eligible for graduate assistantships a student must be formally accepted as a graduate student at the University of Alaska Fairbanks, be in good academic standing throughout the tenure of the support, be registered throughout the tenure of the assistantship/fellowship/award, and demonstrate satisfactory progress toward a degree.

The University annually awards teaching/research assistantships to qualified graduate students. For information and applications, students should contact the head of the department in which they are enrolled.

Assistantship Stipends

Stipends for graduate assistantships are generally paid for the school year at rates of $10.00-$12.00 per hour for 20 hours per week. Assistantships are sometimes available during the summer for 20-40 hours per week.

Teaching and research assistants are entitled to out-of-state tuition waivers for those students who are classified as non-residents of the State of Alaska. Students must present a copy of their Letter of Appointment to the fees assessors during registration each semester to receive the non-resident tuition waiver.

A graduate student with a GPA less than 3.0 for one semester will be allowed to petition to continue as a graduate assistant. 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.

**Work and Study Loads**

A full-time graduate student is defined as one who is enrolled for nine or more semester hours of credit, but the average full-time study load for a graduate student who is not working is 12 credits per semester.

The final decision on the work and study load relationship rests with the student's advisory committee and dean.

"Student greeting," a sculpture by Karen Olanna, is located near the center of campus. UAF photo/Mary Ann Borchert
HOUSING INFORMATION

In General
Each residence hall is staffed with a head resident and several resident advisors. The head resident is responsible for the administration, programming and counseling within the hall. The resident advisors are full-time students who work with the head resident in planning and administering a program of social, recreational and governmental activities.

Housing Deadlines
The University of Alaska Fairbanks is experiencing an increased demand for all on-campus housing facilities. Since housing applications are mailed to students with acceptance letters from the Office of Admissions and Records, students should plan to complete their enrollment applications well in advance. The UAF currently has a substantial waiting list for married student housing. Contact the Housing Office for more information on the availability of married student housing.

Eligibility
Students must maintain full-time status (nine credits for graduate students) to qualify for student housing. Extended registration on campus is also considered full-time registration for purposes of housing allocation. See Extended Registration policy for limitations. Students should consult the housing staff about regulations concerning maximum terms of occupancy for each degree level.

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 storage facility area. 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 assignment. Specific room assignments will be given to students upon their arrival in the residence hall. 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.

Residence hall students are permitted to remain on campus during the Thanksgiving, Christmas and spring vacation periods at no additional cost.

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. Animals are not permitted in campus student housing. Toll telephone calls may not be made from resident hall floor phones, nor should incoming toll calls be accepted. Pay telephones are available.

Automobiles
Only a limited number of electric outlets for automobiles are available. All motor vehicles garaged, stored or used on campus must be registered with UAF security and bear a University of Alaska Fairbanks decal.

Residence Halls
ANDREW NERLAND HALL (1953) houses 102 students in double and single rooms on four floors. Nerland Hall is named for a pioneer Fairbanks merchant.
long-time member of the Board of Regents and president of the Board of Regents from 1935 until his death in 1956.

JOHN E. McINTOSH HALL (1956) houses 102 male students in double and single rooms on four floors. McIntosh Hall is named for a former president of the Board of Regents.

WICKERSHAM HALL (1958) houses 95 female students in single rooms and suites which consist of two sleeping rooms, a study and a bathroom. This three-story hall is name for Judge and Mrs. James Wickersham. Judge Wickersham introduced into Congress the bill that created the University of Alaska, and Mrs. Wickersham served on the Board of Regents.

MORTON STEVENS HALL (1958) houses 69 men and 33 women in double and single rooms on four floors. The hall is named for Morton Stevens who was president of the Board of Regents from 1921-1932.

AUSTIN E. LATHROP HALL (1962) houses 66 men and 74 women, all in double rooms. Lathrop Hall is named for a Fairbanks businessman who served as a member and later as vice president of the Board of Regents from 1932 until his death in 1950.

IVAR SKARLAND HALL (1964) houses 138 male and female students (over the age of 21) in double and single rooms on three floors. This hall is equipped to house handicapped students. Skarland Hall is named for a long-time professor of anthropology at the university.

TERRIS MOORE HALL (1964) houses 136 female and 182 male students in double and single rooms on eight floors. Moore Hall is named for the second president of the University of Alaska.

E. L. BARTLETT HALL (1970) houses 322 male and female students in double and single rooms on eight floors. Bartlett Hall is named for E. L. "Bob" Bartlett who served 24 continuous years as one of Alaska’s U.S. senators.

STUDENT APARTMENT COMPLEX (1984) is comprised of 60 two bedroom and one four-bedroom apartments, accommodating 244 single students. A board plan is not required for apartment residents since a full kitchen is provided in each apartment. This complex also has six apartments which were designed to accommodate handicapped students.

Residence Hall Application Procedures

Applications for single student housing are mailed to all students upon notification of acceptance from the Office of the Director 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 housing-board contract and mail it immediately to the Housing Office, University of Alaska Fairbanks, Fairbanks, Alaska 99775-0880 with a $50 reservation and damage deposit. Confirmation for residence hall housing is assured when the student receives written notification from the Housing Office. Specific room assignments will be made after Aug. 15 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 for continuing students are announced prior to Dec. 1 for the subsequent spring semester and prior to April 1 for the subsequent fall 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: $520 per person in double rooms, and $640 for single rooms. 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 $50 reservation/damage deposit, must be returned to the Housing Office, University of Alaska Fairbanks, Fairbanks, Alaska 99775-0880. If you decide not to attend UAF and a written statement is received by the Housing Office 45 days prior to official opening, 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 $50 deposit will be refunded at the end of the school year. If moving off-campus after fall semester, notice of intent to vacate must be given to the Housing Office on or before Dec. 1 in order to be eligible for a full refund.

The deposit may be used to pay outstanding hall dues and/or charges for repair or replacement of furniture or fixtures for which the student is responsible. Charges for loss or damage of equipment or for defacement of any area in community use, such as lounges, recreation rooms, corridors or bathrooms, may be assessed equally against the residents of the area and deducted from the amount on deposit. 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 semester. An application for housing becomes a binding contract at the beginning of the fall semester. Contracts for fall semester are automatically renewed for spring semester on Dec. 1 unless the Housing Office receives a notice of intent to vacate.

Contracts are voided if the student doesn’t attend UAF full-time or is released from the contract because of marriage, health reasons or other emergencies deemed appropriate by the Dean of Students.

Meal Ticket
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 or a two-meals-per-day board plan.

Meal tickets are effective from the evening of the first day of upper class registration through the last day of final exams. Limited food service is available on a cash basis during vacation period, except on official university holidays.

Students who do not live in University resident halls may be authorized by the Dean of Student Affairs 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. Rentals range from $250 (efficiency to $590 (3 bedroom) per month including utilities. Furnished and unfurnished apartments are available.

Laundry facilities are provided but not always on an individual basis for each unit. Storage facilities are extremely limited, and students are not encouraged to bring their own furniture, unless they are accepted for housing at Yak Estates or Garden Apartments. Personal items such as dishes, utensils and bedding are not provided. Parking areas are provided for each housing complex. Pets are not allowed, except at Yak Estates.

The family housing units with their completion dates in parentheses after their names are listed below.

MODULAR UNITS (1970) contain 30 efficiency units for married students without children.

HARWOOD HALL (1964) houses 36 married student couples without children in one bedroom and efficiency units. Harwood Hall is named for Boyd Harwood, a former member of the Board of Regents.

STUART HALL (1965) contains 12 units for married students without children. Stuart Hall is named for Walter T. Stuart who was a member of the Board of Regents.

WALSH HALL (1958) houses 13 married student couples without children in one-bedroom units. Walsh Hall is named for the late Michael Walsh, of Nome, who was a member of the Board of Regents.

HESS VILLAGE (1972) contains 72 units consisting of: 16 one-bedroom; 48 two-bedroom; and eight three-bedroom units. Children are allowed and units are assigned according to family size. Hess Village is named for Luther Hess, who was a member of the Territorial Legislature, and Harriet Hess, who was a member of the Board of Regents.

GARDEN APARTMENTS (1964) houses six student families with children. Apartments are unfurnished to provide an alternative to furnished facilities.

YAK ESTATES (1971) townhouse apartment complex located four miles from campus on Chena Ridge. There are 48 two-bedroom and 48 three-bedroom unfurnished units.

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 $25 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 write:

HOUSING OFFICE
732 YUKON DRIVE, BARTLETT HALL
UNIVERSITY OF ALASKA FAIRBANKS,
FAIRBANKS, ALASKA 99775-0880
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.

It is the university's policy to make all programs and activities readily accessible through relocation of classes and activities whenever possible, with reasonable structural modifications, or by other means for qualified disabled students. Contact the Coordinator for Disabled Students, Center for Health and Counseling, University of Alaska Fairbanks, Fairbanks, Alaska 99775-0440, (907) 474-7043 or 504 Coordinator, 101 Eielson Building, University of Alaska Fairbanks, Fairbanks, Alaska 99775-6320, (907) 474-7919.

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.

Additional Academic Opportunities

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. 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
SIGNERS' HALL
UNIVERSITY OF ALASKA FAIRBANKS,
FAIRBANKS, ALASKA 99775-1540
PHONE: (907) 474-7021.

Other Campus Services

Alaska Teacher Placement

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

Educators from Alaska, other states, and around the world register with ATP. When listings are received at ATP, they are referred to registrants who meet the school districts endorsement requirements. During the summer when school district personnel are on campus interviewing educators, registrants often come to Fairbanks to be available for interviews.

Permanent Placement files for UAF education majors are maintained by ATP.
Contact Alaska Teacher Placement by writing, dropping by the office or calling. ATP is located in the Moore-Bartlett Complex, 732 Yukon Drive, Fairbanks, Alaska 99775-1550, (907) 474-6644.

Alumni Services

The UAF Office of Alumni Relations is located on the ground floor of Constitution Hall. The University of Alaska Fairbanks Alumni Association was created in 1986 when the statewide association voted to dissolve in favor of campus-specific associations. In Constitution Hall, the UAF office is located in space originally used by the alumni. Former students and graduates belong to the association, which is also interested in increased contact with UAF's present day students.

Athletics and Recreation

University trails are available for cross-country running and skiing, including a lighted ski trail.

In the intramural sports program, men and women students from the different living groups (faculty and staff, too) participate in more than 40 different team and individual competitions each year.

UAF sponsors intercollegiate athletic teams (the "Nanooks") 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

The William Ransom Wood Center is UAF's answer to cabin fever. The bold, massive architecture complements modern Alaska and, at the same time, recalls its frontier ruggedness.

Facilities and services of 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, also lend themselves to 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 office offers students and alumni a variety of services. Ideally, upon entry to the university each student should continue to develop lifestyle and career goals. In cooperation with faculty and advisors, the staff in Career Planning and Placement works with any interested student to ensure a well-planned academic program, developed to maximize successful attainment of the student's life and career goals. 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 office 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 making use of the center.

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 you 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 not available on campus, but are available at any of the medical care facilities in Fairbanks.

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.

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 and acts as a liaison between the foreign student and the U.S. Immigration and Naturalization Service.

Special Summer Activities
Special summer institutes are often funded by federal and state agencies and private foundations. Summer institutes in the teaching of languages, counseling, guidance, English, science and mathematics have been held.
Special workshops and institutes open to high school age students are also presented. These include the music camp and a youth leadership conference.
An extensive recreation program is planned for summer sessions students by the Student Activities Office. Typical recreational activities include trips to Eskimo and Indian villages, goldpanning exhibitions, hiking, dances, movies, and a riverboat excursion.

The Women’s Center
The Women’s Center, located adjacent to the Center for Health and Counseling, serves as a gathering place for groups and a resting place for individuals. Although the primary emphasis of the center is on responding to the needs and priorities of female students, resources and activities are also open to female faculty, staff and family members. A variety of forums, including workshops, noon hour programs, lending library, counseling and referral services, are offered. The Women’s Center is a focal point for identifying and addressing issues of educational, economic, political, social and emotional concern to women. The center is open daily and students are encouraged to drop in for information, assistance and respite.
ACADEMIC REGULATIONS

Student Responsibilities

It is each graduate student's responsibility to be informed of and to comply with all regulations and requirements for admission to graduate study. The completion of all graduate degree requirements is also the responsibility of the student. 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 3.00 in courses identified on the student's Advancement to Candidacy, or, if not yet advanced, a cumulative grade-point average GPA of 3.00 on all approved courses taken since admission to graduate study.

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. Students will attribute the source of information not original with themselves (direct quotes or paraphrases) 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, 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 on a routine basis 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. Address, 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.

Attendance
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.

Drop/Add
Students are expected to compete the courses in which they enroll in. Students may, however, withdraw from a course until the ninth week of the semester by following the Drop/Add procedure. After that time, student initiated withdrawals from individual courses will not be accepted. Students wishing to add courses to their schedules may do so until the end of late registration by following the Drop/Add procedure. Information about the procedure and forms may be obtained from the Office of Admissions and Records.

Withdrawal
After the end of the ninth week of the semester, withdrawals from individual courses will not be accepted.

Total withdrawal from UAF after the ninth week must be initiated by the dean of the college/school in which the student is majoring. The dean initiating the withdrawal will immediately notify the course instructors of the withdrawal.

Withdrawals after the second week, regardless of type, will appear on the student's permanent record as the letter "W" but will have no effect on the student's GPA nor any reference to the student's standing in the class.

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 student or faculty regarding the dean's decision is the Vice Chancellor for Academic Affairs, the Chancellor and then the Fairbanks 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. 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.

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 and 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.

Grade Point Average (GPA) Computation/Grading System

For the computation of a GPA, the number of UAF credits attempted for each semester is divided into the number of grade points earned, the credits attempted each semester are multiplied by a grade point factor based on the grades awarded. Credits attempted where grades of AU (audit), CR (credit), DF (deferred), ENR (enrolled), I (Incomplete), F (pass), S (satisfactory) or W (withdrawn) have been awarded are not included in the GPA computation. In addition, noncredit courses, transfer credits and credit by examination do not affect the GPA calculations. Undergraduate work is not included in the GPA for graduate students. When one completes a bachelor's degree, the GPA in future work is calculated only on the credits and grades earned since the bachelor's degree was awarded.

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

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. Grades appearing on academic records are as follows with grade point factors in parenthesis:

A (Including +/-) 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 (four grade points per credit).

B (Including +/-) Indicates outstanding ability above the average level of performance (three grade points per credit).

C (Including +/-) Indicates a satisfactory or average level of performance (two grade points per credit).

D (Including +/-) The lowest passing grade, indicates work of below average quality and performance (one grade point per credit).

F (Including +/-) Indicates failure (no grade points). All "F" grades, including those earned in pass/fail courses, are included in the GPA calculations.

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.

S SATISFACTORY - Used only to indicate satisfactory final completion of graduate thesis.

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 will be 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
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".

Minimal Acceptable Grades

For those courses specified on the student's Advancement to Candidacy, a grade of "C" will be accepted in graduate-level courses (600-level courses), provided the student maintains a "B" average for all graduate courses. A grade of "A" or "B" ("P" is unacceptable) must be earned in upper division course work (300-400 level) specified in the Advancement to Candidacy. 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 VA any veteran receiving VA educational 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 the suspension of VA benefits.

UAF does not have a Veterans' Affairs Office on campus. However, a counselor visits the campus regularly during the year. Veterans interested in further information about educational benefits should contact the Office of Admissions and Records.

Disqualification from Graduate Study

Upon the recommendation of 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 which will then forward it to the Office of Admissions and Records.

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 doctor's degree, the time limit is 10 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 graduate advisory committee, department head, and dean.

Graduate Advisory committee

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 appointed by the appropriate dean, usually upon recommendation of the department head; Ph.D. committee members are also approved by the Dean of the Graduate School.

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 five faculty members, one of whom must be from outside the department. A minimum of three committee members for the
master's degrees and the educational specialist degree and five for the doctoral degree shall be faculty whose primary employment is with the University of Alaska. This does not exclude cooperative unit members associated with the different colleges and schools. Adjunct or affiliate professors may be used to supplement these basic committees, and persons without University of Alaska appointments may serve as guest committee members. Any exceptions to the composition of graduate advisory committees must be explicitly approved in writing by the Office of the Graduate School.

Committee Responsibility

The major responsibilities of the Graduate Advisory Committee are as follows: to formulate, in consultation with the student, a Graduate Study Plan; to develop a tentative timetable for completion of all requirements for the degree program; to monitor the student's work, both in course work and research, and to provide advice and feedback to the student on that progress as well as file an annual progress report with the Office of the Graduate School; to approve, where appropriate, a research topic; to supervise the preparation of the thesis 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 examinations and other exams required by the department. The student's advisor (major professor, advisory committee chair) acts as head of the graduate advisory committee.

Majors

No one may have graduate standing without being formally admitted to a specific major or accepted in an approved interdisciplinary program. Declaration of major is made at the time the graduate application for admission is accepted. Graduate students wishing to change the area of emphasis of their degree program must secure approval by completing a "Graduate Change of Major and/or Degree Program" form. If a graduate student wishes to change to a different program in another department, division, school or college, a new graduate application for admission must be submitted so that the applicant's credentials may be fully reviewed by the faculty responsible for that degree program.

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

Graduate Study Plan

The Graduate Study Plan (GSP) outlines the curriculum of study and a timetable to be followed by the graduate student in meeting graduate degree requirements. It serves as a road map for graduate study and should be completed in draft form early in the program. The GSP is prepared by the advisory committee in consultation with the student, and it serves as a working agreement between the student and the faculty of mutual expectations. 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 first full-time equivalent of two semesters at the University. Copies of the working document, as well as subsequent revisions, shall be made available to the student and to each member of the advisory committee, and a copy should be filed in the office of the appropriate department and with the Office of the Graduate School.

The GSP not only contains the specific degree requirements, but indicates the mechanism for fulfilling these requirements (e.g., via course work, examinations, readings, internships or other supervised experience, etc.) and a projected timetable for completing the various requirements. Depending upon the length of the student's degree program, in some cases the first draft of the GSP may also be the final one; but
for the longer programs, the final GSP will evolve over several semesters, with additions and revisions being made as the student progresses. The final GSP is the basis for preparation of the application for Advancement to Candidacy.

**Advancement to Candidacy**

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.

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 for candidacy.

**Master's Degree**

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 (e.g., study after admission to a specific degree program), 2) received approval of a provisional thesis title, if a thesis is required, and 3) received approval of the finalized Graduate Study Plan.

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 must be submitted the summer session prior to awarding of the degree.

**Doctor of Philosophy**

A Ph.D. student may apply for candidacy for the Doctor of Philosophy degree after having 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) completed the language and/or research tool requirement, 5) obtained approval of the advisory committee for the title and synopsis of the thesis, and 6) passed a written comprehensive examination. A Ph.D. student must apply for advancement to candidacy no later than one year prior to the anticipated date of the awarding of the degree.

**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

Each student must pass a comprehensive examination. The comprehensive examination will examine students' mastery of their major and related fields. The primary purpose of the comprehensive examination, and the thrust of the questions, should be to determine whether the student has an 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.

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 take a written comprehensive examination within two years of entering the program, but no later than two academic years before the expected completion of the degree (whichever is earliest) and it is a prerequisite for advancement to candidacy. At the discretion of the doctoral student's advisory committee, an oral examination may supplement a written comprehensive examination.

The Ph.D. comprehensive examination is a department-based examination. Some programs hold regularly scheduled Ph.D. comprehensive examinations and have established examination procedures. Programs that do not hold regularly scheduled Ph.D. comprehensive examinations must augment the graduate student's regular advisory committee with two department faculty who are not members of the student's advisory committee, and who shall be appointed by the department head for the examination. All members of the augmented committee will be voting members. Examination questions will be sought from all faculty in the program with expertise in the appropriate areas. The augmented committee will select questions from those submitted for the examination.

Defense of Thesis Examination

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 the 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 unless it can be successfully defended by the candidate.

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

Examination Committee

In most instances, 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 Office of the Graduate School.

Should it be necessary for a committee member to be absent from an examination, 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 of Examination.

**Outside Examiner**

The presence of an "outside examiner," representing the Office of the Graduate School, is required at all oral examinations (except the Placement Examination). The outside examiner is appointed by the Office 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.

It is the student's responsibility to request that an outside examiner be appointed to serve at all oral examinations. The student should notify the Office of the Graduate School at least two weeks prior to an oral comprehensive examination, project defense or thesis defense. The Office of the Graduate School will advise the student of the faculty member appointed to serve at the student's examination, and in the case of a defense of thesis or project, the student will supply the examiner with a copy of the thesis (project) at least seven days prior to the examination.

The examiner will complete the Report of Outside Examiner form and submit it to the Office of the Graduate School stating any adverse concerns resulting from attendance at the examination or review of the thesis (project).

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**

After the completion of each examination, a form which reports the results of the examination must be completed by the student's committee (if it was an oral exam, signature of the outside examiner is required) and submitted to the Office of the Graduate School.

**Language/Research Tool Requirement**

Proficiency in a language or a research tool is required of students in some master's degree programs and in all Ph.D. degree programs. For the master's degree, the requirement may be specified by the program offering the degree or by the student's advisory committee, if its requirements exceed those of the program.

The specific language/research tool is determined by the student's advisory committee, guided by policies of the administrative unit in which the degree is offered and by discussions with the student. Competency in a foreign language is required, however computer languages, statistics, mathematics, etc., or a study in such areas as history or philosophy of science, business administration, law, economics, etc., may be substituted by the committee upon the approval of the Dean of the Graduate School. In all instances, however, topics selected are intended to be supplementary to and must be supportive of the student's degree program. This language/research tool requirement should be viewed as a breadth requirement. Remedial courses and basic or introductory courses or skills in subjects in which the student would normally be expected to have proficiency as part of the degree program may not be used in meeting this requirement. Consult the Graduate Office if questions arise.

Determination of the student's proficiency in meeting the requirement is the responsibility of the advisory committee. When foreign languages are required, committees are encouraged to seek evaluation assistance from the Department of Linguistics and Foreign Languages. If the Educational Testing Service Foreign Language Exam is used, the expense is borne by the student. Minimum scores
required on this examination are 60% for doctoral candidates and 40% for master’s candidates, although some programs may require higher scores.

The University assumes no responsibility to students in preparing for language/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. Occasionally, the Department of Linguistics and Foreign Languages may offer a special foreign language course designed to assist students in their preparation. 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 courses listed on the advancement to candidacy form.

Completion of the language/research tool requirement should be reported to the Office of the Graduate School on the form, "Report on Completion of Language/Research Tool Requirement."

Submission of Theses

Guidelines for the preparation of a master’s or Ph.D. thesis are available in each department and the Office of the Graduate School.

General Policy

A thesis is required in some master’s degree programs, as indicated by specific degree program requirements. A thesis is required of every candidate for the Ph.D. degree and is expected to represent the equivalent of at least one academic year’s work at the University of Alaska. The doctoral thesis must demonstrate the student’s ability to perform independent research in the student’s major field and must be a substantial contribution to knowledge, the substance of which will be publishable in a professional journal.

Theses prepared in partial fulfillment of graduate degree requirements must be individually authored; co-authorship is not acceptable.

Since theses receive public distribution, writers are cautioned that they will be held fully responsible for their use of any copyrighted materials in their manuscripts. Accordingly, all candidates for degrees are hereby reminded that they must obtain written permission for the use of any copyrighted material.

All records of work done and all specimens collected in connection with the preparation of these manuscripts are the property of the University or the agency financing the work. That material which is the property of the University can be released with the permission of the dean after it has been reproduced by the University; all collected specimens must be deposited with the University of Alaska Museum.

The University has no overall policy to restrict publication; students should be aware, however, that individual programs or sponsoring organizations may have such a policy. Since publication may be defined as "public distribution of copies or reproductions," students desiring to withhold their theses from public domain should secure copyrights. Before applying for a copyright, however, students should ascertain any restriction imposed by funding sources.

Deadlines

Students must check with their program or department head to ascertain deadlines for preliminary thesis review. Some directors and heads of departments may require that they be allowed to review a final draft of the thesis prior to the Defense of Thesis Examination.

Four weeks before the end of the semester, the student must have 1) passed the Defense of Thesis Examination, 2) filed the signed form certifying the passage of this examination with the Office of the Graduate School, and 3) submitted the thesis in final form to the Office of the Graduate School. The exact dates for these deadlines are found in the Graduate Manual.
Approval Process

Once the thesis has been successfully defended and the final copy prepared, it must be circulated by the student for approval at all appropriate levels. All members of the graduate advisory committee and the committee chair should be asked to sign first. If a member of the committee is out of town and will not return in time to meet the submission deadlines, the chair must prepare a cover letter explaining the situation and verifying that the committee member has reviewed final drafts and/or was present at the defense examination. The thesis may then be forwarded for further approval, and the committee member may review and sign upon returning.

Submission and binding Fee

Two copies on thesis paper must be submitted to the Office of the Graduate School. One becomes part of the Rasmuson Library Archives and is not available for use outside the library; the other is cataloged for general circulation. An additional copy may be required for the student's department library.

The candidate must pay the library binding fee at the Business Office, and the receipt for the binding fee should be submitted with the thesis to the Office of the Graduate School. If additional copies are to be bound for the student, departments, etc., these additional copies and their accompanying receipts (or University journal voucher) for binding must also be delivered to the Office of the Graduate School at the time of submission. If pockets are needed for maps or charts there is an additional fee which needs to be paid at the Business Office and included on the receipt for binding.

Copyright

Before applying for a copyright for a thesis, the student should check with the committee chair to ascertain whether any funding source used for the research precludes the right to file for and hold an individual copyright. Students who wish to retain the exclusive right to reproduce, display, adapt, publish, or perform all or any part of their work, and provided they are not otherwise precluded from doing so by prior contractual agreements, may apply for copyright.

Students may apply directly to the U.S. Copyright Office, or they may authorize University Microfilms International to apply for a copyright for them. In either case, if copyright is intended, the following notice must appear on the title page of the thesis:

(C) Copyright (year) (name of author)

For further information and forms regarding copyright, please contact the Office of the Graduate School.

Microfilming

The University of Alaska Fairbanks participates in the Doctoral Dissertation Program of University Microfilms International (UMI), which requires that a copy of all Ph.D. theses be sent by the University of Alaska Fairbanks to UMI in Ann Arbor, Michigan, for microfilming. The Ph.D. candidate is required to pay the fee to cover the cost of microfilming the complete thesis, the final dissemination of the material, and the cost of producing and forwarding one positive microfilm copy of the thesis to the Library of Congress. The fee also includes publication of the abstract of the thesis in UMI's monthly listing of Ph.D. theses.

The fee for these services should be paid at the UAF Business Office by check (made payable to UAF) or by journal voucher. The receipt for microfilming must be submitted with the thesis to the Office of the Graduate School.

Master's degree candidates have the option of whether or not to have their theses sent to UMI for microfilming and their abstracts included in Master's
Abstracts. If this service is desired, payment must be made at the same time and in
the manner described above.

Publication by microfilm does not preclude subsequent publication of the
thesis in whole or in part by the author.

At the student's request and on the recommendation of the advisory
committee, the Office of the Graduate School will delay publication by microfilm for
one year in order to protect patent or other rights. A request for such a delay
should be made in a letter or memorandum to the Dean of the Graduate School
and should indicate the length of time the thesis is to be restricted and the person
who may authorize its release.

Abstract for Publication

At the time the thesis is submitted to the Office of the Graduate School,
Ph.D. candidates must also submit two final copies of an abstract of their work for
publication in Dissertation Abstracts International. The abstract must be approved
by the student's advisory committee. The fee for microfilming will include cost of
publishing the abstract in this volume.

The abstract submitted for publication in Dissertation Abstracts
International may be the same as the Abstract used in the preliminary pages of the
thesis, however an additional heading is required for the two copies submitted to
University Microfilms International.

For more details on the preparation of theses see the Graduate Manual.

Registration Regulations

A graduate student must be registered for a minimum of three graduate
credits each semester while actively working toward a degree. A student failing to
either register or 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 study.

Students must be registered in the semester in which they graduate.
However, students who have been continuously registered and have completed all
degree requirements, including final thesis approval and the removal of all
incomplete and deferred grades, within the first four weeks of the semester in
which they intend to receive the degree, need not register for that semester.
However, an application for graduation must be submitted to the Office of
Admissions and Records before the deadline for that semester (See the Graduate
Manual).

Extended Registration

A student whose only remaining requirement is the completion of the final
examination(s), the removal of a deferred grade from an earlier enrollment, or the
completion of a thesis may extend registration rather than register for course
credits during that semester. A student on extended registration is considered
enrolled for the current semester. There are two categories of extended registration:
1) Off Campus - for graduate students who are actively working toward a degree
but are not in residence and do not use university facilities ($150 fee per semester);
and 2) On Campus - for students needing to use facilities and faculty advisement
($225 fee per semester). Students on extended registration in residence who are
considered full-time by their department and the Graduate School Office pay full-
time student activity fees and medical insurance fees, and may receive certification
of full-time status for deferment of student loans.

Change of Major

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 only be used when the areas of emphasis or the degrees offered are
within the same program. A student who wishes to change to a different program in another department, school, or college must submit a new application for admission so that the credentials may be fully reviewed by the faculty responsible for that degree program.

Requests for Exceptions

A student may request an exception to a degree requirement, policy, procedure, deadline, etc. Such requests should be prepared by the student, in memorandum format, with adequate explanation of the extenuating or unusual circumstances warranting the request. The request must be approved by the student's advisory committee, department head, and dean and must be submitted to the Office of the Graduate School. The Office of the Graduate School will notify the student and the advisory committee of the action taken on each request.

Graduation

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

Application for Graduation
Degree candidates must formally apply for graduation. The Application for Graduation must be filed with the Office of Admissions and Records during the semester the student plans to graduate, and not later than the application filing dates which appear in the UAF academic calendar.

Applications for graduation filed after the deadline will be processed for graduation the following 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.
DEPARTMENTS AND CURRICULA

College of Liberal Arts

Anne D. Shinkwin, 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.


Anthropology

Degrees: M.A., Ph.D.
Minimum Requirements for Degree: M.A.--30 credits

The anthropology program offers a balanced and flexible program of academic courses and research opportunities in cultural anthropology, archeology, 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 the 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.

Faculty

Head, Department of Anthropology and Professor: Richard H. Jordan
Professors: Jean S. Aigner, Lydia T. Black, G. Richard Scott, Anne D. Shinkwin
Associate Professor: Linda J. Ellana, W. Roger Powers
Assistant Professor: Charlotte Basham, Ann Frentzen, Patricia Kwachka, Phyllis Morrow

Anthropology — M.A. Degree

The graduate program emphasizes a basic and general preparation in the field of anthropology. Such preparation enables graduates of the 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.

The program offers two options -- a thesis track and a non-thesis track. The choice of option is guided by the student's interests and goals, the graduate advisory committee and the requirements of the university.
Degree Requirements:
1. A student must complete the general university requirements for the master's degree.
2. A student must pass a written examination in anthropology. Each student is expected to take the examination during the second year in the program.
3. A graduate advisory committee is to be established beginning in the first semester of admission in 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.
5a. Required courses for all graduate students enrolled in the program:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anth. 601--Proseminar in Social/Cultural Anth.</td>
<td>3</td>
</tr>
<tr>
<td>Anth. 611--Proseminar in Archeology</td>
<td>3</td>
</tr>
<tr>
<td>Anth. 621--Proseminar in Physical Anth.</td>
<td>3</td>
</tr>
</tbody>
</table>

5b. Anth. 600--Anthropology Colloquium 0

All graduate students in residence are required to attend and participate in the Departmental colloquium.

6a. Thesis Track: Core requirements outlined above to be included in a program of at least 30 hours of study: 24 hours must be regular course work (not research or thesis) and 21 of these must be at the 600 level, plus 6 hours of thesis (Anth. 699).
6b. Non-Thesis Track with a Research Paper: at least 36 hours, including at least 30 hours of regular course work (including the core requirements), with 24 of these 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.
7. The student must have at least one course in statistics (which may be part of the undergraduate record).
8. All students must have fieldwork and laboratory experience appropriate to the discipline or subdiscipline.

Anthropology -- Ph.D. Degree

A Ph.D. program in Anthropology is expected Fall 1988. Currently students may develop an interdisciplinary Ph.D. with an emphasis in several areas of anthropology: Alaskan archaeology; Quaternary studies; contemporary Alaskan Native studies. For further information contact the Head of the Department of Anthropology and refer to information elsewhere in this catalog which deals with interdisciplinary degrees.

Computer Science

Degrees: M.S.
Minimum Requirements for degree: M.S.--30 credits

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.

The M.S. degree follows the recommendations of the Association for Computing Machinery (ACM) and the Institute for Electrical and Electronic Engineers (IEEE).

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 program 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 Bachelor level computer science program may be admitted to the M.S. program. In such cases, undergraduate courses may be required to remedy deficiencies.

Faculty

Professors: Ronald W. Gatterdam, Barbara M. Lando
Associate Professors: Peter Knoke, Mitchell Roth
Assistant Professors: Dusan Jevtic, Ming Jiang

Computer Science -- M.S. Degree

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. Complete the following program (major) requirements:

   Courses ................................................... 30 Credits
   C.S. 411--Analysis of Algorithms or  
   C.S. 611--Complexity of Algorithms  ......... 3
   C.S. 631--Programming Language Implementation ... 3
   C.S. 448--System Architecture or
   C.S. 641--Advanced System Architecture ......... 3
   C.S. 451--Automata and Formal Languages or
   C.S. 651--The Theory of Computation ............ 3
   Advisor approved electives .. ........ ............ 12
   C.S. 690-691--Graduate Seminar and Project .... 6

No more than 6 credits may be taken at the 400 level.

3. Upon completion of core course work, the candidate must pass an examination based on the core material.

English

Degrees: M.A., M.A.T., M.F.A.
Minimum Requirements for Degrees: M.A.--30 credits; M.F.A.--45 credits; M.A.T.--36 credits

The Department of English offers three graduate degrees. The Master of Arts degree focuses on scholarly research in British and American literature. The Master of Arts in Teaching degree emphasizes the training of teachers of literature and writing. The Master of Fine Arts degree centers on the writing of original, imaginative work in poetry, fiction, drama and/or non-fiction. All the degree programs require students to take graduate literature courses and to engage in research and writing. Candidates for the Master of Arts in Teaching degree do not write theses; Master of Arts candidates write theses in literary scholarship; Master of Fine Arts candidates write original creative works as theses. After being admitted to one of the degree programs, a graduate student may apply for one of the department's teaching assistantships.

Faculty

Acting Department Head and Professor: John W. Morgan
Professors: John W. Bernet, Alice L. Harris, David A. Stark
Associate Professors: Roy K. Bird, Joseph A. Dupras, Marie Lium, Michael J. Schuldiner, Russell E. Stratton, Russell D. Tabbert, Cynthia L. Walker
Assistant Professors: Eric Heyne, Janis Lull, John Murray (visiting), Leroy Perkins, James Ruppert, Peggy Shumaker, Frank Soos.
Instructor: Doris Ann Bartlett
English — M.A. Degree

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 approved credits on the 600 level, distributed as follows:

Courses ....................................................... Credits
Engl. 601—Bibliography, Meth., and Criticism ........................................... 3
Six courses in English chosen in consultation with and approved by the graduate committee ........... 18
(Extra course required if student does not take Engl. 685.)
Engl. 685—Teaching College Composition
(if a graduate assistant or planning to teach) ............................................. 3
Engl. 699—Thesis ...................................................... 6

3. Students may advance to candidacy when their advisory committee deems that they have made satisfactory progress toward completion of their degree.
4. 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.
5. Pass an oral defense of the thesis.

English — M.F.A. Degree (Creative Writing)

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 45 approved credits at the 600 level, except as noted under 2.f, distributed as follows:

Courses ....................................................... Credits
a. Engl. 671—Writer's Workshop .......................................................... 9
b. Engl. 601—Bibliography, Meth., and Criticism ...................................... 3
c. Engl. 685—Teaching College Composition (if a graduate assistant or planning to teach)[Extra 600-level course required if student does not take English 685] ............................................. 3
d. Two form courses ....................................................... 6
   Engl. 681—Forms of Poetry
   Engl. 682—Forms of Fiction
   Engl. 683—Forms of Drama
   Engl. 684—Forms of Non-Fiction Prose
e. Literature seminars
   (minimum of four; to be determined by student's advisory committee) ........... 12
f. Electives (to be approved by student's advisory committee; courses may be at 400 level if in another discipline) ............................................. 6
g. Engl. 699—Thesis ...................................................... 6

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 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.
5. Pass an oral defense of the thesis.

History

Degrees: M.A.T.
Minimum Requirements for Degrees: M.A.T.—36 credits
The history department seeks to make the student aware of the cultural heritage of humankind, the great problems that have been faced throughout history and how we have sought to solve them.

The department also trains the student in applying the historical method which offers analysis based on the dimension of time. Discussion, focused on concrete, specific events, persons and judgments explains why things are as they are. Students will learn effective historical research and writing.

Through the study of history, students may prepare for careers in public service agencies; as members of management teams, particularly in the area of policy analysis; for careers in teaching, or for advanced work in history and other social sciences.

Faculty
Head, Department of History and Professor: Claus-M. Naske
Professor: John Whitehead
Associate Professor: Peter Cornwall, Carol Gold, Richard Pierce
Assistant Professor: Terrence Cole

History -- M.A.T. Degree

Refer to general requirements for the M.A.T. degree. Persons interested in this degree program should contact the head of the department.

Mathematics

Degrees: M.A.T., M.S., Ph.D.
Minimum Requirements for Degrees: M.A.T.--36 credits; M.S.--30-35 credits.

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 Ph.D. program emphasizes research and advanced study in selected areas. 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.

Faculty
Head, Department of Mathematical Sciences and Associate Professor: Clifton Lando
Professors: Jack Distad, Ronald W. Gatterdam, Gary Gislason, Barbara Lando, Robert Piacenza, Philip Van Veldhuizen, (Emeritus)
Associate Professors: Patricia Andreasen, Michael Freedmann, John P. Lambert, Mitchell Roth, Walter Tape, Dana Thomas.
Assistant Professors: John Gimbel, Dusan Jevtic, Ming Jiang, Pham Xuan Quang, Susan Royer, Larry Santoni, Steven Thompson

Mathematics -- M.A.T. Degree

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete 36 credits in courses approved by the student's graduate committee. At least 24 credits, including thesis and/or research, must be at the 600 level.

Mathematics -- M.S. Degree

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a curriculum of 30-35 credits of mathematics courses consisting of a core, electives and project/thesis. At least 24 credits, including thesis and/or research must be at the 600 level.
3. Upon completion of core course work, the candidate must pass an examination based on the core material.
Mathematics – Ph.D. Degree

Degree Requirements:
1. Complete the general university requirements and Ph.D. requirements.
2. Complete the required program as arranged by conference with the candidate's graduate advisory committee.

Music

Degrees: M.A., M.A.T.
Minimum Requirements for Degrees: M.A.--30 credits; M.A.T.--36 credits.

The curriculum of the graduate degrees in music are designed to satisfy cultural and professional objectives. The master of arts degree offers advanced training in five areas of specialization: performance, music education, music theory/composition, music history and Alaskan ethnomusicology. The master of arts in teaching is designed primarily as a functional program for the public school music teacher. Areas of specialization are instrumental, vocal, music supervision, and elementary specialist. The program is determined by the student and the graduate committee.

The music department of UAF is a full member of the National Association of Schools of Music, the national accrediting organization.

Faculty
Head, Department of Music and Associate Professor: John Duff
Professors: Theodore DeCorso, James Johnson, Thomas Johnston, Suzanne Summerville, Gordon B. Wright
Associate Professors: Kathleen Butler-Hopkins, Bruno DiCecco, David Stech.
Assistant Professors: John Harbaugh, John Hopkins
Instructor: Wendy Stofer

Music – M.A. Degree

Students may select from the following areas of specialization: Performance, music education, music theory/composition, music history, and Alaskan ethnomusicology.

Each graduate student's program is individually tailored and designed to meet the student's professional interests and aspirations, consistent with the following principles and procedures:

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.
   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.

   Composition majors must submit examples of previous work.

   Performance majors must demonstrate acquaintance with solo literature of the various historical periods through audition or submission of performance tapes.
3. Applicants must also submit a proposal outlining their aspirations and interests that they wish to pursue for their degree program.
4. Upon completion of all of the above, the music department will assess its own potential to serve the needs of the student.
5. Applicants will be accepted from any accredited institution; however, before admission to a degree program, all students (including UAF graduates) must take the preliminary examination.

6. 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.

The committee will monitor the student's progress in the program, and recommend modifications and improvements, should changes be necessary.

7. To establish a base of core curriculum requirements common to all graduate music programs, the following courses must be taken by all graduate students:
   a. Music 601--Introduction to Graduate Study (2 Credits).
   b. Applied Music: A minimum of four credits of private lessons study at either the senior or graduate level. Committee may suggest further study if remedial work is deemed necessary.
   c. A minimum of six graduate credits (excluding Individual Study) to be selected from the following categories: music theory, music history, ethnomusicology, music literature, and Mus. 671--Psychology of Music (3 credits).

8. 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.

9. The minimum number of credits which must be earned for a master's degree is 30 semester hours, of which 21 will be in a primary area of specialization and the balance in a secondary area.

10. Near the completion of approximately one-half of the program, students will meet with their committees in an advisory examination. This examination will be conducted orally and 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 the student plans to spend an appreciable amount of their scholarly career. Advisory examinations may be repeated until such time as the student has satisfactorily defined his area of specialization.

11. Each candidate for a master's degree in music who completes the necessary course work must take a substantial oral examination in the area of their major project, thesis, or recital.

12. Students majoring in vocal performance, music history, or ethnomusicology will be required to demonstrate proficiency of 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.

13. 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 handbook.

14. All 600-level courses are restricted to graduate students only; graduate students may also elect some of their courses from the 400-level. The 400-level courses are open to both upper-division undergraduate students and graduate students as well. However, at least 24 credits of the program, including thesis or research, must be at the graduate level.

15. Further information about typical two-year programs may be obtained by contacting the Music Department.

Music -- M.A.T. Degree

See the department for further details.
Victoria, a muskox calf, rests in the shade of a birch tree at the Large Animal Research Station which is associated with the Institute of Arctic Biology. UAF photo/Sam Winch
College of Natural Sciences
Kolf Jayaweera, Dean

The College of Natural Sciences embraces several 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 take advantage of the outstanding campus research facilities relating to northern problems: the Geophysical Institute, the Institute of Arctic Biology, the Alaska Cooperative Wildlife Research Unit and the Alaska Cooperative Fishery Research Unit. The college also offers two interdisciplinary programs, earth sciences and general sciences, specifically intended for those seeking teaching certificates.

Graduate Degrees -- Master of Science in biology, zoology, wildlife management, chemistry, geology, geophysics, physics, general science, space physics and atmospheric sciences. Master of Arts in Teaching in biological sciences, chemistry, geology and physics. Ph.D in biological sciences, physics, space physics, atmospheric sciences, geophysics and geology. The College of Natural Sciences also offers a variety of interdisciplinary degrees in ecological sciences, wildlife management, atmospheric chemistry, biochemistry and molecular biology.

Affiliation with Northern Institutes
Geophysical Institute: Syun-Ichi Akasofu, Director
Institute of Arctic Biology: Francis Williamson, Director
Alaska Cooperative Wildlife Research Unit: David R. Klein, Unit Director
Alaska Cooperative Fishery Research Unit: James B. Reynolds, Unit Director

Atmospheric Sciences (see Physics)

 Degrees: M.S., Ph.D

Biology

 Degrees: M.S., M.A.T., Ph.D.
Minimum Requirements for Degrees: M.S.--30 credits; M.A.T.--36 credits; Ph.D--open.

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, and using the excellent facilities of major research institutes in Fairbanks. Areas of strong research emphasis of department faculty include circumpolar floristics, arctic plant physiology, plant-animal coevolution, Pleistocene faunas, insect ecology (terrestrial and freshwater), bird and mammal physiological ecology, mammalian physiology, vertebrate population dynamics, biology of marine fish and seabirds, molecular evolution and population genetics.

The Department of Biology and Wildlife has approximately 60 graduate students, 40 of whom are seeking biology or botany degrees. The atmosphere is informal and students and faculty interact frequently, not only in small-enrollment classes but on field trips, in intramural athletics, and in dozens of community and social settings. Teaching assistantships in department courses provide excellent experience and a helpful stipend for graduate students who do not have full research funding. Several competitive fellowships are available through the UAF Chancellor.

Graduates of UAF may go on to other universities for doctorates or post doctoral research; UAF's reputation allows good students a wide latitude for such advanced study. Many M.S. and Ph.D. recipients find professional positions with state and federal land and biological resource agencies, with whom the department faculty maintain close contact.
Faculty
Head, Department of Biology and Wildlife and Professor: Ronald L. Smith
Professors: F. Stuart Chapin III, Frederick C. Dean, Howard Feder, Dale D. Feist, R. Dale Guthrie, Stephen F. MacLean, Jr., David F. Murray, Luis Proenza, Gerald F. Shields, Robert B. Weeden, Robert G. White, Frank Williamson
Associate Professors: W. Scott Armbruster, R. Terry Bowyer, Pierre Devigne, Jacqueline D. Laperrtere, Edward C. Murphy, Mark, W. Oswood
Assistant Professors: Brian M. Barnes, John E. Blake, John P. Bryant, John F. Fox, Joshua Schmel, Kent E. Schwaegerle, James S. Sedinger
Instructor: Douglas L. Schamel

Botany, Biology, or Zoology — 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. 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.

Botany, Biology, or Zoology — M.A.T. Degree

Persons interested in this degree program should contact the head of the department.

Botany, Biology, or Zoology — Ph.D. Degree

Complete general university and Ph.D. degree requirements

Chemistry

Degrees: M.A., M.A.T., M.S.
Minimum Requirements for Degrees: M.A., M.S.—30 credits; M.A.T.—36 credits

Graduates in chemistry qualify 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.

Faculty from many departments and research institutes in the university participate in the department's Program in Biochemistry and Molecular Biology. This program, which emphasizes an understanding of the molecular principles involved in life processes, provides academic and research experience for graduate students who are interested in careers in the growing area of biotechnology.

The chemistry department offers the student 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, and liquid scintillating counters are available in cooperation with other departments and institutes at UAF.

Faculty
Head, Department of Chemistry and Professor: Paul R. Reichardt
Professors: Don Button, Daniel B. Hawkins, L. Claron Hoskins, David Shaw
Associate Professors: Lawrence Duffy, John Keller, Donald Lokken, Betty Anne Philip, Richard Stolzberg
Assistant Professor: Daniel Jaffe
Instructor: Diane Shaw
Coordinator of Biochemistry and Molecular Biology: Lawrence Duffy

Chemistry – M.A. or 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. At least 24 credits, including thesis and/or research, must be at the 600 level.

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.

Chemistry – M.A.T. Degree

Persons interested in this degree program should see the head of the department.

General Science

Degrees: M.S.
Minimum Requirements for Degree: M.S.--30 credits

The Departments of Mathematics, Physics, Chemistry, Biology and Wildlife, and Geology offer work toward the master of science degree with a major in general science. This degree may be described as a "breadth" rather than a "depth" degree, and a candidate is ordinarily pursuing a course of study in which one of these departments is cooperating with at least one other department within the university. A prospective candidate must meet the general requirements for admission and for the awarding of the degree. At least 21 credits must be earned in science and mathematics. At least 12 credits must be earned in the department giving the degree. A thesis (maximum of three credits) or project (no credit) must be completed in the major department. It is not intended that the individual courses merely satisfy the credit requirements; each course should contribute to the specific aim of the candidate, and the thesis or project should reflect this aim. The coordinator of the General Science program is John Murray, Department of Physics.

General Science – 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. At least 24 credits, including thesis and/or research, must be at the 600 level.

Geology and Geophysics

Degrees: M.A.T., M.S., Ph.D.
Minimum Requirements for Degrees: M.S.--30 credits, including thesis; M.A.T.--36 credits; Ph.D. (open)

Graduates in geology will have broad backgrounds in the earth sciences with firm foundations in mathematics, physics, and chemistry. Graduate programs are tailored around minimal core course requirements (M.S. only) to the special research and study interest of the student. In addition to courses listed under the geology and geophysics program, students should check the course listings under the School of Mineral Engineering and the Marine Science Program.

All serious students of the geological sciences at UAF should note that in addition to the facilities available directly through instructional programs, there are active research laboratories 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.

Head, Department of Geology and Geophysics and Associate Professor of Geology:
Samuel E. Swanson

Geology Faculty
Professors: Daniel B. Hawkins, David M. Hopkins, Don M. Triplehorn
Associate Professors: R. A. Gangloff, Rainer J. Newberry
Assistant Professors: James E. Beget, R. Keith Crowder, Mary J. Keskinen, Wes Wallace, Keith Watts
Adjunct Faculty: Laural Burns, John Davies, John Decker, Charles G. Mull, Gar Pessell, Richard D. Reger, Thomas E. Smith, Milton A. Wiltse

Geophysics Faculty
Coordinator and Associate Professor: Joan P. Gosink
Professors: Carl Benson (Emeritus), Nirendra Blswas, Juergen Kienle, Thomas E. Osterkamp, David B. Stone, Eugene M. Wescott, Wilford Weeks
Associate Professors: Hans Pulpan, William M. Sackinger, Lewis H. Shapiro, William J. Stringer
Assistant Professors: Douglas Pulpan, William M. Sackinger, Lewis H. Shapiro, William J. Stringer

Geology -- M.S. Degree*

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits, including thesis (Geos. 699) and individual research (Geos. 698). At least 24 credits (including thesis and research) must be at the 600 level, and at least 15 credits from course work (exclusive of thesis and research) must be at the 600 level.

OPTIONS:
A. General Geology Option: Complete at least one 600-level course from each of these three general areas: 1) Sedimentology-Stratigraphy, Paleontology, Quaternary Studies; 2) Structural Geology, Tectonics, Geophysics; 3) Igneous-Metamorphic Petrology, Geochemistry, Mineral Deposits.
B. Economic Geology Option: Complete 9 credits in applied geoscience with at least one course in mineral economics or engineering management.
C. Petroleum Geology Option: Complete at least one course each in advanced structural geology, advanced stratigraphy, advanced sedimentology, and a geophysics course approved by the graduated advisory committee. The plan of study must include a minimum of two of the following courses:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geos. 643--Sandstone Depositional Environments</td>
<td>3</td>
</tr>
</tbody>
</table>
Geos. 644--Advanced Stratigraphy .............................. 3
Geos. 645--Advanced Carbonate Sedimentology ................. 3
Geos. 646--Seismic Stratigraphy ................................ 3
Geos. 647--Advanced Sedimentology ............................ 3
Geos. 648--Sedimentary Basin Analysis ........................... 3

Geophysics -- M.S. Degree*

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits, including thesis (Geos. 699) and individual research (Geos. 698). At least 24 credits (including thesis and research) must be at the 600 level, and at least 15 credits from course work (exclusive of thesis and research) must be at the 600 level.

OPTIONS:
A. Solid-Earth Geophysics Option: In addition to geophysics courses, the graduate advisory committee will require a selection of advanced courses in both geology and physics. The actual courses will depend upon how far the student's degree work is biased towards one discipline or the other.
B. Snow, Ice and Permafrost Geophysics Option: The student's graduate advisory committee will require a selection of advanced courses on ice, snow and permafrost studies and either geology, applied science and engineering, physics, or meteorology/oceanography (climate), depending on how far the student's degree is biased toward one given discipline.

*To be admitted, the student 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. Acceptance for the snow, ice, and permafrost geophysics option is not limited to those with a geoscience background; students with strong physical science or engineering backgrounds are also encouraged to apply.

Geology -- M.A.T. Degree

Contact the head of the department for degree requirements.

Geology -- Ph.D. Degree
Geophysics -- Ph.D. Degree

Degree Requirements:
1. Complete the general university requirements for graduate students and Ph.D. degree requirements.
2. Complete the required program as arranged by conference with the graduate advisory committee.

Physics

Degrees: M.S., M.A.T., Ph.D.
Minimum Requirements for Degrees: M.S.--30 credits; M.A.T.--36 credits; Ph.D.--no fixed credits

The physics department is responsible for the Physics, Space Physics, Atmospheric Sciences, and the General Science programs.

Physics is concerned with the nature of matter and energy and encompasses all phenomena in the physical world from elementary particles to the structure and origin of the universe. Physics provides, together with mathematics and chemistry, the foundation of work in all fields of physical science and engineering, and contributes to other fields such as biology and medicine.
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. The research program of the Geophysical Institute currently emphasizes 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, and polar meteorology.

Graduate students may designate their major field as physics, space physics or atmospheric sciences. Students will pursue their studies under the supervision of an advisory committee which will advise on the course of study to be followed.

Faculty
Head, Department of Physics and Professor: John L. Morack.
Associate Professors: David C. Fritts, Thomas J. Hallinan, John S. Murray, John V. Olson, Roger W. Smith, Brenton J. Watkins
Assistant Professors: Sue Ann Bowling, Neal Brown, Koji Kawasaki, Channon P. Price, Hiroshi Tanaka
Coordinator of Graduate Program: Daniel W. Swift
Coordinator of General Sciences Program: John Murray

Physics – 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 Phys. 699, Thesis. At least 24 credits, including Thesis and/or Research, must be at the 600 level.

Space Physics – M.S. Degree

Degree Requirements:
1. Complete the general university requirements and the master’s degree requirements.
2. Complete a minimum of 30 credits of approved courses including:

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic courses in space physics</td>
<td></td>
</tr>
<tr>
<td>Approved physics courses (minimum)</td>
<td>12</td>
</tr>
</tbody>
</table>

Atmospheric Sciences – M.S. Degree

Degree Requirements:
1. Complete the general university requirements and the master’s degree requirements.
2. Complete required program as arranged by conference with the graduate committee in accordance with the Physics department manual of Policies and Procedures for graduate studies.

Specialization in ice and snow studies with emphasis on ice physics, ice in climate and ice in science applications is available through the Geology/Geophysics Program (see Ice and Permafrost Geophysics Option).

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic courses in atmospheric sciences</td>
<td></td>
</tr>
<tr>
<td>Approved physics courses (minimum)</td>
<td>12</td>
</tr>
</tbody>
</table>

Physics – M.A.T. Degree

Contact the department head for degree requirements.

Atmospheric Sciences – Ph.D. Degree

1. Complete the general university requirements and Ph.D requirements.
2. Complete the following:

Basic courses in atmospheric sciences .................................................. 12
Approved physics courses (minimum) ................................................... 12

(For Specialization in ice and snow studies, see Geology/Geophysics Program,
Ice and Permafrost Option.)

Basic Courses in Atmospheric Sciences:

ATM 636--Physics of the Lower Atmosphere ....................................... 3
ATM 646--Dynamics of the Atmosphere and Ocean ................................ 3
Phys. 650--Aeronomy .............................................................................. 3
ATM 656--Atmospheric Circulation, Weather, and Climate ...................... 3

Physics Courses:

Phys. 611--Mathematical Physics ......................................................... 3
Phys. 612--Mathematical Physics ......................................................... 3
Phys. 621--Classical Mechanics ............................................................ 3
Phys. 622--Statistical Mechanics ........................................................... 3
Phys. 631--Electromagnetic Theory ....................................................... 3
Phys. 632--Electromagnetic Theory ....................................................... 3
Phys. 651--Quantum Mechanics ............................................................ 3
Phys. 652--Quantum Mechanics ............................................................ 3

Physics -- Ph.D. Degree

Space Physics -- Ph.D. Degree

1. Complete the general university requirements and Ph.D. requirements.
2. 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 (see Physics)

Degrees: M.S., Ph.D

Wildlife Management

Degrees: M.S., Ph.D.
Minimum Requirements for Degrees: M.S.--30 credits

The geographic location of the university is particularly advantageous for the
study of wildlife management. 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.

Adequate study collections of plants and animals are available. There is also a
2,000-acre study area near the campus. Graduates have ample opportunity for close
association with the personnel of the Alaska Cooperative Wildlife Research Unit, the
Alaska Cooperative Fishery Research Unit and several local offices of the 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.
Wildlife Program

Faculty
Head, Department of Biology and Wildlife and Professor: Ronald L. Smith
Program Chair and Professor: Frederick C. Dean
Professors: David R. Klein, Robert B. Weeden, Robert G. White
Associate Professor: Edward C. Murphy
Assistant Professors: John E. Blake, R. Terry Bowyer, James S. Sedinger
Research Associate: Erich H. Follmann

Unit Leader: David R. Klein

The Department of Biology and Wildlife and the Alaska Cooperative 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 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 Wildlife Research Unit, University of Alaska Fairbanks, Fairbanks, Alaska. Applications should be sent to the unit leader; such applications are supplementary to the application for admission for graduate study.

Wildlife Management – M.S. Degree
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits of approved courses, including W.F. 699--Thesis, in the field of wildlife management. 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 Management – Ph.D. Degree
See Ph.D. general degree requirements.

Rural College
Gerald V. Mohatt, Acting Dean

The Rural College was created in 1987 when the restructuring of the University of Alaska system was implemented. The Rural College is committed to educational processes through which its students are empowered to effect social and economic changes in their communities, and protect and enrich the quality of their lives and culture. Particular consideration is given to the needs of permanent residents of rural Alaska and students in non-traditional settings who seek skills and degrees suited to the rural economy and to the well-being of rural communities and the demands and needs of complex multi-cultural settings.

The college offers a range of academic and programmatic options to students which respond to the changing conditions of Alaska. The college offers graduate degrees in education and psychology. All programs in the college seek to prepare persons to work effectively in cross-cultural settings and display a sensitivity to and understanding of the diversity of the human condition.

The college is a center for the development and support of distance delivery and field-based degree and non-degree course work throughout the university. Selected degrees and certificates are offered at the dispersed campuses in the Aleutians, Bristol Bay, Chukchi, Interior, Kuskokwim, and Northwest regions of the state. These
GRADUATE SCHOOL

Campuses administer instructional programs in association with five departments: Behavioral Sciences and Human Services, Education, General Studies, Rural Development and Vocational/Technical Education. Research and development activities involving issues associated with rural Alaska are supported and administered through the Center for Cross-Cultural Studies. Academic and logistical support for these distance-delivered programs and correspondence study are provided through the Center for Distance Education.

Behavioral Sciences and Human Services

The Department of Behavioral Sciences and Human Services offers three graduate programs: an M.A. in Community Psychology, M.Ed. in Guidance and Counseling (Elementary and Secondary), and an M.Ed. in College Student Personnel Administration.

The Community Psychology program trains graduate-level professionals with general skills in the area of mental health and with specific training in the areas of alcohol and drug abuse, primary prevention and other prevention approaches, or clinical cross-cultural psychology.

The Guidance and Counseling programs prepare educators to be elementary counseling consultants or secondary school counselors. The program emphasizes acquisition of knowledge in counseling/consultation, appraisal and research.

The program in College Student Personnel Administration is designed to train educators to function in student service positions in higher education. The history, philosophy, and contemporary issues in higher education; management concepts; principles of educational psychology, measurement and research are some of the highlights of this program.

All of the graduate programs include either a practicum or internship to give the students hands-on training. Our programs are also designed to meet the needs of rural Alaska.

Faculty

Head, Department of Behavioral Sciences and Human Services and Associate Professor: Gerald S. Berman

Professors: E. Clifford Brennen, Charles Geist, Richard Katz, Gerald V. Mohatt, M.S. Rao, John Turner

Associate Professors: Richard G. Possenti, Harris Shelton

Assistant Professors: Jill Baker, James Cole, William Connor, Carol Dtehl, Mary Hampton, Victor Lieberman, Laurie Marum, Valerie Montoya, Cathy Sink.

Community Psychology

Degree: M.A.

Minimum Requirements for Degree: 48 credits

The M.A. program in community psychology seeks to train graduate-level practitioners in mental health and community development who can work sensitively and effectively in cross-cultural community contexts, and particularly in Native settings in rural areas and urban settings with multi-cultural populations. The program attempts to meet the demand for trained mental health professionals in rural Alaska.

Objectives

1. to train graduate-level psychologists for rural and cross-cultural settings in Alaska;
2. to place graduate-level psychologists in agencies of human and social services and education in Alaska;
3. to provide mental health professionals for urban areas that have a large cross-cultural and rural population (in-migration groups);
4. to provide in-service and continuing education opportunities for mental health professionals at the graduate level with specific regard to cross-cultural and rural issues in the delivery of mental health service.

The program is oriented toward prevention as a major responsibility for the rural provider. But prevention and treatment are not separated since both must focus on building intact, naturally occurring systems in families and communities. The program, then, sees the community as both a resource for problem solving and as the target for change.

The program is specifically committed to learning non-Western cultures, in particular Native cultures in Alaska, so that practitioners can be culturally sensitive rather than monocultural and therefore better serve their clients. There is an emphasis in the curriculum on experiential learning and the use of self-knowledge as a basis for learning how to help others. The program seeks to increase students' self-awareness, in particular their understanding of cultural diversity and their own cultural biases, and their appreciation of the significance of their own development for effective work with individuals and communities.

The program is practice-oriented, seeking to educate practitioners who can reflect intelligently and creatively on their own and others' practice. The program is also value-full rather than value-free. Courses strive to be cross-culturally sensitive, either through course content, style of teaching or use of class and community resources. Skills such as prevention strategies, counseling, and psychological testing and expressions of Western culture, and therefore must be applied sensitively in multicultural situations, or if necessary, abandoned for more culturally appropriate methods of help. We seek to educate students committed to constructive social change which gives all people equal access to resources.

Admittance

Students are accepted in the spring for the fall semester. Applications are generally due by April 1, although applications may be accepted at any time during the year. The program will accept a maximum of 15 students per year with the option to accept less, given limited resources.

Admission Requirements
1. Evidence of 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 will be sought. In part, this will be inferred from the participant's academic and employment history and an interview when possible. Also, three letters of reference will be required endorsing the applicant's admission to the community psychology program.
2. Persons who have a non-social science background must complete the necessary undergraduate prerequisites as delineated by their adviser prior to advancement toward candidacy.
3. An application must include a personal statement of the applicant's purpose in seeking this degree.

Part-time students will be accepted. The student must enroll in one core required course during the first semester.

Course Requirements

The program requires a 15-credit (5 courses) core of courses with a 12 credit hour internship and three to six credit hours for project or thesis, including an oral defense of the work which will also constitute a comprehensive exam. The student must also complete at least 9 credits (3 courses) from an approved list of courses (see below) in consultation with advisor. Additional electives are to be chosen in consultation with the advisor to make up the 30-credit hour requirement for coursework.

Internship
This is either a full-time, one-semester or part-time, one-year experience under the supervision of a qualified psychologist, mental health or human services practitioner. Placements are arranged after at least 24 credits are completed.

Community Psychology — M.A. Degree

Required Courses ........................................ 30-33 Credits
Psy. 630--Community Psychology ........................ 3
Psy. 631--Community Psychology:
  Cross-Cultural Applications .......................... 3
Psy. 661--Cross Cultural Counseling .................... 3
Psy. 663--Clinical Methods & Assessment ................ 3
ANS. 401--Knowledge of Native Elders .................. 3
Psy. 690--Internship in Community Psychology ....... 12
Psy. 698--Project or Thesis ............................. 3-6

Complete at least 9 credits from the following:
Psy. 625--Prevention of Alcohol & Drug Dependence .......... 3
Psy. 635--Field-Based Research .......................... 3
Psy. 665--Healing: Implications for Clinical/Community Practice . 3
Psy. 660--Principles & Techniques of Individual Counseling ........... 3
Psy. 662--Transformational Development and Psychological therapy .... 3
Psy. 688--Practicum in Community Psychology ............... 3
Soc. 638--Social Policy & Social Change ................ 3
Soc. 645--Prevention Theories & Strategies ............... 3

Guidance and Counseling

Degree: M.Ed.
Minimum Requirements for Degree: 42 Credits

The M.Ed program in Elementary and Secondary Guidance and Counseling attempts to meet the demands of trained professional Counselors for the multicultural setting in rural and urban Alaska. The purpose of this program is to train experienced public school teachers at the graduate level in cross-cultural counseling with specific training in the areas of counseling and consultation for educational, social, and vocational decisions. The program includes the acquisition of knowledge in counseling, appraisal, and research. In addition, a supervised practicum is required.

Guidance and Counseling — M.Ed. Degree

Admission Requirements:
1. The equivalent of a University of Alaska Bachelor of Education degree or an Alaska teaching certificate with a minimum of 24 semester hours of education courses with an average GPA of 3.00 (B). A copy of the valid teaching certificate must be included in the application.
2. Three years of satisfactory teaching experience in an accredited school at the elementary or secondary level, verified by letter from the district office.
3. Three letters of recommendation: Professional practicing counselor, peer teacher, and a community individual.
4. Admission also may be contingent upon (1) satisfactory scores on various standardized tests and (2) a satisfactory personal interview conducted by Behavioral Sciences and Human Services faculty members.
Minimum Degree Requirements:
1. Complete a minimum of 42 credits in approved courses. This is a non-thesis program.
2. Pass a written qualifying examination in the foundation courses after completing 15 credit hours of an approved program.
3. Design and complete a counseling research project approved by the advisory committee with an oral comprehensive examination.
4. Complete the general graduate degree requirements.
   Courses assigned by the student's graduate committee to remove deficiencies will not be allowed as part of the graduate program.

Required Courses Elementary:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 611-Learning, Thinking and Perception</td>
<td>3</td>
</tr>
<tr>
<td>in Cultural Perspective</td>
<td></td>
</tr>
<tr>
<td>Ed. 630-Curriculum Theory</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 690--Seminar in Cross-Cultural Studies</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 615--Foundations of Guidance</td>
<td></td>
</tr>
<tr>
<td>and Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 624--Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 628--Life Span Development</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 634--Practicum I</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 645--Behavioral Consultation</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 660--Cross-Cultural Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 698--Research Project</td>
<td></td>
</tr>
<tr>
<td>SWK 306--Social Welfare: Policies and Issues</td>
<td>9</td>
</tr>
</tbody>
</table>

(Recommended: ANS 475; Ed. 380, 601, 603; Psy. 304; Soc. 304, 405, 408; Sp.C. 330.)

Required Courses Secondary:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 611-Learning, Thinking and Perception</td>
<td>3</td>
</tr>
<tr>
<td>in Cultural Perspective</td>
<td></td>
</tr>
<tr>
<td>Ed. 690--Seminar in Cross-Cultural Studies</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 615--Foundations of Guidance</td>
<td></td>
</tr>
<tr>
<td>and Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 623--Principles and Techniques of Individual Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 624--Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 628--Life Span Development</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 634--Practicum I</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 636--Practicum II</td>
<td>3</td>
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<tr>
<td>Coun. 660--Cross-Cultural Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 698--Research Project</td>
<td></td>
</tr>
<tr>
<td>SWK 306--Social Welfare: Policies and Issues</td>
<td>3</td>
</tr>
</tbody>
</table>

(Recommended: ANS 475; Ed. 380, 601, 603; Psy. 304; Soc. 304, 405, 408; Sp.C. 330.)

Guidance and Counseling—Certification Program

Graduates may qualify for counseling endorsement in various states only by planning their programs to meet specific requirements. Certificates are issued by the appropriate state department of education. In Alaska, certificates are granted by the Alaska Department of Education in Juneau. Students who obtain the M.Ed. degree will meet the current academic requirements for Alaska certification. Teachers holding a master's degree and three years of teaching experience may be eligible for certification in Guidance and Counseling by completing a core of specialization courses. Any teacher wishing to become certified through the University of Alaska
Fairbanks must apply for admission, be accepted and complete 12 credit hours in residence.

**Admission Requirements:**
1. A master's degree and current Alaska Teaching Certificate with a minimum of 24 hours of education courses with an average g.p.a. of 3.00 (B).
2. Transcripts and copy of teaching certificate.
3. Letter of verification of teaching experience from school district.
4. Three letters of recommendation: Practicing counselor, peer teacher, and community individual.

**Minimum Degree Requirements Elementary Endorsement (Certification):**
1. Complete a minimum of 21 credits in approved courses.
2. Pass a qualifying examination in the foundation courses after completing 15 credit hours of an approved program.

Prerequisite courses to this program must appear in the Master's Degree program. Graduate level courses in Educational Psychology or Learning Theory and Curriculum Theory foundation courses are included in the qualifying examination. Where the courses do not appear in the transcripts, these are deficits to be included in the certification program.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Coun. 615--Foundations of Guidance and Counseling</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 624--Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 628--Life Span Development</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 634--Counseling Practicum I</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 645--Behavioral Consultation</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 660--Cross Cultural Counseling</td>
<td>3</td>
</tr>
<tr>
<td>SWK 306--Social Welfare: Policies and Issues</td>
<td>3</td>
</tr>
</tbody>
</table>

*Foundation courses for the qualifying examination after 15 semester hours in an approved program.*

**Minimum Requirements Secondary Endorsement (Certification)***
1. Complete a minimum of 25 credits in approved courses.
2. Pass a qualifying examination in the foundation courses after completing 15 credit hours of an approved program.

Prerequisite courses to this program must appear in the Master's Degree program. Graduate level courses in Educational Psychology or Learning Theory and Curriculum Theory foundation courses are included in the qualifying examination. Where the courses do not appear in the transcripts, these are deficits to be included in the certification program.

<table>
<thead>
<tr>
<th>Required courses:</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Coun. 615--Foundations of Guidance and Counseling</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 623--Principles and Techniques of Individual Counseling</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 624--Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>*Coun. 628--Life Span Development</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 634--Counseling Practicum I</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 636--Counseling Practicum II</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 660--Cross Cultural Counseling</td>
<td>3</td>
</tr>
<tr>
<td>SWK 306--Social Welfare: Policies and Issues</td>
<td>3</td>
</tr>
</tbody>
</table>

*Foundation courses for the qualifying examination after 15 semester hours in an approved program.*
College Student Personnel Administration

Degree: M.Ed.
Minimum Requirements for Degree: 36 Credits

This program is designed to train educators to be able to function in student service positions in higher education. This training would include specifically: history, philosophy, and contemporary issues in higher education; management concepts; principles of educational psychology, measurement, and research; and supervised laboratory experiences in college student personnel agencies.

Admission Requirements:
1. One year of satisfactory experience in post-secondary or secondary education or equivalent as approved by the Admissions Committee.
2. Admission may also be contingent upon (1) satisfactory scores on various standardized tests and (2) a satisfactory personal interview conducted by Behavioral Sciences and Human Services faculty members.

Minimum Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 36 credits as follows:

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 601--Critique of Educational Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 618--Higher Education: Basic Understanding</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 654--School Law</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 690--Seminar in Cross-Cultural Studies</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 623--Principles and Techniques of Individual Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Coun. 624--Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>CSP 651--Current Issues in Student Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>CSP 655--Practicum in Student Personnel Administration (Must be taken twice)</td>
<td>6</td>
</tr>
</tbody>
</table>

9 credits selected from the following:

| Ed. 611--Learning, Thinking and Perception in Cultural Perspective | 3 |
| Ed. 612--Cultural and Phil. Found. of Education                 | 3 |
| CSP 661--Practicum in Counseling: Higher Education              | 3 |
| Psy. 304--Personality                                          | 3 |

*Other courses may be selected with consent of the student's advisory committee.
3. Pass a comprehensive examination.
4. Recency of undergraduate credit will be of concern to the candidate's committee when developing the graduate program.

Education

Degrees: M.Ed., Ed.S.
Minimum Requirements for Degrees: M.Ed.--minimum of 36 credits; M.A.T.--minimum of 36 credits; Ed.S.--minimum of 30 credits beyond master's.

Faculty
Head, Department of Education and Professor: Judith S. Kleinfeld
Professor: Raymond J. Barnhardt, David M. Smith

**Assistant Professors:** Mary M. Birkeland*, Wendy J. Esmalikka, Eber Hampton, Barbara G. Harrison, Oscar Kawagley*, Eric C. Madsen*, Patricia A. Nelson, Dennis G. Schall*, Jolene Workman

**Instructors:** Lamont E. Albertson*, Beverly Grogan*, Penny T. Mendenhall*, Norbert Noordhoff, William R. Pflisterer, Mary Slaughter, Sidney Stephens

*Non-Fairbanks Faculty

**Education — M.Ed. Degree**

The Master of Education program offers several options from which a person selects an area of specialization. Inquiries concerning options and the specific requirements of each option should be directed to the Department of Education.

**Admission Requirements:**
Minimum requirements for admission to the M.Ed. program are:
1. A bachelor's degree, with a minimum of 24 credits of education courses with an average GPA of 3.00, and
2. One year of satisfactory teaching experience or administrative experience in public schools or appropriate experience.

Applications for admission must be made through University Admissions and Records Office. To be considered for acceptance, the following must be submitted by the applicant:
   a. A completed and signed application form.
   b. All transcripts of college credits earned.
   c. Three letters of reference.
   d. A 4-5 page written essay containing a critical self-evaluation of past educational experiences, a discussion of career goals and the reasons for choosing to apply to the UAF Department of Education.
   e. Admission may also be contingent upon a satisfactory interview with members of the Department faculty. The interview may be conducted by audioconference.

**Minimum Degree Requirements:**
1. Complete the general university requirements and master's degree requirements.
2. Complete the following core requirement:

   **Courses** ........................................................... Credits
   Ed. 601--Educational Research .................................. 3
   Ed. 602--Design and Practice of Educational Research ........ 3
   Ed. 610--Education and Cultural Processes .................. 3
   Ed. 690--Seminar in Cross-Cultural Studies ................ 3
   Ed. 698/699--Project/Thesis ..................................... 6

3 credits from the following:
   Psy. 670--Advanced Cross-Cultural Psychology .............. 3
   Ed. 612--Cultural and Phil. Foundations of Education .... 3
   Ed. 615--Social Organization of Classrooms and Learning .. 3
   Ed. 620--Language, Literacy and Learning ................... 3

3. Complete a minimum of 15 credits from one of the following areas of specialization to be selected in consultation with the students advisory committee:
   Cross-Cultural Education
   Curriculum and Instruction
   Educational Leadership
   Language and Literacy
4. NOTE: The course-work must meet the following conditions:
   a. A total of 36 credits must be completed beyond the baccalaureate degree.
   b. A minimum of 30 semester hours must be at the 600 level.
   c. A minimum of 15 credits completed on the Fairbanks campus.
   d. No more than 9 semester credits can be transferred from other institutions.
   e. No more than 9 semester hours earned at UAF prior to admission to the M.Ed.
      program may count toward the degree.
   f. A minimum of 6 credits completed in a field-setting must be completed for the
      cross-cultural option.

5. Present a synthesizing paper upon completion of the core program.
6. Write a project or thesis.
7. Presentation of project or thesis results
   Note: The candidates and their committee will meet a minimum of three times
   during the student's program. The initial meeting will take place concurrently with
   the student achieving 12 credits of graduate study. The interim meeting will take place for
   the purpose of discussing and developing the synthesizing paper. The final meeting will
   be for the purpose of discussion of the project. Advancement to candidacy for the
   M.Ed. will occur after the completion of 18 credits and a satisfactory synthesizing
   paper, and at least one semester before graduation.

Type B Administrative Certificate

Admission Requirements:
Admission to the State of Alaska, Type B Certification program is accomplished
by applying for graduate study at UAF through Admissions and Records, and
indicating that the application is for the Department of Education, Type B Certification
only. Applicants to the M.Ed. in Educational Leadership may apply concurrently for
the Type B Principal Certificate. (To attain both the M.Ed. and Certification requires
42 hours of course work.) Applicants who apply only for the Certificate of Principal's
Endorsement must have a master's degree. Applicants who apply only for the
Superintendent's Endorsement must have an Ed.S. or Doctorate. Certification is
granted by the State upon recommendation of the UAF Department of Education.
Upon admission, students will be assigned an advisor who will oversee their course
program and internship.

Minimum Certification Requirements:
1. A master's degree.
2. Three years of successful public experience.
3. A Principal or Superintendent internship, depending on which certificate is being
   sought (Ed. 664 or Ed. 665).
4. Complete the following courses:
   courses ........................................................................................................... credit
   **Ed. 630--Curriculum Theory or
   **Ed. 631--Small School Curriculum Design .................................................. 3
   **Ed. 650--Organizational Behavior in Schools .................................................. 3
   **Ed. 651--Large and Small School Management Processes ................................. 3
   **Ed. 652--Effective Schooling Practices ............................................................ 3
   **Ed. 653--Instructional Leadership in Public Schools ........................................... 3
   **Ed. 654--School Law ...................................................................................... 3
   **Ed. 660--Educational Administration in Cultural Perspective ............................ 3
   **Ed. 664--Internship: Principal's Endorsement or
   Ed. 665--Internship: Superintendent's Endorsement .......................................... 3
   Ed. 691--Contemporary Issues in Education ...................................................... 3
Education – Ed.S. Degree

The 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.

Admission Requirements:
1. Applicants must be experienced educators who have at least three years of professional teaching, counseling or administrative experience.
2. A master's degree is required and should be in a field which provides an appropriate foundation for the additional graduate study.
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: Aptitude 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. The minimum requirements will be the completion of 36 semester hours beyond the master's degree level. Student may transfer up to 9 hours from another university into their program.
2. Fulfillment of the requirements of the Ed.S. degree must be completed within seven years after first registering in the program.
3. Satisfactory performance on written and oral examination conducted by the Department of Education faculty is required.
4. At least 30 of the 36 semester hours must be at the graduate level (600).

Specific Course Requirements:
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 a total background of at least 60 semester hours beyond the baccalaureate degree as outlined in the following course requirements:
1. Common core requirements for all Educational Specialist candidates (if the following courses were completed as part of a master's programs, they may not be applied toward the Education Specialist Degree).
   a. Course work (12 semester hours) ........................................ Credits
      Ed. 601--Introduction to Educational 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
   b. Field Study or Internship (minimum of 6 semester hours) ............. 6
      Under the guidance of the student's graduate committee, each candidate will design a field research and/or internship project for a specific school district or rural area. Students will prepare the design at UAF; and, will live in the community for one semester of the internship gathering data. Students will submit a written report on their findings and will defend the report 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.
2. Educational Specialist areas of specialization and concentration (minimum of 18 semester hours).

A. Public School Administration (Public School Superintendent Credential Endorsement):

1. Admissions Requirements:
   Minimum of one year of school administration experience is required for admission to this concentration. The credential, however, can be recommended only upon completion of the prescribed Ed.S. program and three years of school administration experience.

2. The following courses are required for this specialization (equivalent graduate courses approved by candidate’s committee may be substituted):

   Courses                                      Credits
   Ed. 650--Organizational Behavior in Schools  3
   Ed. 651--Large and Small School Management   Processes  3
   Ed. 652--Effective School Practices  3
   Ed. 654--School Law  3
   Ed. 655--Public School Finance  3
   Ed. 660--Educational Administration in Cultural Perspectives  3

3. Recommended courses to provide specialization depth:
   ANS 430--Alaska Native Education
   ANS 475--Alaska Native Social Changes
   B.A. 651--Organizational Behavior
   Econ. 427--Collective Bargaining
   Ed. 615--Social Organization of Classrooms and Learning
   Ed. 630--Curriculum Theory
   Soc. 405--Social Change
   Soc. 497--Formal Organizations

B. Cross-Cultural Studies Area of Specialization and Concentration:

1. Admissions Requirement
   Applicant should have a master's degree in an approved areas of study determined by the Education Department's admissions committee. The committee may recommend provisional admittance based on applicant's eliminating deficiencies.

2. The following courses are required for this specialization (may substitute equivalent graduate courses approved by candidate's committee)

   Courses                                      Credits
   Ed. 602--Design and Practice of Educational Research  3
   Ed. 612--Cultural and Philosophical Foundations of Education  3
   Ed. 615--Social Organization of Classroom and Learning  3
   Ed. 620--Language, Literacy and Learning  3
   Ed. 611--Learning, Thinking and Perception in Cultural Perspective  3

3. Recommended courses to provide specialization depth:
   ANS 430--Alaska Native Education
   ANS 475--Alaska Native Social Changes
   Ed. 621--Cultural Aspects of Language Acquisition
   Ed. 630--Curriculum Theory
   Ed. 660--Educational Administration in Cultural Perspective
   Electives: 600 level courses approved by candidate's committee
Teacher Certification

Students may qualify for teaching certificates in various states only by planning their program to meet specific requirements. To obtain an Alaskan teaching certificate students should confer with the Department of Education to obtain course requirements and application procedures to the Teacher Education Program. It is essential that the student have the necessary prerequisites and be admitted to the Teacher Education Program prior to acceptance for placement in student teaching in the public schools. Students may be endorsed for secondary certification only in majors which have been approved by the Alaska Department of Education.

**Elementary Education Certification Requirements:**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psy. 240—Developmental Psychology in Cross-Cultural Perspective</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 201—Introduction to Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 304—Literature for Children</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 330—Diagnosis and Evaluation of Learning</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 375—The Exceptional Learner</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 419—Integrated Methods and Curriculum Development</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 423—Reading, Language and Literacy</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 452—Elementary Student Teaching*</td>
<td>12</td>
</tr>
</tbody>
</table>

One course from the following:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 345—Sociology of Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 346—Structure of American Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 350—Communication in Cross-Cultural Classrooms</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 380—Cultural Influences in Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 450—Education and Cultural Transmission</td>
<td>3</td>
</tr>
</tbody>
</table>

* A minimum of 6 credits of math is required for admission to student teaching. (Math. 205 and 206 recommended.)

**Secondary Education Certification Requirements:**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psy. 240—Developmental Psychology in Cross-Cultural Perspective</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 201—Introduction to Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 330—Diagnosis and Evaluation of Learning</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 375—The Exceptional Learner</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 402—Methods of Teaching in the Secondary School</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 407—Reading Strategies for Secondary Teachers</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 424—Small High School Programs or</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 425—Community as an Educational Resource</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 430—Multicultural Teaching Techniques</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 453—Secondary Student Teaching</td>
<td>12</td>
</tr>
</tbody>
</table>

One course from the following:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 345—Sociology of Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 346—Structure of American Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 350—Communication in Cross-Cultural Classrooms</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 380—Cultural Influences in Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed. 450—Education and Cultural Transmission</td>
<td>3</td>
</tr>
</tbody>
</table>

**Admission to Student Teaching:**

Retention in the teacher education program is contingent upon a second formal review prior to student teaching. This review will involve assessment of all criteria used for admission with the expectation that continued acceptable performance and/or appropriate growth will be noted in all areas. Applications for student teaching are due by October 1 or February 15 during the semester previous to the planned...
semester of student teaching. Placement for student teaching will proceed upon the determination that the application is acceptable.

Teachers for Alaska Program

This program is designed to provide teaching certification to students with a baccalaureate degree who want to teach at the secondary school level either in small rural schools or in Alaska's urban multi-cultural secondary schools. The program offers two options 1) secondary certification in a subject area; 2) K-12 small schools certification. Students participate in a full time program that features small seminars, an apprenticeship, a cohort student group, and a graduate level approach to preparation for teaching.

Students enroll in a Fall and Spring/Late Spring block of integrated, tightly sequenced courses. The fall program consists of Ed. 582 -- Teaching as Reflective Inquiry, Ed. 583 -- Teaching as Decision-Making and Invention, and Ed. 584 -- Practicum. The Spring/Late Spring block consists of Ed. 453 or Ed. 455 -- Student Teaching, Ed. 619 -- Reflective Inquiry into Multicultural Classrooms and Communities, and Ed. 692 -- Designing Learning Environments. The K-12 certification option requires additional course work.

Inquiries should be addressed to the Teachers for Alaska program office on the Fairbanks campus.

Acceptance to Teacher Education

Any student wishing to become certified for teaching through the University of Alaska Fairbanks must be formally accepted for admission and be accepted to the teacher education program. The application process should be initiated during enrollment in Ed. 201, or, for transfer student and in other special cases, at least during the semester prior to enrolling in any methods courses.

Criteria for Admission to Teacher Education

The Admissions Committee will consider a variety of information, including the following:
1. Academic Competence
2. Successful experience in one of the following contexts:
   a. public school classrooms
   b. other settings with children
   c. rural Alaska
3. Interpersonal, intercultural, and communication skills
4. Any and all additional standards set by the State.

These factors will be assessed by faculty rating forms, letters of reference, university grade point average, and evaluations from University-sponsored practicum placements.

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 Resource Management, Forest Sciences, and Plant and Animal Science. Also included is the Agricultural and Forestry Experimental Station with facilities at Fairbanks, Palmer and the Forest Soils Laboratory at Fairbanks. 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. The courses and program were developed in close cooperation with many university units and non-university agencies and groups.
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 Services, U.S. Forest Service, the Bureau of Land Management, Soil Conservation Borough, Alaska Association of Soil Conservation Subdistricts, and U.S. Fish and Wildlife Service.

Division of Resources Management

Faculty
Division Head and Professor: Alan Jubenville
Professors: Wayne C. Thomas, Robert B. Weeden
Associate Professors: Carol E. Lewis, William O. Workman
Assistant Professors: Thomas J. Gallagher, Carla A. Kirts, Ruthann B. Swanson

Division of Forest Sciences

Faculty
Division Head and Professor: Keith Van Cleve
Associate Professors: Anthony Gasbarro (CES)
Assistant Professors: John D. Fox, Glen P. Juday, Edmond C. Packee, John A. Yarle

Division of Plant and Animal Sciences

Faculty
Division Head and Professor: Frank J. Wooding
Associate Professors: Donald E. Carling (Palmer), Fredric M. Husby, Jenifer H. McBeath, Jay D. McKendrick (Palmer), Stephen D. Sparrow
Assistant Professors: Leroy Ben Bruce (Palmer), Robert F. Cullum, Patricia S. Holloway, Meriam G. Karlsson, Michael T. Panciera, Chien-Lu Ping (Palmer), Paul M. Windschitl (Palmer)
Instructor: Charles W. Knight

Agricultural Research Services, U.S.D.A.

Research Soil Scientists: Verlan L. Cochran, Elena B. Sparrow
Research Weed Scientists: Jeffery S. Conn
Research Soil Physicist: Brenton Sharratt

Natural Resources Management

Degrees: M.S.
Minimum Requirements for Degree: M.S.---30-35 credits

Natural Resources Management – M.S. Degree

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. General Requirements:
   All candidates will meet the general requirements for the degree; individual programs may emphasize one of the following areas: forest management, soil management, parks and recreation, agriculture, watershed management, and land use planning.
   a. Candidates must have or acquire a general familiarity with the major resource fields listed above, as well as, wildlife management, environmental quality management, and mineral industries. Program depth in any one field will depend on the needs of the candidate and the capabilities of the university. For some fields, students will take additional courses at other universities that specialize in those fields.
   b. Candidates must have course work, prior to or within the program, in computer science, statistical methods, and basic economics.
3. Program requirements:
a. Thesis degree: 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.L.R. 630--Planning Theory</td>
<td>3</td>
</tr>
<tr>
<td>A.L.R. 631--Planning Practicum</td>
<td>3</td>
</tr>
<tr>
<td>A.L.R. 692--Graduate Seminar</td>
<td>4</td>
</tr>
<tr>
<td>A.L.R. 699--Thesis</td>
<td>6-12</td>
</tr>
<tr>
<td>600-Level approved elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional courses: a minimum of 5-11 credits, depending on the number of thesis credits taken, the student's previous training and program needs, and approval by graduate committee.

Minimum required credits past the baccalaureate degree is 30.

b. Non-thesis degree: Designed for those planning a management career involving largely non-research aspects such as general planning and administration, communication and public information, and impact assessment. The requirements are similar to the above with the following exceptions:

1. a 3-credit hour research paper will replace the 6-12 credit hours of thesis;
2. a minimum of 19 credits of additional courses;
3. the minimum number of credits required past the baccalaureate degree is 35.

4. At least 24 credits of the program, including thesis and/or research, must be at the 600 level.

Admission Requirements:

1. A baccalaureate degree in an appropriate undergraduate major.
2. Students desiring degree programs emphasizing socio-economic aspects of natural resources management must have strong undergraduate backgrounds in the social sciences, while those wishing in-depth work in any of the specific resources fields for which the University of Alaska Fairbanks does not have a strong undergraduate program at present, must have undergraduate degrees in such fields.
3. Scores of the general aptitude sections of the Graduate Record Examination.
4. Brief statement of career goals, research area of particular interest, and why UAF seems suited to student needs.

Research Areas:

Thesis research will be directed toward problems specifically related to management of natural resources in high latitudes, and may involve, at various levels, basic information; biological-physical aspects of management on the land; and relationship of various management practices to the situation in Alaska at present and in the foreseeable future with respect to land ownership patterns, land use and planning, economic trends, competing resources needs and wants, and knowledge of implications of various resource uses needed for informed decision making.

School of Engineering

Vincent S. Haneman, Jr., P.E., Dean

Professional engineering embraces the wide range of cultural and technical subjects related to the planning, design and construction of works necessary for civilization. An engineer is an innovator, a builder and a problem solver. Engineers turn scientific knowledge into goods and services useful to human beings and are responsible to society in the decisions they make. An engineer is interested in creating, and is willing to work as a member of a professional team in a position 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 emphasize northern problems and principles; therefore, engineering and technology 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 additional problems of high latitude are a factor. Many of the leading professional engineers in Alaska are graduates of the UAF engineering program.

The school 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.

Arctic Engineering

Degree: M.S.
Minimum Requirements for Degree: 30 credits (beyond Bachelors Degree in Engineering)

The arctic engineering program is administered by the Civil Engineering Department in cooperation with the Department of Mechanical Engineering and is designed to provide training 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 trained 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:
1. Complete the general university requirements and master's degree requirements.
2. Complete the following degree program:
   a. Core Courses: (Minimum of 15 credits)
      C.E. 681--Frozen Ground Engineering........................................3
      C.E. 682--Ice Engineering or
      Geos. 616--Sea ice.................................................................3
      C.E. 683--Arctic Hydrology and Hydraulic Engineering.................3
      C.E. 684--Arctic Utility Distribution.........................................3
      M.E. 685--Arctic Heat and Mass Transfer...................................3
      M.E. 687--Arctic Materials Engineering....................................3
   b. C.E. 699 or 699--Thesis or Project.........................................3

   Electives: 12 credits in areas related to or supportive of the student's degree program. All electives must be approved by the student's graduate committee.
3. Pass the state Engineer-in-Training Examination.
4. At least 24 credits, including thesis and/or research, must be at the 600 level.
   Note: C.E. 603, Arctic Engineering is not an approved elective for M.S. in Arctic Engineering.
Civil Engineering

Degrees: M.C.E., M.S.

Minimum Requirements for Degrees: M.C.E. or M.S.--30 credits

Civil engineers plan, design, and 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.

The civil engineering program at UAF began in 1922, had its first graduates in 1931 and since has graduated 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 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. 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, a specialty in Water Resources and Hydrology is available. The master's degree programs can emphasize a flexible program in water resources and hydrology tailored to individual students. The courses within the department in these areas stress the problems of northern regions and emphasize principles of analysis, planning and engineering design as related to water supply, flood control, environmental safety and land management.

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)

Faculty
Head, Department of Civil Engineering and Associate Professor: J. Leroy Hulsey
Professor: Robert F. Carlson, P.E., Douglas L. Kane, P.E., William Mendenhall, P.E. (Emeritus), Timothy Tilsworth, P.E.
Associate Professors: Jan Botha, P.E., Thomas C. Kinney, P.E., Lutfi Raad, P.E.
Assistant Professor: Mark A. Tumeo, P.E.

Civil Engineering - M.C.E. Degree

Students entering the master of civil engineering program should have completed a bachelor's degree in civil engineering. Students with bachelors degrees in other fields of engineering should work out a program to remove background deficiencies with their graduate committee.

A student will elect a civil engineering program approved by the graduate committee and must complete the general university requirements and master's degree requirements.

Thirty credits of approved courses beyond the B.S. degree are required. M.C.E. candidates will have passed a State Engineer-In-Training Examination prior to the awarding of the degree. At least 24 credits, including thesis and research, must be at the 600 level.
Civil Engineering -- M.S. Degree

A student selecting this program must meet the general university requirements and master's degree requirements plus an additional 30 credits approved by the graduate committee, of which six to twelve credits will be thesis. At least 24 credits, including thesis and research, must be at the 600 level. M.S. candidates must pass a State Engineering-in-Training Examination prior to the awarding of the degree.

Electrical Engineering

Degrees: M.E.E., M.S.
Minimum Requirements for Degrees: M.S.--30 credits; M.E.E.--32 credits

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. They include data communications, telecommunications, electromagnetic wave propagation, satellite communications, digital and physical electronics, computer and microcomputer applications including 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.

Graduate students whose goals are broad professional practice will ordinarily choose the M.E.E. program; those who wish to emphasize research and advanced specialized study usually elect the M.S. degree program, which includes a thesis.

Faculty
Head, Department of Electrical Engineering and Professor: John D. Aspnes, P.E.
Associate Professors: Kenneth J. Kokjer, P.E.; George Mulligan, P.E.
Assistant Professors: Joseph G. Hawkins, Charles E. Mayer, B. David Spell, P.E.,
Gerald Walker

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 bachelor degree in electrical engineering. Students with bachelor degrees
in other fields should work out a program to remove background deficiencies with their graduate committee.

General University requirements, as well as 32 credits of course work approved by the student's advisory committee, must be completed beyond the Bachelor of Science degree. 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 six credit hours of research may be allowed under special circumstances. The M.E.E. is structured for completion in two semesters. Candidates for the M.E.E. degree must pass the fundamentals of engineering examination made available by the Alaska State Board of Registration. Candidates must also pass a written and oral comprehensive examination in the final semester of study.

Electrical Engineering -- M.S. Degree

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

Thirty credits of courses beyond the B.S. degree approved by a student's graduate committee must be completed, as well as general university requirements. 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 the fundamentals of engineering examination made available by the Alaska State Board of Registration. Candidates must also pass a written and oral comprehensive examination in the final semester of study.

Engineering and Science Management

Degrees: M.S.
Minimum Requirements for Degrees: 33 credits (beyond a bachelor's degree in engineering or a scientific field)

The engineering and science management curriculum is designed for graduate engineers and scientists who will hold executive or managerial positions in engineering, construction, industrial, or governmental organizations. The curriculum includes human relations, financial, economic, quantitative, technical and legal subjects useful in solving problems of management.

The curriculum includes graduate-level core courses in the subjects named above, plus additional course work either directed toward special problems such as arctic engineering or in one of the more general fields of engineering or science through projects or research in the application in management principles. In addition to an undergraduate degree, a candidate should have had on-the-job experience in engineering or science.

Candidates for the engineering management degree must hold a previous degree in an engineering discipline; candidates for the science management degree must hold a degree in a natural or physical science.

Faculty
Head, Department of Engineering and Science Management and Professor: F. Lawrence Bennett, P.E.
Associate Professor: H. Andrew Scott, P.E. (visiting)
Lecturers: Clark R. Milne, P.E., B.G. Olson

Engineering Management -- M.S. Degree
Science Management -- M.S. Degree

1. Complete the general university requirements and master's degree requirements.
2. Complete the following degree and program (major) requirements:
   a. Nine credits, including: ........................................... 9
      ESM 601--Engineers in Organization .................................. 3
      ESM 609--Project Management or  
      BA 643--Marketing Management* ..................................... 3
      A third course chosen from:  
      BA 643--Marketing Management* ..................................... 3
      ESM 608--Legal Principles for ESM ................................... 3
      ESM 609--Project Management ......................................... 3
      BA 661--Human Resource Management* ................................ 3
   b. Six credits, chosen from ........................................... 6
      ESM 605--Engineering Economy ....................................... 3
      ACCT 602--Financial Accounting  
      Concepts for Administrators* ....................................... 3
      BA 625--Financial Management ....................................... 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.
   c. Six credits, chosen from ........................................... 6
      ESM 620--Statistics for ESM ......................................... 3
      ESM 621--Operations Research  
      BA 605--Management Information Systems* ................................ 3
   d. ESM 684--Project: 3 credits ....................................... 3
   e. Nine credits of electives in the student's  
      technical specialty ................................................... 9

TOTAL ............................................................................. 33

*No more than twelve (12) credits may be taken in the School of Management.

In addition to completing the 33 credits indicated above, a candidate must  
prove competence in computer programming by passing a programming course  
or a qualifying examination.

Substitutes for one or more of the courses listed above are permitted if similar  
courses are included in the student’s previous academic background. Nor more than  
ine credits of appropriate graduate-level course work completed at other institutions  
with a grade of A or B may be transferred and applied toward the total 33 credits of  
required and elective courses. Both substitutes and transfer of credit must be  
approved by the department.

At least 24 Credits, including thesis and research, must be at the 600 level.

Environmental Quality Engineering and Science

Degrees: M.S.

Minimum Requirements for Degrees: 30 credits

The environmental quality engineering 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 pollution, air pollution and 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, an interdisciplinary  
program is available leading to the Master of Science in Environmental Quality  
Science.

Faculty
Program Coordinator and Professor: Timothy Tilsworth, P.E.
Professor: Robert F. Carlson, P.E.; Ronald A. Johnson, P.E.
Associate Professor: Edward J. Brown

Environmental Quality Engineering – M.S. Degree
Environmental Quality Science – M.S. Degree

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete the following degree and program (major) requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQE 601</td>
<td>EQE Measurements</td>
<td>3</td>
</tr>
<tr>
<td>EQE 602</td>
<td>Engr. Mgmt. of Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>EQE 603</td>
<td>Solid Waste and Air Pollution</td>
<td>3</td>
</tr>
<tr>
<td>EQE 604</td>
<td>Environ. Quality Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>EQE 605</td>
<td>C/P Process</td>
<td>3</td>
</tr>
<tr>
<td>EQE 606</td>
<td>Biological Treatment Processes</td>
<td>3</td>
</tr>
<tr>
<td>*EQE 693</td>
<td>Special Topics</td>
<td>0-3</td>
</tr>
<tr>
<td>*EQE 697</td>
<td>Individual Study</td>
<td>0-6</td>
</tr>
<tr>
<td>*EQE 698</td>
<td>Research/Special Project</td>
<td>3</td>
</tr>
<tr>
<td>*EQE 699</td>
<td>Thesis</td>
<td>0-6</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>6-9</td>
</tr>
</tbody>
</table>

*Electives, thesis, and/or special projects must have approval of the advisory committee.

A minimum of 30 credits of approved and required courses must be completed. Thesis study (6 credits) is optional. At least 24 credits, including thesis and/or research, must be at the 600 level.

Thesis Option:
- Thesis: 6
- Required courses: 18
- Electives: 6

Non-Thesis Option:
- Special Project: 3
- Required courses: 18
- Electives: 9

All science majors will be expected to have completed a formal course in computer programming, either BASIC or FORTRAN, and introductory calculus, with a minimum grade of B. This requirement will be treated as a deficiency for those students who have not met it.

Mechanical Engineering

Degrees: M.S.
Minimum Requirements for Degrees: M.S.--30 credits

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, applied research, development and management. A degree in mechanical engineering also frequently forms the base for entering law, medical, or business school, as well as graduate work in engineering.

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
Head, Department of Mechanical Engineering and Professor: Ronald A. Johnson, P.E.
Professors: Vincent S. Haneman, Jr., P.E., Jim B. Tiedemann, P.E., John P. Zarling, P.E.
Associate Professor: Deben K. Das, P.E., Terry McFadden, P.E.
Mechanical Engineering – M.S. Degree

Degree Requirements:
1. Complete general university requirements and master’s degree requirements.
2. Complete the following program (major) requirements:
   a. Mathematics Core ........................................... 6
      Select at least two of the following:
      Math. 421--Applied Analysis I ............................. 4
      Math. 422--Applied Analysis II ............................ 4
      Math. 423--Applied Mathematics .......................... 3
      Math. 310--Numerical Analysis ............................ 3
      Any 600 level mathematics course ........................ 3
   b. Mechanical Engineering Core ............................... 12
      Select at least four of the following:
      M.E. 601--Finite Element Analysis ........................ 3
      M.E. 604--Experimental Mechanics ........................ 3
      M.E. 617--Power Analysis ................................. 3
      M.E. 631--Advanced Mechanics of Materials .............. 3
      M.E. 634--Advanced Materials Engineering .............. 3
      M.E. 641--Advanced Fluid Mechanics ........................ 3
      M.E. 642--Advanced Heat Transfer ........................ 3
      M.E. 685--Arctic Heat Transfer and Mass Transfer ....... 3
   c. Approved Electives ........................................ 6
      Any M.E. or other engineering/science/mathematics graduate courses approved
      by the student’s advisory committee.
   d. M.E. 699--Thesis ........................................... 6
   e. NOTE: All students must take at least one course in the mechanical systems
      sequence (M.E. 601, 631, 634) and one from the fluids/thermal science
      sequence (M.E. 641, 642).

Total .................................................. 30

Candidates for the M.S. in Mechanical Engineering must pass the Engineering-in-
Training Examination or the Graduate Record Examination in Engineering.

School of Fisheries and Ocean Sciences

Vera Alexander, Acting Dean

The School of Fisheries and Ocean Sciences (SFOS) was created in 1987. It is
the 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 science, 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 oceanography. Fisheries degrees at the Ph.D.
level are presently undertaken on an interdisciplinary basis, but a formal Ph.D.
program in fisheries is being developed.

The School of Fisheries and Ocean Sciences is home to research institutes,
academic programs, and public service components throughout the state. Fisheries
science degrees are offered through the Program in Fisheries by UAF at the Fairbanks
Campus and at Juneau, where faculty, formerly with the School of Fisheries and
Sciences at the University of Alaska Southeast (formerly the University of Alaska
Juneau), are now affiliated with the Juneau Center for Fisheries and Ocean Sciences, a
research unit of UAF. The Institute of Marine Science has facilities in Fairbanks and
Seward. Its faculty, through the Graduate Program in Marine Sciences and Limnology, instruct and supervise students seeking marine biology and oceanography degrees. 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.

Program in Fisheries

Degrees: M.S.
Minimum Requirements for Degree: M.S.--30 credits

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 is in Prince William Sound and Cook Inlet.

The Juneau Center for Fisheries and Ocean Sciences (JCFOS) houses the UAF Fisheries Science Program in southeast Alaska. JCFOS has well equipped labs and a 42-foot research vessel. 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.

Faculty
(Faculty research affiliations within SFOS as noted)
Professor: Richard Gard (JCFOS), Jong S. Lee (FITC), Ole A. Mathisen (JCFOS)
Associate Professor: Willard E. Barber, Robert M. Fagen (JCFOS), John S. French (FITC), Anthony J. Gharrett (JCFOS), Lewis J. Haldorson (JCFOS), Terrance J. Quinn II (JCFOS), James B. Reynolds, Thomas C. Shirley (JCFOS), William W. Smoker (JCFOS)
Assistant Professors: Jeremy S. Collie (JCFOS), Charles A. Crapo (FITC), William D. Eaton (JCFOS), Brian H. Himelbloom (FITC), Jeffrey C. Nash (FITC)

Fisheries Science – M.S. Degree

Degree Requirements:
1. Complete general university requirements for master's degree.
2. The following core courses or their equivalent are required:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FISH 630--Quantitative Fisheries Science</td>
<td>3</td>
</tr>
<tr>
<td>Biol. 650--Fish Ecology</td>
<td></td>
</tr>
<tr>
<td>or OCN 640--Fisheries Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>Biol. 473--Limnology</td>
<td></td>
</tr>
<tr>
<td>or OCN 650--Biological Oceanography</td>
<td>3</td>
</tr>
</tbody>
</table>

Graduate Program in Marine Sciences and Limnology

Degrees: M.S., Ph.D.
Minimum Requirements for Degree: M.S. 30 credits (beyond a bachelor's degree), Ph.D. (open).

The curriculum in the Marine Sciences program provides academic opportunities for students seeking M.S. and Ph.D. degrees in oceanography and marine biology. At the M.S. level, the curriculum emphasizes ocean related course work in the various disciplines of oceanography (physical, biological, chemical, geological and fisheries) and marine biology. Additional courses are selected from the university curriculum at large to assure a high level of competence in the student's area of major interest.

Working in cooperation with the Institute of Marine Science, graduate students are afforded excellent opportunities for field and laboratory research through association with a large staff of oceanographers and marine biologists. Oceanographic
studies are carried out aboard the research vessel Alpha Helix, while laboratory research is conducted at the Seward Marine Center and on the Fairbanks campus.

Graduate students are admitted on the basis of their ability and the capability of the Graduate Program in Marine Sciences and Limnology to meet their particular needs. Each application is reviewed by the program faculty. Requests for admission are considered throughout the year. Stipends for student support are awarded on a competitive basis.

**Faculty** *(All faculty are affiliated with the Institute of Marine Science).*

*Program Head and Professor: William S. Reeburgh*


*Assistant Professors: Walter R. Johnson, George W. Kipphut, David L. Musgrave, Brenda L. Norcross*

**Oceanography**

Oceanography is both interdisciplinary and multidisciplinary. The emphasis in oceanography 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 (physical, chemical, biological, geological, fisheries) and marine biology. Limnological research projects are also undertaken under the oceanography degree. The Ph.D. degree is offered oceanography. Students entering both the M.S. and Ph.D. program are expected to complete a core curriculum dealing with the various areas of oceanography. Additional courses are selected from other areas in the university to assure a high level of competence in the student's area of major interest. Research is the major emphasis in the M.S. and Ph.D. programs. Challenging and significant problems are available for degree research.

Opportunities for laboratory and field work are available through the School of Fisheries and Ocean Sciences and the Institute of Marine Science. These include laboratories at Fairbanks, the Seward Marine Center, the Juneau Center for Fisheries and Ocean Sciences, and the Fishery Industrial Technology Center at Kodiak. Research vessels operated by the institute and school include the R/V Alpha Helix which has open ocean capabilities and operates in Alaskan coastal waters, the Gulf of Alaska, and the Bering Sea, the R/V Little Dipper which operates on day trips in Resurrection Bay, and the R/V Maybeso which operates in southeast Alaskan waters. Laboratory facilities include a seawater system at Seward and a variety of modern and analytical instrumentation, including mass spectrometers, a variety of alpha, gamma and beta counting equipment, a flow cytometer facility and a variety of gas and liquid chromatography equipment. Mainframe and personal computing facilities are readily accessible to graduate students.

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. Requests for admissions are considered continually and each application is reviewed by the department faculty. Stipends for financial support are awarded competitively. 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. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits including MSL 620, 630, 650 and 660 (or equivalents). All fisheries oceanographers must take MSL 640 and any three of the above courses. All oceanographers will complete 3 cr of seminar (MSL 692). At least 24 credits, including thesis and/or research, must be at the 600 level.
3. Oceanography majors must demonstrate field experience aboard an oceanographic vessel.

Marine Biology -- M.S. Degree

A graduate curriculum in marine biology is offered by the Graduate Program in Marine Sciences and Limnology. Marine biology and biological oceanography have different foci. Marine biology focuses on the organisms, while biological oceanography focuses on how biological processes influence and are influenced by the ocean environment.

Graduate students are afforded excellent opportunities for laboratory and field research through the Institute of Marine Science. Laboratory facilities are available at Fairbanks, the Seward Marine Center, the Juneau Center for Fisheries and Ocean Sciences, the Fishery Industrial Technology Center at Kodiak, and at a number of coastal field sites. Opportunities for field work are available on the R/V Alpha Helix which operates along the Alaskan Coast and in the Bering Sea, on the R/V Little Dipper which operates in Resurrection Bay, and on the R/V Maybe so which operates in Southeast Alaska.

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. Requests for admissions are considered continuously and each application is reviewed by the department faculty. Stipends for financial support are awarded competitively. Limited fellowship support is available. Most students are supported on research projects that relate directly to their degree research.

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits including MSL 610, MSL 611, MSL 615; three credits of MSL 692, and any one of the following: MSL 620, 630, 650, 660, or BIOL 652. At least 24 credits, including thesis and/or research, must be at the 600 level.

Oceanography -- Ph.D. Degree

There are no fixed course requirements, nor is an M.S. degree required to earn the Ph.D. degree. This degree is awarded for proven ability and scholarly attainment and each candidate's program is planned with their graduate advisory committee. A candidate for the Ph.D. degree in the Marine Sciences program will be expected to have course work at least equivalent to that required for the M.S. degree.

School of Management

Michael L. Rice, 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 graduate program is designed to provide management education for students with a wide variety of undergraduate degrees. The objectives of the school impose the obligation to prepare literate, articulate and liberally educated business specialists, knowledgeable in fundamental economic laws, accounting and information systems, and keenly sensitive to interpersonal relationships and the dignity of the individual. The school seeks to provide the technical knowledge of the accounting, economics and management professions while also emphasizing an awareness of our society and its ethical, moral and cultural values. All of these programs are designed to emphasize the problems and circumstances unique to Alaska, including treatment of
start-up or venture management, international trade, regional economic development, regulation, financial institutions and markets, transportation, natural resource economics, hotel administration, and a comprehensive professional program in accounting.

The school offers the Master of Business Administration degree and the Master of Science in resource economics.

**Business Administration**

**Degrees:** M.B.A.

**Minimum Requirements for Degree:** M.B.A.--30 credits

The business administration department offers professional training in the field of management to those individuals interested in entering industry or government upon graduation. The objective of the program is to prepare men and women to meet the complex problems of the political, economic, and social environment and to enable them to give efficient service to industry and government on the basis of their academic training.

The MBA program is accredited by the American Assembly of Collegiate Schools of Business (AACSB).

**Faculty**

*Business Administration*

*Head, Department of Business Administration and Professor:* Peter G. Biesiot  
*Professors:* David B. Hoffman, William G. Phillips, Michael L. Rice  
*Associate Professors:* Marvin J. Andresen, Anne Marie Francesco, John A. Lehman, Mary Lindahl, Ralph W. Nester, John N. Taylor, Paul C. Taylor, Howard Zach  
*Assistant Professors:* Joseph Ben-ur, Cory R. Borgeson (adjunct), Laura M. Milner, R. Kelley Pace, Mark Speece  
*Lecturers:* Richard W. Hompesch III, Charles Dexter

*Accounting*

*Head, Department of Accounting, Graduate Director of MBA program and Professor:* M. Burton Olen  
*Professor:* Milton A. Fink, B. Henry Wichmann  
*Associate Professor:* Thomas E. Bartlett, Ken Boze, Clifford T. Cox, E. Thomas Robinson

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

**Admission Requirements:**
1. Admission to the M.B.A. is open to any person possessing an undergraduate degree whose grade point average and score on the Graduate Management Admission Test indicates a potential for satisfactory completion of the program.
2. Entering students will be required to possess competence at the undergraduate level in the fields of accounting, economics, quantitative methods, calculus, management and marketing. Prior to initial enrollment, the student’s record will be reviewed to determine whether deficiencies exist which must be remedied before M.B.A. core work is undertaken.

**Degree Requirements:**
1. Complete the general university requirements and master’s degree requirements.
2. Complete a minimum of 30 semester hours (including 24 hours in the required core) of courses in business administration, accounting, and economics as approved by the candidate’s graduate committee. At least 24 credits, including research and/or thesis, must be at the 600 level.
3. Earn a passing score for a comprehensive written examination generally taken during the last semester of course work to test achievement and knowledge in the general area of business and specialized courses.
4. Students who elect to write a thesis must pass an oral defense of thesis examination.

**M.B.A. Requirements:**

Recognizing that competence in the practice of management necessitates training in both breadth and depth, the MBA program at the University of Alaska Fairbanks consists of 18 courses, or the equivalent of a two-year program. The course is divided into two segments, as follows:

1. **Foundation Courses:**
   
   Admission to the program is open to those who hold undergraduate degrees in a wide variety of disciplines. The foundation courses are offered to provide the basic environmental concepts, the required analytical tools, including calculus, and the functional knowledge of business which are prerequisites to the advanced MBA core courses. Individuals with undergraduate degrees in business from accredited institutions, or with adequate preparation may waive foundation courses in those areas. Thus, it is possible that some individuals could accomplish the degree requirements with the successful completion of the 30 hours of MBA core courses.

   | Course                                      | Credits |
---|---------------------------------------------|---------|
| Foundation Courses                          |         |
| Econ. 611--Principles of Economic Analysis  | 3       |
| B.A. 603--The Process and Legal Environment of Management | 3       |
| B.A. 605--Management Information Systems    | 3       |
| B.A. 606--Quantitative Analysis             | 3       |
| B.A. 625--Financial Management              | 3       |
| B.A. 643--Marketing Management              | 3       |
| B.A. 608--Organizational Theory             | 3       |
| Total Required Foundation Courses           | 24      |

2. **Advanced MBA Core Courses:**

The MBA core courses constitute the second year in the program. Admission to the MBA core courses presupposes completion of the foundation core courses. At the discretion of the MBA Committee, a student who has met the majority of the prerequisite requirements may be permitted to enroll in an MBA core course prior to completion of the foundation core program.

   | Course                                      | Credits |
---|---------------------------------------------|---------|
| Advanced M.B.A. Core Courses               |         |
| Econ. 624--Managerial Economics             | 3       |
| Acct. 650--Management Accounting Seminar    | 3       |
| B.A. 651--Organizational Behavior           | 3       |
| B.A. 680--Seminar in Finance                | 3       |
| B.A. 683--Seminar in Marketing              | 3       |
| B.A. 684--Production and Operations         |         |
| Management                                  | 3       |
| B.A. 690--Administrative Policy             | 3       |
| B.A. 691--Research Methods and Design      | 3       |
| B.A. 698--Research Project                  | 3       |
| An elective chosen from B.A. 661--Human Resource Management, Econ. 603--Macro Economic Theory, or other electives approved by the graduate committee | 3       |
| Total Required M.B.A. Core Courses          | 30      |
| Total Program Requirements                  | 54      |

3. Candidates with an undergraduate major or an emphasis in Economics will substitute an additional elective approved by the Graduate Committee for Managerial Economics--Econ. 624.

4. Students writing a thesis, will substitute 6 credits of thesis for B.A. 698, research project, and 3 credits of electives.
Economics

Degrees: M.S.
Minimum Requirements for Degree: M.S. --30 credits

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 work 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
Head, Department of Economics and Assistant Professor: Monica Thomas
Associate Professors: John Boyce, Kristen Keith, J. Patrick O'Brien, Yeung-nan Shieh
Assistant Professors: Richard Adu-Asamoah (visiting), Chris Fawson, Yong U. Glasure (visiting), Robert R. Logan, Steven Yen (visiting)

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 aptitude sections of the Graduate Record Examination.

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete a minimum of 30 credits of course work, including Econ. 699 -- Thesis, in the field of resource economics. At least 24 credits, including thesis, must be at the 600 level.
3. Program Requirements:
   Required Courses: ......................................................... Credits
   Econ. 601 -- Microeconomic Theory I .................................. 3
   Econ. 603 -- Macroeconomic Theory I ................................. 3
   Econ. 623 -- Mathematical Economics .................................. 3
   Econ. 626 -- Econometrics .............................................. 3
   Econ. 635 -- Resource Economics I .................................... 3
   Econ. 636 -- Resource Economics II ................................... 3
   Econ. 670 -- Seminar in Research Methodology ........................ 0
   Elective Courses: must be approved by graduate committee (minimum) ........................................ 6
   Thesis: (minimum) .................................................... 6

Emphasis in Mineral Economics
I. In addition to the requirements stated above, students pursuing an emphasis in Mineral Economics are expected to have completed the following course work:
introduction to mineral industry, mineral valuation, operations research, mining law, mining geology and at least one course in financial management.
2. Complete the general university requirements and master's degree requirements.
3. Complete a minimum of 33 credits of course work, including Econ. 699--Thesis, in the field of mineral economics. At least 27 credits, including thesis, must be at the 600-level.
4. Emphasis Requirements:

   Required Courses: ............................................. Credits
   Econ. 601--Microeconomics Theory .................................. 3
   Econ. 603--Macroeconomics Theory .................................. 3
   Econ. 623--Mathematical Economics .................................. 3
   Econ. 626--Econometrics or
   Min. 635--Geostatistical Ore
   Reserve Estimation ............................................. 3
   Econ. 635--Resource Economics ................................... 3
   Econ. 636--Resource Economics II ................................ 3
   Econ. 670--Seminar in Research Methodology ...................... 0
   Min. 621--Advanced Mineral Economics ............................ 3
   B.A. 680--Seminar in Finance ................................... 3
   Econ. 699--Thesis .............................................. 6
   Approved Elective ............................................. 3

*Students who have successfully completed differential equations may substitute an approved elective for Econ. 623.

School of Mineral Engineering

Donald J. Cook, Dean

Mankind's 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 Mining Extension Programs.

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-level programs are offered in geological engineering, mining engineering, mineral preparation engineering and petroleum engineering in conjunction with the research activities of the Mineral Industry Research Laboratory (MIRL) and the Petroleum Development Laboratory (PDL).

Mining and Geological Engineering

The Department of Mining and Geological Engineering has statewide responsibility for academic instruction in the fields of geological engineering and mining engineering. Overall, 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.
Faculty
Head, Department of Mining and Geological Engineering and Associate Professor: Robert C. Speck
Professors: David R. Maneval, P.D. Rao, Frank J. Skudrzyk
Associate Professors: Sukumar Bandopadhyay, Scott L. Huang, Nils I. Johansen, P.E., Mritunjoy Sengupta, Warrack Willson (visiting)
Assistant Professor: H.K. Lin, Paul Metz
Instructor: Daniel E. Walsh

Geological Engineering

Degrees: M.S.
Minimum Requirements for Degree: M.S.--30-33 credits.

Geological engineering is a branch of engineering dealing with the application of geology. Geological engineers work with the human environment in the true sense of the word. Properties of earth materials, exploration activities, geophysical and geochemical prospecting, geotechnical engineering, site investigations and engineering geology are all phases of geological engineering.

The Master of Science in Geological Engineering degree consists of a core program and electives in either geotechnical engineering or exploration engineering. University policies pertaining to graduate study leading to a master's degree apply as approved by the student's adviser and the Department of Mining and Geological Engineering faculty.

Geological Engineering -- M.S. Degree -- Thesis Option

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. Complete the following program (major) requirements:
   Fall Semester .................................................. 15 Credits
   Min. 621--Advanced Mineral Economics ................ 3
   Min. 631--Research Methods ................................. 3
   G.E. 666--Advanced Engineering Geology or
   G.E. 675--Applied Mining Geology .......................... 3
   Approved Technical Electives .............................. 3
   G.E. 471--Remote Sensing for Engineers .................. 3
   Spring Semester ................................................ 15 Credits
   Approved Technical Electives (minimum) ............... 3
   Thesis (maximum) .............................................. 12
   Total Minimum ................................................ 30
3. Electives will consist of an approved course in study which will prepare the student for either exploration engineering or geotechnical engineering.
4. All graduate students will be expected to acquire some teaching and/or research experience in addition to thesis work as part of their M.S. degree program.
5. At least 24 credits, including thesis and/or research, must be at the 600 level.

Geological Engineering -- M.S. Degree -- Non-Thesis Option

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. Complete the following program (major) requirements:
   Courses ....................................................... Credits
   Min. 621--Advanced Mineral Economics ................ 3
   Min. 631--Research Methods ................................ 3
   G.E. 666--Advanced Engineering Geology or
   G.E. 675--Applied Mining Geology ........................ 3
   G.E. 471--Remote Sensing for Engineers ................. 3
   Approved Technical Electives (minimum) ............... 18
Report/Research ................................................. 3-6
Total Minimum ................................................. 33

3. Electives will consist of an approved course of study which will prepare the student for either exploration engineering or geotechnical engineering.

4. At least 24 credits, including report and/or thesis, must be at the 600 level.

**Mining Engineering**

Degree: M.S., E.M.

**Minimum Requirements for Degrees:** M.S.--30-36 credits; E.M.--thesis and 5 years of experience

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 curricula consist of required and elective course work as outlined below. University policy pertaining to graduate study leading to a master's degree apply as approved by the student's adviser and the Mining Engineering faculty.

**Professional Degree** -- The graduate program also leads to 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 a satisfactory thesis.

**Mining Engineering -- M.S. Degree -- Thesis Option**

**Degree Requirements:**

1. Complete the general university requirements and graduate degree requirements.

2. Complete the following program (major) requirements:

   **Fall Semester** ............................................. 15 Credits
   - Min. 631--Research Methods in Mineral Engineering ............................................ 4
   - Min. 637--Mine Systems Simulation or Min. 673--Theoretical and Experimental Methods in Rock Mechanics ............................................ 3
   - Min. 621--Advanced Mineral Economics .................................................. 3
   - Approved Technical Electives ........................................................................ 3-6
   - Min. 688--Graduate Seminar I ........................................................................ 1

   **Spring Semester** .............................................. 15 Credits
   - Min. 433--Mining Access, Safety, and Environmental Law ...................................... 3
   - Min. 689--Graduate Seminar II .......................................................... 1
   - Min. 699--Thesis* .................................................................................. 6
   - Approved Technical Electives ........................................................................ 3-6
   - Total ............................................................................... 30

*6 credit maximum. At least 24 credits, including thesis, must be at the 600 level.

3. All graduate students will be expected to acquire some teaching and/or research experience in addition to thesis work as part of their M.S. degree requirements.

4. Technical electives will consist of 9 course credits approved by the advisory committee to prepare the student for thesis work. At least two of the technical electives must be taken from the following list:

   - C.E. 603--Arctic Engineering .............................................................. 3
   - Pet.E. 666--Arctic Drilling and Well Completion ........................................ 3
   - Min. 635--Geostatistical Ore Reserve Estimation ........................................ 3
   - Min. 646--Mining Engineering in the Arctic ........................................... 3
   - Min. 647--Advanced Underground Mine Design ....................................... 3
   - Min. 673--Theoretical and Experimental.................................................... 3
Mining Engineering — M.S. Degree — Non-Thesis Option

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. Complete the following program (major) requirements:
   - Required courses: 15 credits
     - Min. 631--Research Methods in Mineral Engineering
     - Min. 637--Mine Systems Simulation or
     - Min. 673--Theoretical and Experimental Methods in Rock Mechanics
     - Min. 621--Advanced Mineral Economics
     - Approved Technical Electives**
     - Min. 688--Graduate Seminar I
     - Min. 698--Report/Research (major)
   - Total Minimum: 36 credits

At least 24 credits must be at the 600 level.

**See list of approved technical electives under item 4, thesis option above.

Engineer of Mines — E.M. Degree

Degree Requirements:
1. The applicant must be a graduate from the School of Mineral Engineering, University of Alaska Fairbanks, with an engineering degree.
2. A minimum of five years of responsible engineering work is required.
3. An acceptable thesis must be submitted. An "acceptable thesis" is defined as a demonstration of professional competence combined with normal research methods working with the student's committee.

Admission Requirements:
1. The applicant must complete and submit a University of Alaska Fairbanks graduate application for admission form to the Director of Admissions and Records for the engineer of mines degree program. Included with the application must be a resume of engineering work experience as mentioned above in point 2.
2. The application will be reviewed by the dean of the School of Mineral Engineering for acceptance recommendation and concurrence with the thesis topic selected.

Thesis:
1. The thesis will be prepared to meet the formal requirements as outlined in the Graduate Manual, including filing a copy in the university library.
2. Submission of the thesis should follow the same procedures and lead times, as the submission of the application for graduation form.
3. 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, to assure that the thesis satisfactorily meets the degree requirements and finally approve the thesis. A defense of thesis, oral or written, will be made to the committee.

Class work beyond the initial degree is not required, and credits for the thesis will be a minimum of six. Registration at UAF during the semester of the thesis submittal is required.
Mineral Preparation Engineering

Degree: M.S.
Minimum Requirements for Degree: 30-33 credits beyond Bachelor's degree.

Mineral Preparation Engineering – M.S. Degree – Thesis Option

Degree Requirements:
1. Complete the general university requirements and master's degree requirements.
2. Complete the following degree and program requirements:

Fall Semester .................................................. 15 Credits
M.Pr. 601--Froth Flotation ................................ 3
M.Pr. 433--Coal Preparation ................................ 3
Min. 621--Advanced Mineral Economics ............. 3
G.E. 431--Applied Ore Microscopy ..................... 2
M.Pr. 699--Thesis ........................................... 4

Spring Semester .................................................. 15 Credits
M.Pr. 684--Mineral Preparation Research ............. 3
M.Pr. 606--Plant Design .................................... 3
M.Pr. 699--Thesis ........................................... 3
*Electives ....................................................... 6
Total ............................................................. 30

Mineral Preparation Engineering – M.S. Degree – Non-Thesis Option

Degree Requirements:
1. Complete the general university requirements and graduate degree requirements.
2. Complete the following degree and program requirements:

Required Course .................................................. Credits
M.Pr 601--Froth Flotation ................................ 3
M.Pr 433--Coal Preparation ................................ 3
Min. 621--Advanced Mineral Economics ............. 3
G.E. 431--Applied Ore Microscopy ..................... 2
M.P.R 698--Report/Research ............................. 3-6
Min./M.P.R 888--Seminar ................................ 1
M.Pr 684--Mineral Preparation Research ............. 3
M.Pr 606--Plant Design .................................... 3
*Electives (minimum) ......................................... 12
Total Minimum .................................................. 33

*Electives will be in the field of chemistry, physics, and mathematics and will be chosen to broaden the candidate's knowledge, depending upon his/her specific background and interest. Electives must be at 600 level.

Petroleum Engineering

Degree: M.S.
Minimum Requirements for Degree: M.S.--30-33 credits.

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 with B.S. degrees in petroleum, chemical or mechanical engineering may be accepted to the programs as full fledged candidates while those with degrees in peripheral fields may be accepted without class standing and advanced to unconditional acceptance following the completion of certain prerequisite courses. A number of generous research and teaching assistantships are available for the qualified candidate.

Faculty

Head, Department of Petroleum Engineering and Associate Professor: Russell D. Ostermann

Professor: G.D. Sharma

Assistant Professors: Kaveh Dehghani, Vidyadhar Kamath, David Ogbe, Saad T. Saleh

Petroleum Engineering -- M.S. Degree -- Thesis Option

1. General requirements:
   a. The student must complete the general university requirements and master's degree requirements;
   b. The student must complete at least 24 semester units of course work and a minimum of 6 units of thesis detailing the research done on a project approved by the student's committee;
   c. The student must earn a satisfactory score on a written comprehensive exam prior to submission of the thesis, and must subsequently present an oral defense of the thesis.

2. Course Requirements: Core courses for a total of 12 semester hours will be required of all students for the Master of Science degree in petroleum engineering. These courses are listed below:

   a. Core Courses ......................................................... Credits
      C.E. 603--Arctic Engineering .................................. 3
      Pet.E. 610--Advanced Reservoir Engineering .................. 3
      Pet.E. 620--Introductory Graduate Seminar ................... 1
      Acct. 623--Property Valuation and
      Petroleum Accounting ........................................... 3
      Pet.E. 650--Advanced Topics in
      Petroleum Engineering ........................................... 2

   b. In addition, 3 hours of advanced level mathematics and 3 hours of geology electives must be completed. Course selection will be subject to the approval of the student's committee.
      Advanced Math Elective ......................................... 3
      Geology Elective .................................................. 3

   c. Two additional petroleum engineering electives will be required from the following list of courses to be offered in rotation, each course being taught every third semester:
      Pet.E. 662--Enhanced Oil Recovery ............................ 3
      Pet.E. 663--Advanced Reservoir Simulation .................... 3
      Pet.E. 664--Geothermal Reservoir
      Engineering ....................................................... 3
      Pet.E. 665--Advanced Phase Behavior .......................... 3
      Pet.E. 666--Arctic Drilling and
      Well Completion .................................................. 3
      Pet.E. Elective ..................................................... 6


   Total ................................................................. 30
Petroleum Engineering -- M.S. Degree -- Non-Thesis Option

All of the requirements for the M.S. Thesis Option must be met except that the thesis requirements and credits are replaced with 6 additional credits of Petroleum Engineering course work and submission of an engineering design report for 3 credits.

1. General Requirements:
   a. The student must complete the general university requirements and master's degree requirements;
   b. The student must complete at least 30 semester units of course work and a minimum of 3 credits in an engineering design report approved by the student's committee;
   c. The student must earn a satisfactory score on a written comprehensive exam.

2. Course Requirements: Core courses for a total of 12 semester hours will be required of all students for the Master of Science degree in petroleum engineering. See a. under the thesis option for a listing of these courses.
   In addition, 3 hours of advanced level mathematics and 3 hours of geology electives must be completed. Course selection will be subject to the approval of the student's committee. Four additional petroleum engineering electives will be required from the list of courses in c. under the thesis option.
   Complete the following: .................................................. Credits
   Pet.E. 698 -- Engineering Project .................................... 3
   Total ................................................................. 33
Course descriptions are included for all graduate level (600) courses. Titles only are listed for upper division (300-400 level) undergraduate courses. No lower division (100-200 level) courses are included as these are not allowable for credit in graduate degree programs. They may, however, be required where deficiencies must be rectified.

Course Numbers
300-499--Upper-division courses.
600-699--Graduate courses.
Special or Reserved Numbers--Courses identified with numbers ending in -92 are seminars; ending in -93 are special topics courses, approved to be offered only during one academic year; -94, approved trial courses; -95, special topics summer session courses, offered only during the summer; -97 indicates individual study -98 individual research; -99, thesis.

Courses identified with these special or reserved numbers may be available at all levels at the discretion of any department, although offerings above the level of approved programs must be approved in advance by the Vice Chancellor for Academic Affairs (e.g., 600-level offering in areas without approved graduate programs). These courses may be repeated for credit.

Course Credits
One 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, and no more than one credit may be earned per week, per student.

Following the title of each course, the figures in parentheses indicate the number of lecture and laboratory hours the class meets each week for one semester. The first indicates lecture hours; the second, laboratory. For example (2+3) indicates that a class has two hours of lecture and three hours of laboratory work each week.

The number of credits listed is for each semester. Thus "3 credits" means three credits may be earned. Credit may not be given more than once for the completion of a course unless the course has been designated as repeatable for credit.

Accounting

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Acct. 472 3 Credits Spring Computer Control and Advanced Auditing (3+0)
Acct. 473 3 Credits Fall Applied Systems Design (3+0)
Acct. 481 1 Credit As. Dem. Wmts. Personal Tax Planning (1+0)
Acct. 482 1 Credit As Dem. Wmts. Business Tax Planning (1+0)
Acct. 483 1 Credit As Dem. Wmts. Estate Tax Planning (1+0)
Acct. 602 3 Credits Spring Financial Accounting Concepts for Administrators (3+0)
Acct. 623 3 Credits As Demand Warrants Land Valuation and Petroleum Accounting (3+0)
Acct. 650 3 Credits Spring Management Accounting Seminar (3+0)
Acct. 300 1-3 Credits Fall, Spring, Agriculture and Land Resources
A.L.R. 310 3 Credits Spring Agricultural Concepts and Techniques (3+0)
A.L.R. 360 3 Credits Alternate Spring Outdoor Recreation Planning (3+0)
A.L.R. 400 3 Credits Alternate Spring Natural Resource Policies (3+0)
A.L.R. 401 3 Credits Alternate Spring Natural Resources Legislation (3+0)
A.L.R. 403 4 Credits Alternate Spring Managing Food Production Systems (3+0)
A.L.R. 425 2 Credits Spring Alaska's Reindeer Industry (2+0)
A.L.R. 430 3 Credits Spring Land-Use Planning (3+0)
A.L.R. 460  3 Credits  Fall  A.L.R. 461  3 Credits  Alternate Spring
Principles of Outdoor Recreation Management (2+3)
Interpretive Services (3+0)

A.L.R. 462  3 Credits  Fall  
Alaskan Environmental Education (3+0)
(Also as Ed. 462)

A.L.R. 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.)

A.L.R. 631  3 Credit  Spring
Planning Practicum (3+0)
Application of principles and processes through group projects focused on Alaska land or resource problems. (Prerequisite: A.L.R. 630 or permission of instructor.)

A.L.R. 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. Next offered: 1988-89.)

A.L.R. 675  3 Credits  Alternate Fall
Applied Ecosystem Science (3+0)
Modern concepts of ecosystem science and their applications 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. Next offered: 1988-89.)

A.L.R. 680  3 Credits  Alternate Fall
Environmental Decision-Making (3+0)
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. (Prerequisite: Graduate status or permission of instructor. Next offered: 1988-89.)

A.L.R. 690  3 Credits  Alternate Fall
Advance Topics in Resource Management (3+0)
Examines common and alternative assumptions basic to resource management approaches as expressed in global, national, or important local issues in resource management. (Prerequisite: Graduate standing or permission of instructor.)

Forest Sciences

A.L.R. 340  3 Credits  Spring  A.L.R. 370  3 Credits  Fall
Natural Resources Measurement (2+3)  Introduction to Watershed Management (2+3)

A.L.R. 450  3 Credits  Alternate Fall  A.L.R. 451  3 Credits  Alternate Spring
Forest Management (3+0)  Regeneration and Silviculture of Northern Boreal Forests (2+3)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Term</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>A.L.R. 452</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Forest Protection (3+0)</td>
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<tr>
<td>A.L.R. 453</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Harvesting and Utilization of Forest Products (3+0)</td>
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<tr>
<td>A.L.R. 640</td>
<td>3</td>
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<td>Simulation and Modeling in Resource Management (3+0)</td>
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<tr>
<td>A.L.R. 670</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Biometeorology (3+0)</td>
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<tr>
<td>A.L.R. 672</td>
<td>2</td>
<td>Alternate Fall</td>
<td>Dynamics of Nitrogen in Forest Ecosystems (2+0)</td>
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**Plant and Animal Sciences**

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<td>A.L.R. 312</td>
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<td>Introduction to Range Management (3+0)</td>
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<td>A.L.R. 313</td>
<td>4</td>
<td>Alternate Spring</td>
<td>Introduction to Plant Pathology (3+3)</td>
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<td>A.L.R. 320</td>
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<td>Alternate Fall</td>
<td>Introduction to Animal Science (2+3)</td>
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<tr>
<td>A.L.R. 321</td>
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<td>Applied Animal Nutrition (2+3)</td>
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<tr>
<td>A.L.R. 380</td>
<td>3</td>
<td>Spring</td>
<td>Soils (2+3)</td>
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<tr>
<td>A.L.R. 411</td>
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<td>Alternate Fall</td>
<td>Plant Propagation (2+3)</td>
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<tr>
<td>A.L.R. 412</td>
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<td>Alternate Fall</td>
<td>Field Crop Production (3+0)</td>
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<td>A.L.R. 420</td>
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<td>Alternate Spring</td>
<td>Animal Nutrition and Metabolism (3+0)</td>
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<tr>
<td>A.L.R. 480</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Soil Conservation (3+0)</td>
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<tr>
<td>A.L.R. 607</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Biotechnology (3+0)</td>
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<td></td>
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<td>(Same as EQE 607)</td>
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**Alaska Native Languages**

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<tr>
<td>ANL 387</td>
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<td>As Dem. Wmths.</td>
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<tr>
<td>ANL 388</td>
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<td>As Dem. Wmths.</td>
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<tr>
<td></td>
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<td>Bilingual Methods and Materials (3+0)</td>
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## Alaska Native Studies

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<tbody>
<tr>
<td>ANS 301</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Native Cultural Heritage Documentation (3+0)</td>
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<tr>
<td>ANS 320</td>
<td>3</td>
<td>Spring</td>
<td>Language and Culture: Applications of Alaska (3+0)</td>
<td>(Same as Anth. 320)</td>
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<tr>
<td>ANS 340</td>
<td>3</td>
<td>Fall</td>
<td>Contemporary Native American Literature (3+0)</td>
<td>(Same as Engl. 340)</td>
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<tr>
<td>ANS 361</td>
<td>3</td>
<td>Fall</td>
<td>Advanced Tuma Theater (3+0)</td>
<td>(Same as THR. 361)</td>
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<tr>
<td>ANS 401</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Knowledge of Native Elders (3+0)</td>
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<tr>
<td>ANS 425</td>
<td>3</td>
<td>Fall</td>
<td>Federal Indian Law and Alaska Natives (3+0)</td>
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<td>ANS 475</td>
<td>3</td>
<td>Spring</td>
<td>Alaska Native Social Change (3+0)</td>
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## Anthropology

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<tr>
<td>Anth. 300</td>
<td>3</td>
<td>As Dem. Wmtes.</td>
<td>Anthropology of Religion (3+0)</td>
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<tr>
<td>Anth. 306</td>
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<td>As Dem. Wmtes.</td>
<td>Economic Anthropology (3+0)</td>
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<tr>
<td>Anth. 309</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Arctic Prehistory (3+0)</td>
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<tr>
<td>Anth. 320</td>
<td>3</td>
<td>Spring</td>
<td>Language and Culture: Applications to Alaska (3+0)</td>
<td>(Same as ANS 320)</td>
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<tr>
<td>Course Code</td>
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<tr>
<td>Anth. 323</td>
<td>3</td>
<td>Fall</td>
<td>Archaeology of China From Earliest Times to 771 B.C. (3+0)</td>
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<tr>
<td>Anth. 328</td>
<td>3</td>
<td>Spring</td>
<td>Historical and Contemporary Indian-White Relations (3+0)</td>
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<tr>
<td>Anth. 329</td>
<td>3</td>
<td>Fall</td>
<td>Peoples of the Russian North (3+0)</td>
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<tr>
<td>Anth. 350</td>
<td>3</td>
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<td>Russian Period in Alaska:1741-1867 (3+0)</td>
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<tr>
<td>Anth. 380</td>
<td>3</td>
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<td>The People of the Alaskan SW: Aleuts, Kodiak Islanders and the Chugach (3+0)</td>
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<tr>
<td>Anth. 381</td>
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<td>Spring</td>
<td>The Inupiak and Yup'ik Peoples (3+0)</td>
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<tr>
<td>Anth. 382</td>
<td>3</td>
<td>Spring</td>
<td>The People of the Alaskan SE (3+0)</td>
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<tr>
<td>Anth. 383</td>
<td>3</td>
<td>Fall</td>
<td>Athabaskan Peoples of Alaska and Adjacent Canada (3+0)</td>
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<td>Anth. 410</td>
<td>3</td>
<td>Fall</td>
<td>History of Social/Cultural Anthropology (3+0)</td>
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<tr>
<td>Anth. 412</td>
<td>3</td>
<td>Spring</td>
<td>Anthropology of Art (3+0)</td>
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<tr>
<td>Anth. 413</td>
<td>3</td>
<td>Spring</td>
<td>Archaeological Method &amp; Analysis (2+3)</td>
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<tr>
<td>Anth. 414</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Environmental Archaeology (3+0)</td>
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<td>Anth. 421</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Analytical Techniques (2+3)</td>
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<tr>
<td>Anth. 422</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Human Osteology (2+3)</td>
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<tr>
<td>Anth. 428</td>
<td>3</td>
<td>Every Third Fall</td>
<td>Ecological Anthropology (3+0)</td>
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<tr>
<td>Anth. 461</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Stratigraphy (2+3)</td>
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<tr>
<td>Anth. 465</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Geoarchaeology (3+0) (same as Geos. 465)</td>
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<tr>
<td>Anth. 600</td>
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<td>Fall and Spring</td>
<td>Anthropology Colloquium (1+0)</td>
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<tr>
<td>Anth. 601</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Proseminar in Social/Cultural Anthropology (3+0)</td>
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<tr>
<td>Anth. 604</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Seminar: Language and Culture (3+0)</td>
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<tr>
<td>Anth. 608</td>
<td>3</td>
<td>Every Third Spring</td>
<td>Classics in Anthropology (3+0)</td>
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</table>

An interdisciplinary colloquium focusing on topics related to the north with emphasis on anthropology and related disciplines. May be repeated. (Prerequisite: Graduate standing or permission of department head.)

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. (Prerequisites: Graduate standing or permission of instructor. Next offered: 1989-90.)

Participants in the seminar will examine in-depth the interrelation between language and culture in the context of theories of human communication, semiotics, and maintenance of cultural boundaries. In particular, the influence of the Sapir/Whorf hypothesis in anthropological thinking today and the field of ethnoscience will be examined, as well as language change in contact situations, with emphasis on emergence of pidgin and creole languages and effects of the introduction of writing. (Prerequisites: Graduate standing; previous credit in anthropological or descriptive linguistics or permission of instructor.)

Landmark contributions in anthropological literature, ethnographies and theoretical works, will be discussed. (Prerequisite: Graduate standing or permission of instructors. Next offered: 1989-90.)
<table>
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<th>Course Code</th>
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<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>Anth. 611</td>
<td>3</td>
<td>Graduate standing or permission of instructor</td>
<td>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. (Prerequisites: Graduate standing or permission of instructor. Next offered: 1988-90.)</td>
</tr>
<tr>
<td>Anth. 612</td>
<td>3</td>
<td>Graduate standing or permission of the instructor</td>
<td>3 Credits As Demand Warrants Paleocology (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.)</td>
</tr>
<tr>
<td>Anth. 613</td>
<td>3</td>
<td>Graduate standing or permission of instructor</td>
<td>3 Credits As Demand Warrants 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 archeology, past arctic adaptations, etc. (Prerequisites: Graduate standing or permission of instructor.)</td>
</tr>
<tr>
<td>Anth. 614</td>
<td>3</td>
<td>Graduate standing or permission of instructor</td>
<td>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 on key archaeological sites. Data from archaeology, ethnology, linguistics and paleoanthropology will be applied to ancient populations changes and the ethnogeneses of Siberian peoples. (Prerequisites: Graduate standing or permission of instructor. Next offered: 1989-90.)</td>
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<tr>
<td>Anth. 615</td>
<td>3</td>
<td>Instructor</td>
<td>3 Credits As Demand Warrants Seminar: Archaeological Method and Theory (3+0) This course provides training and experience in analyzing archaeological data sets and writing site reports. It will introduce current methodological and theoretical issues in archaeology, and guide the student through the development of a research design. (Prerequisite: Graduate standing.)</td>
</tr>
<tr>
<td>Anth. 616</td>
<td>3</td>
<td>Graduate standing or permission of instructor</td>
<td>3 Credits Alternate Spring 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. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>Anth. 621</td>
<td>3</td>
<td>Instructor</td>
<td>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. (Prerequisites: Graduate standing or permission of instructor. Next offered: 1989-90.)</td>
</tr>
<tr>
<td>Anth. 622</td>
<td>3</td>
<td>Instructor</td>
<td>3 Credits As Demand Warrants Problems in Human Population Biology (3+0) Preview of current methodological and theoretical advances in human population biology. Problem areas to be considered will include behavior, genetic analysis, the biological basis of human social behavior, phylogenetic reconstruction, the evidence for natural selection in human populations, human ecology, and demography. Emphasis will be placed on the recent literature of the field. (Prerequisites: Graduate standing or permission of instructor.)</td>
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<tr>
<td>Anth. 630</td>
<td>3</td>
<td>Instructor</td>
<td>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</td>
</tr>
</tbody>
</table>
proposals is also given attention. (Prerequisites: Graduate standing in anthropology or permission of instructor.)

Anth. 637 3 Credits
Methods in Ethnohistorical Research (3+0)
In the seminar, students of anthropology are introduced in 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. (Prerequisites: Graduate standing in anthropology or permission of instructor.)

Anth. 640 3 Credits
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. (Prerequisites: Graduate standing or permission of instructor.)

Anth. 650 3 Credits
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. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1990-91.)

Art

Art 301 3 Credits  Fall and Spring  Intermediate Ceramics (1+4)  Art 305 3 Credits  Spring  Advanced Drawing (1+4)
Art 307 3 Credits  Fall and Spring  Intermediate Printmaking (1+4)  Art 309 3 Credits  Fall and Spring  Intermediate Metalsmithing and Jewelry (1+4)
Art 311 3 Credits  Fall and Spring  Intermediate Sculpture (1+4)  Art 313 3 Credits  Fall and Spring  Intermediate Painting (1+4)
Art 324 3 Credits  Fall and Spring  Watercolor Painting and Composition (1+4)  Art. 363 3 Credits  Alternate Spring  History of Modern Art (3+0)
Art. 364 3 Credits  Alternate Spring  Italian Renaissance Art (3+0)  Art 365 3 Credits  Fall  Native Art of Alaska (3+0)
Art 371 3 Credits  Fall  Introduction to Computer Art (1+4)  Art 401 3 Credits  Fall and Spring  Advanced Ceramics (1+4)
Art 407 3 Credits  Fall and Spring  Advanced Printmaking (1+4)  Art 409 3 Credits  Fall and Spring  Advanced Metalsmithing and Jewelry (1+4)
Art 411 3 Credits  Fall and Spring  Advanced Sculpture (1+4)  Art 413 3 Credits  Fall and Spring  Advanced Painting (1+4)
Art 417 3 Credits  Every Third Fall  Lithography (1+4)  Art 419 3 Credits  Fall and Spring  Life Drawing (1+4)
### GRADUATE SCHOOL

#### Art Courses

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<th>Term</th>
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<tr>
<td>Art 427</td>
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<td>Every Third Spring</td>
<td>Art 437</td>
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<td>Every Third Fall</td>
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<tr>
<td>Relief</td>
<td>(1+4)</td>
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<td>Intaglio</td>
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<td>Art 441</td>
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<td>Every Third Spring</td>
<td>Art 442</td>
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<td>Lost Wax Casting</td>
<td>(1+4)</td>
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<td>Nonferrous Forging</td>
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<td>Art 443</td>
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<td>Every Third Spring</td>
<td>Art 447</td>
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<td>Every Third Spring</td>
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<td>Holloware</td>
<td>(1+4)</td>
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<td>Silkscreen</td>
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<td>Art 450</td>
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<td>Every Third Fall</td>
<td>Art 451</td>
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<td>Every Third Spring</td>
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<td>Raku Pottery</td>
<td>(1+4)</td>
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<td>Earthenware</td>
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<td>Every Third Fall</td>
<td>Art 453</td>
<td>3</td>
<td>Every Third Spring</td>
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<tr>
<td>Porcelain</td>
<td>(1+4)</td>
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<td>Kiln Design and Construction</td>
<td>(1+4)</td>
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<td>Art 454</td>
<td>3</td>
<td>Every Third Fall</td>
<td>Art 455</td>
<td>3</td>
<td>Every Third Spring</td>
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<tr>
<td>Vapor Glazing</td>
<td>(1+4)</td>
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<td>Studio Glass</td>
<td>(1+4)</td>
<td>Spring</td>
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<tr>
<td>Art 471</td>
<td>3</td>
<td>Spring</td>
<td>Art 499</td>
<td>1-3</td>
<td>Fall and Spring</td>
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<tr>
<td>Computer Art</td>
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<td>Thesis Project</td>
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#### Atmospheric Sciences

**ATM 636**  
*Physics of the Lower Atmosphere (3+0)*  
Small-scale physical and chemical processes in the lower atmosphere, including micrometeorology, radiative transfer and cloud physics. Subjects to be covered include the transfer of solar and thermal radiation through the atmosphere, the radiation budget at the surface of the earth, the resulting energy, momentum, and mass fluxes near the ground, water vapor and its phase changes, and the nucleation and growth of cloud droplets and precipitation particles. (Prerequisite: Graduate standing in geosciences or permission of instructor. Next offered: 1989-90.)

**ATM 646**  
*Dynamics of the Atmosphere and Ocean (3+0)*  
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 in SPAS. Next offered: 1988-89.)

**ATM 656**  
*Atmospheric Circulation, Weather, and Climate (3+0)*  
The circulation of the atmosphere and the weather and climate produced by that circulation. The general circulation of the atmosphere, weather systems, air-sea and air-snow interactions, circulation types and climatic anomalies, and climatic change. (Prerequisite: Graduate standing in geosciences or permission of instructor. Next offered: 1989-90.)

#### Biology

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. 305</td>
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<td>Fall</td>
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<tr>
<td>Invertebrate Zoology</td>
<td>(3+3)</td>
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<tr>
<td>Biol. 307</td>
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<td>Fall</td>
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<tr>
<td>Parasitology</td>
<td>(2+3)</td>
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</table>
Biol. 308 3 Credits  Spring  Biol. 317 5 Credits  Alternate Spring  
Principles of Evolution (3+0)  Comparative Anatomy of Vertebrates (2+9)

Biol. 328 3 Credits  Spring  Biol. 342 4 Credits  Spring  
Biology of Marine Organisms (3+0)  Microbiology (3+3)

Biol. 361 4 Credits  Alternate Spring  Biol. 362 4 Credits  Fall  
Cell Biology (3+3)  Principles of Genetics (3+3)

Biol. 406 4 Credits  Spring  Biol. 407 3 Credits  Alternate Spring  
Entomology (3+3)  Aquatic Entomology (2+3)

Biol. 317 3 Credits  Alternate Fall  Biol. 414 4 Credits  Alternate Fall  
Comparative Physiology (3+3)  Developmental Biology (3+3)

Biol. 423 4 Credits  Fall  Biol. 424 3 Credits  Fall  
Ichthyology (3+3)  Biology of the Freshwater Fish of Alaska (3+0)

Biol. 418 4 Credits  Alternate Fall  Biol. 425 3 Credits  Fall  
Mammalogy (2+3)  Ornithology (2+3)

Biol. 426 3 Credits  Spring  Biol. 427 3 Credits  Alternate Fall  
Anatomical Behavior (2+3)  Bacteriology and Immunology (3+6)

Biol. 441 3 Credits  Spring  Biol. 442 5 Credits  Alternate Fall  
Microbial Ecology (2+3)  Cytogenetics (2+3)

Biol. 443 3 Credits  As Dem. Wmts.  Biol. 452 3 Credits  Alternate Spring  
Ecological Genetics (2+3)  Cyto genetics (2+3)

Biol. 470 3 Credits  Alternate Fall  Biol. 471 3 Credits  Spring  
Ecological Genetics (2+3)  Population Ecology (3+0)

Biol. 472 3 Credits  Fall  Biol. 473 3 Credits  Fall  
Communities and Ecosystems (3+0)  Limnology (2+3)

Biol. 477 3 Credits  Alternate Fall  Biol. 478 2 Credits  Spring  
Water Pollution Biology (3+0)  Field Ecology (0+3)

Biol. 479 2 Credits  Spring  Biol. 480 3 Credits  Alternate Fall  
Ornithology Field Trip (0+3)  Water Pollution Biology (3+0)

Biol. 601 3 Credits  Alternate Spring  
Radiolabeled Techniques (2+3)  The use of radiolabeled tracer 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. (Prerequisites: Graduate standing or permission of instructor for upper division undergraduates. Next offered: 1989-90.)

Biol. 610 2 Credits  Alternate Fall  
Regulation of Biological Processes (3+0)  A consideration of regulation of biological processes at levels of organization from the molecular to society and the ecosystem. The course will use animal, microbial, and plant material and will consider control theory and its applications to biology. (Prerequisites: Graduate Standing and, in cases of highly qualified undergraduates, the instructor's permission. Next offered: 1989-90.)
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. Next offered: 1988-89.)

Biol. 616  3 Credits  As Demand WARRANTS  
Principles and Methods of Taxonomy (2+3)  
Philosophy and methodology relating to current trends in systematics, particularly morphometric and biochemical systematics. Laboratory fee: $10. (Next offered: 1989-90.)

Biol. 618  2 Credits  Alternate Spring  
Biogeography (2+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. Next offered: 1988-89.)

Biol. 619  2 Credits  Alternate Fall  
Marine Mammals (1+3)  
Evolution, systematics, morphology, physiology, ecology, and behavior of seals and whales. Laboratory fee: $10.00. (Prerequisites: Graduate standing or permission of instructor. Next offered: 1988-89.)

Biol. 622  3 Credits  Alternate Fall  
Physiological Ecology: Temperature Regulation and Thermal Adaptation (2+3)  
Responses of organisms to their thermal environment, field research-oriented laboratory. Laboratory fee: $10.00. (Prerequisites: Graduate standing, Biol. 210 or permission of instructor. Next offered: 1988-89.)

Biol. 624  3 Credits  Alternate Spring  
Physiological Ecology: Energetics and Nutrition (2+3)  
A study of physiological processes involved in the interaction of organisms with their environment, with special emphasis placed on northern habitats. Energetics and nutrition will cover the nutritional ecology of plants and animals and describe the adaptations of organisms to avoid or minimize nutritional imbalance or inadequacy. Laboratory fee: $10. (Prerequisites: Graduate standing and a physiology course and Biol. 271 or permission of instructor. Next offered: 1988-89.)

Biol. 626  3 Credits  Alternate Fall  
Physiological Ecology: Vertebrate Reproduction (2+3)  
A study of the physiological processes involved in the interaction of organisms with their environment. Special emphasis will be placed on northern habitats. Sensory and reproductive physiological ecology will cover the physiology and ecology of reproduction, nervous and hormone systems, and circadian rhythms. Laboratory fee: $10. (Prerequisites: Graduate standing and a physiological course and Biol. 271 or permission of instructor. Next offered: 1989-90.)

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. Next offered: 1989-90.)

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. Next offered: 1988-89.)

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. Next offered: 1989-90.)

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. Next offered: 1988-89.)

Biol. 650 3 Credits Alternate Fall
Fish Ecology (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: $10.00. (Prerequisites: WLF 423 and 429. Next offered: 1989-90.)

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, Bot. 239 and either Biol. 308 or Bot. 331; graduate student standing or senior with permission of instructor. Next offered: 1989-90.)

Biol. 680 4 Credits Alternate Fall
Data Analysis in Biology (3+3)
(Same as 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, computer programming, use of statistical packages, and plotting routines. Each student will analyze a data set appropriate to the student’s research interests. Laboratory fee: $10. (Prerequisites: Stat. 301, 401 and either graduate standing in a biologically oriented field or permission of instructor. Next offered: 1989-90.)

Botany

Botany 331 4 Credits Spring Botany 333 3 Credits Alternate Fall
Systematic Botany (2+6) Biology of the Non-Vascular Plants (2+3)

Bot. 334 4 Credits Alternate Fall Bot. 416 3 Credits Alternate Spring
Morphology and Anatomy of Vascular Plant Physiology (2+3)
Plants (3+3)

Bot. 474 4 Credits Alternate Fall Bot. 475 2 Credits Alternate Spring
Plant Ecology (3+3) Plant Communities of Alaska-Field Course(1+3)

Bot. 476 4 Credits Alternate Spring
World Vegetation and Flora (3+3)

Bot. 674 3 Credits Alternate Spring
Advanced Plant Ecology: Populations and Communities (2+3)
Current issues and concepts of plant ecology emphasizing population and evolutionary ecology, competition, coexistence, and plant community structure and dynamics. Laboratory fee: $10.00. (Prerequisite: Bot. 474 or permission of instructor. Next offered 1989-90.)
Bot. 675  3 Credits  Alternate Fall
Plant Physiological Ecology (2+3)
Physiological ecology of dormancy, germination, growth, photosynthesis, water relations and relations and nutrition with an emphasis on northern and other stressful environments; relationship to community and ecosystem processes. Laboratory fee: $10.00. (Prerequisites: Biol. 210 or Bot. 416; Bot. 474 or permission of instructor. Next offered: 1989-90.)

Bot. 676  3 Credits  Alternate Spring
Reproductive Biology of Flowering Plants (3+0)
The biology of plant reproduction, including breeding systems, pollination ecology, seed dispersal, plant-animal coevolution, reproductive processes on the structure and function of biotic communities. (Prerequisites: Bot. 239, Biol. 271 or Biol 308 or Bot. 331 and graduate standing or consent of instructor. Next offered: 1989-90.)

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Business Administration

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<tr>
<th>Course Code</th>
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<th>Session</th>
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<tr>
<td>B.A. 301</td>
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<td>Fall and Spring</td>
<td>Processes of Management (3+0)</td>
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<tr>
<td>B.A. 310</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Intermediate Management Information Systems (3+0)</td>
</tr>
<tr>
<td>B.A. 326</td>
<td>3</td>
<td>Spring</td>
<td>Principles of Advertising (3+0)</td>
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<tr>
<td>B.A. 332</td>
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<td>Fall and Spring</td>
<td>Business Law (3+0)</td>
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<tr>
<td>B.A. 350</td>
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<td>Fall</td>
<td>Introduction to Real Estate and Land Economics (3+0)</td>
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<tr>
<td>B.A. 361</td>
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<td>Personnel Management (3+0)</td>
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<tr>
<td>B.A. 375</td>
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<td>Fall</td>
<td>Marketing of Hospitality Service (3+0)</td>
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<td>B.A. 378</td>
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<td>Passenger Transportation Management (3+0)</td>
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<td>B.A. 410</td>
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<td>Fall</td>
<td>Systems Analysis and Design (3+0)</td>
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<td>B.A. 425</td>
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<td>Spring</td>
<td>Advanced Corporate Financial Problems (3+0)</td>
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<td>B.A. 303</td>
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<td>Advanced Leadership (3+1)</td>
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<td>B.A. 325</td>
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<td>Fall and Spring</td>
<td>Financial Management (3+0)</td>
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<td>B.A. 331</td>
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<td>The Legal Environment of Business (3+0)</td>
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<td>B.A. 343</td>
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<td>Fall and Spring</td>
<td>Principles of Marketing (3+0)</td>
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<tr>
<td>B.A. 360</td>
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<td>Fall and Spring</td>
<td>Operations Management (3+0)</td>
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<td>B.A. 372</td>
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<td>Hotel Management (3+0)</td>
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<td>B.A. 377</td>
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<td>Food and Beverage Management (3+0)</td>
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<td>B.A. 390</td>
<td>3</td>
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<td>Organizational Behavior (3+0)</td>
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<tr>
<td>B.A. 423</td>
<td>3</td>
<td>Fall</td>
<td>Investment Management (3+0)</td>
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<tr>
<td>B.A. 430</td>
<td>3</td>
<td>Fall</td>
<td>Current Topics in Finance (3+0)</td>
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B.A. 436  3 Credits  Spring  B.A. 441  3 Credits  Spring  
Consumer Behavior (3+0)  Promotion Management (3+0)  

B.A. 443  3 Credits  Spring  B.A. 445  3 Credits  Fall  
International Marketing (3+0)  Marketing Research (3+0)  

B.A. 453  3 Credits  Fall and Spring  B.A. 456  3 Credits  Spring  
Internship in Business Administration (0+var.)  Small Business Management (3+0)  

B.A. 460  3 Credits  Fall  B.A. 461  3 Credits  Spring  
International Business (3+0)  International Finance (3+0)  

B.A. 462  3 Credits  Fall and Spring  B.A. 465  3 Credits  Alternate Spring  
Administrative Policy (3+0)  Tourism Destination Planning and Development (3+0)  

B.A. 471  3 Credits  Alternate Spring  B.A. 475  3 Credits  As Dem. Wmts.  
Tourism Seminar (3+0)  Transportation and Logistics (3+0)  

B.A. 480  3 Credits  Spring  B.A. 483  3 Credits  Spring  
Organization Theory (3+0)  Marketing Management (3+0)  

B.A. 603  3 Credits  Fall  
The Process and Legal Environment of Management (3+0)  
A graduate level introduction to issues in management which focuses on the essentials of effective management for the practicing manager. A critical look at current operating management theory including planning, managing, staffing, and leadership skills. (Prerequisite: Graduate standing.)  

B.A. 605  3 Credits  Fall  
Management Information Systems (3+0)  
Application of systems concepts for producing information to be used in business decision making. Computer hardware and BASIC and COBOL programming languages. Design of computer-based decisions systems. Materials fee: $20. (Prerequisite: Graduate standing.)  

B.A. 606  3 Credits  Spring  
Quantitative Analysis (3+0)  
An introductory study of the quantitative methods, tools, and statistics applicable to the solution of business and economic problems. Concepts, techniques, and statistical analysis, including probability, statistical inference and analysis of variance, and correlation and regression analysis. (Prerequisites: Graduate standing and Math. 161-162 or equivalent.)  

B.A. 608  3 Credits  Spring  
Organizational Theory (3+0)  
The structure and design of modern organizations, including a critical review of topics such as organization functions, design parameters, contingency factors, and structural configurations. (Prerequisites: Graduate standing.)  

B.A. 625  3 Credits  Spring  
Financial Management (3+0)  
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.)  

B.A. 643  3 Credits  Fall  
Marketing Management (3+0)  
An introductory graduate level course in marketing including the study of product and product planning, research, distribution channels, logistics, consumer behavior, pricing, sales promotion and management, and the institutional structure of markets. (Prerequisites: Graduate standing.)
### Organizational Behavior (3+0)
A study of the behavior of individuals and small groups within organizations including the following concepts: personality, perception learning, motivation, group attraction and formation, group processes, conflict, and leadership. (Prerequisites: Graduate standing in M.B.A. Program.)

### Human Resources Management (3+0)
The study of the effective management of human resources in organizations including employee planning, employee attraction, selection and orientation, career development, evaluation, training, compensation, EEO, safety, and labor relations. (Prerequisites: Graduate standing.)

### Seminar In Finance (3+0)
A study of the finance function of the firm and the major problems faced by the financial managers, including capital investment analysis and valuation, capital budgeting, financial structure and dividend policies, working capital management, and other current topics in financial management. (Prerequisites: Graduate standing. Completion of foundation core courses. B.A. 325 or B.A. 625.)

### Seminar In Marketing (3+0)
A survey of marketing institutions, systems, policies, and practices. Review of marketing constituents in economic development, marketing theory, and current problems. (Prerequisites: Graduate standing. Completion of foundation core courses. B.A. 343 or B.A. 643.)

### Production and Operations Management (3+0)
A study of the technical management skills needed to effectively manage the activities of selecting, designing, operating, controlling, and updating the productive and operating systems in diverse types of organizations, ranging from manufacturing to service. Materials fee: $20. (Prerequisites: Graduate standing in M.B.A. Program.)

### Administrative Policy (3+0)
The broad aspects of administrative policy and the major social, political, legal, economic, and international forces impacting on complex organizations. Development of an intuitive systematic scientific understanding of the design and use of formal systems for comprehensive long-range planning and policy formulation in large corporations. (Prerequisites: Graduate standing. Completion of foundation core courses. Recommended that B.A. 690 be taken last semester of program.)

### Research Design and Methods (3+0)
Emphasis on the general applications of the methods of business research and the scientific method of research in business administration. Topics to be considered include the planning of a research project and problem identification, scientific methods in business administration, research design and models, library, survey, and experimental research methods. The course is designed to aid the MBA student in identifying and specifying research problems prior to involvement in the preparation of the research project. Materials fee: $20. (Prerequisite: Graduate standing in MBA Program.)

### Chemistry

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<th>Credits</th>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
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<td>Chem. 324</td>
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<td>Chem. 322</td>
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<td>Organic Laboratory (1+8)</td>
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<td>Physical Chemistry (3+0)</td>
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<td>Instrumental Analytical Methods (3+0)</td>
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<td>Analytical Instrumental Laboratory (1+6)</td>
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<td>General Biochemistry (4+0)</td>
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<td>Chem. 412</td>
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<td>Biochemistry Laboratory (1+6)</td>
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<td>Molecular Spectroscopy (3+0)</td>
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<td>Chem 660</td>
<td>3</td>
<td>Spring</td>
<td>Chemical Oceanography (3+0) (Same as MSL 660)</td>
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</table>

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.)
**Civil Engineering**

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>C.E. 326</td>
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<td>Fall and Spring</td>
<td>Introduction to Geotechnical Engineering (3+3)</td>
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<tr>
<td>C.E. 344</td>
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<td>Spring</td>
<td>Water Resources Engineering (3+0)</td>
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<tr>
<td>C.E. 402</td>
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<td>Introduction to Transportation Engineering (3+0)</td>
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<td>C.E. 404</td>
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<td>Spring</td>
<td>Highway Engineering (2+3)</td>
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<td>C.E. 415</td>
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<td>Advanced Surveying (2+3)</td>
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<td>C.E. 422</td>
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<td>Foundation Engineering (3+0)</td>
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<td>C.E. 431</td>
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<td>Structural Engineering I (3+0)</td>
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<td>C.E. 433</td>
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<td>Reinforced Concrete Design (2+3)</td>
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<td>C.E. 436</td>
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<td>Spring</td>
<td>Structural Steel Design (2+3)</td>
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<td>C.E. 441</td>
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<td>Environmental Engineering (3+3)</td>
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<td>C.E. 445</td>
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<td>Engineering Hydrology (2+3)</td>
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<td>Fall and Spring</td>
<td>Civil Engineering Internship (0+3)</td>
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<td>C.E. 334</td>
<td>3</td>
<td>Fall</td>
<td>Properties of Materials (2+3)</td>
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<td>C.E. 400</td>
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<td>Fall and Spring</td>
<td>EIT Exam</td>
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<td>C.E. 403</td>
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<td>Fall</td>
<td>Traffic Engineering (2+3)</td>
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<td>C.E. 412</td>
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<td>Elements of Photogrammetry (2+3)</td>
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<td>C.E. 416</td>
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<td>Boundary Surveying (1+0)</td>
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<td>C.E. 425</td>
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<td>Advanced Soil Mechanics (2+3)</td>
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<td>Structural Engineering II (3+0)</td>
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<tr>
<td>C.E. 434</td>
<td>3</td>
<td>Spring</td>
<td>Timber Design (2+3)</td>
</tr>
<tr>
<td>C.E. 438</td>
<td>3</td>
<td>Spring</td>
<td>Design of Engineered Systems (3+0)</td>
</tr>
<tr>
<td>C.E. 442</td>
<td>3</td>
<td>Spring</td>
<td>Environmental Engineering II (3+0)</td>
</tr>
<tr>
<td>C.E. 446</td>
<td>3</td>
<td>Spring</td>
<td>Hydraulic Engineering (2+3)</td>
</tr>
<tr>
<td>C.E. 603</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Arctic Engineering (3+0)</td>
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<td>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.)</td>
</tr>
<tr>
<td>C.E. 605</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Pavement Design (3+0)</td>
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<tr>
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<td>Current design techniques for flexible and rigid pavements. Materials characterization, loading considerations, empirical design methods, mechanistic design methods, rehabilitation. (Prerequisites: Graduate standing and C.E. 402 or consent of instructor. Next offered: 1988-89)</td>
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<tr>
<td>Course Code</td>
<td>Credits</td>
<td>Offered</td>
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<tr>
<td>C.E. 617</td>
<td>3</td>
<td>Alternate Fall</td>
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<tr>
<td>Control Surveys (3+0)</td>
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<tr>
<td>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: C.E. 415 or other surveying experience acceptable to instructor. Next offered: 1989-90.)</td>
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<tr>
<td>C.E. 620</td>
<td>3</td>
<td>Alternate Spring</td>
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<tr>
<td>Civil Engineering Construction (3+0)</td>
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<tr>
<td>Construction equipment, methods, planning and scheduling, construction contracts, management and accounting, construction estimates, costs, and project control. (Prerequisites: ESM 450 or equivalent. Next offered: 1988-89.)</td>
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<tr>
<td>C.E. 622</td>
<td>3</td>
<td>Alternate Fall</td>
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<tr>
<td>Foundations and Retaining Structures (3+0)</td>
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<tr>
<td>Advanced study of shallow and deep foundations, retaining structures and buried pipes. (Prerequisites: C.E. 422 or permission of instructor. Next offered: 1989-90.)</td>
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<tr>
<td>C.E. 625</td>
<td>3</td>
<td>Alternate Fall</td>
<td></td>
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<tr>
<td>Soil Stabilization (3+0)</td>
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<tr>
<td>Soil and site improvement using deep and shallow compaction, additives, preloading, vertical and horizontal drains, electro osmosis and soil reinforcement. (Prerequisites C.E. 435 or permission of instructor. Next offered: 1989-90.)</td>
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<tr>
<td>C.E. 626</td>
<td>3</td>
<td>Alternate Fall</td>
<td></td>
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<tr>
<td>Applications in Geotechnical Engineering (3+0)</td>
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<tr>
<td>Selected topics in geotechnical engineering studied in conjunction with case histories. (Prerequisites: C.E. 326, C.E. 422 and C.E. 425 or permission of instructor. Next offered: 1989-90)</td>
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<tr>
<td>C.E. 627</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>Earthquake Engineering (3+0)</td>
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<tr>
<td>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 liquifaction, soil settlement, soil-structure interaction and slope stability; analysis and design of dams, earth structures and foundation systems (Prerequisites: C.E. 326.)</td>
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<tr>
<td>C.E. 631</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>Advanced Structural Analysis (3+0)</td>
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<tr>
<td>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.</td>
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<tr>
<td>C.E. 632</td>
<td>3</td>
<td>Alternate Fall</td>
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<tr>
<td>Advanced Structural Design (3+0)</td>
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<tr>
<td>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: C.E. 431. Next offered: 1988-89.)</td>
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<tr>
<td>C.E. 637</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>Earthquake Engineering II (3+0)</td>
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<tr>
<td>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: C.E. 432.)</td>
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<tr>
<td>C.E. 661</td>
<td>3</td>
<td>As Demand Warrants</td>
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<tr>
<td>Advanced Water Resources Engineering (3+0)</td>
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<tr>
<td>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.)</td>
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<tr>
<td>Course</td>
<td>Credits</td>
<td>Description</td>
<td>Notes</td>
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<tr>
<td>C.E. 662</td>
<td>3</td>
<td>Open Channel and River Engineering (3+0)&lt;br&gt;Principles of open channel flow, transitions and controls, unsteady flow, river engineering, stream channel mechanics, and mechanics of sedimentation. (Prerequisite: E.S. 341. Next offered: 1989-90.)</td>
<td>Alternate Spring</td>
</tr>
<tr>
<td>C.E. 663</td>
<td>3</td>
<td>Groundwater Dynamics (3+0)&lt;br&gt;Fundamentals of geohydrology, hydraulics of flow through porous media, well hydraulics, groundwater pollution, and groundwater resources development. (Prerequisite: E.S. 341. Next offered: 1988-89.)</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>C.E. 676</td>
<td>3</td>
<td>Coastal Engineering (3+0)&lt;br&gt;Review of deep and shallow water waves, littoral drift, coastal structures, pollution problems, and harbor seiches. (Prerequisite: E.S. 341.)</td>
<td>As Demand Warrants</td>
</tr>
<tr>
<td>C.E. 681</td>
<td>3</td>
<td>Frozen Ground Engineering (3+0)&lt;br&gt;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. Next offered: 1989-90.)</td>
<td>Alternate Spring</td>
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<tr>
<td>C.E. 682</td>
<td>3</td>
<td>Ice Engineering (3+0)&lt;br&gt;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: E.S. 331, Math 202, training or experience in soil mechanics. Next offered: 1989-90.)</td>
<td>Alternate Spring</td>
</tr>
<tr>
<td>C.E. 683</td>
<td>3</td>
<td>Arctic Hydrology and Hydraulic Engineering (3+0)&lt;br&gt;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 circum-polar countries will be included in the course. (Prerequisite: C.E. 344 or equivalent. Next offered: 1989-90.)</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>C.E. 684</td>
<td>3</td>
<td>Arctic Utility Distribution (3+0)&lt;br&gt;Practices and considerations of utility distribution in Arctic regions. Emphasis on proper design to include freeze protection, materials, energy conservation, and system selection. (Prerequisite: E.S. 341 or permission of instructor. Next offered: 1988-89.)</td>
<td>Alternate Years</td>
</tr>
<tr>
<td>C.E. 685</td>
<td>3</td>
<td>Topics in Frozen Ground Engineering (3+0)&lt;br&gt;Selected frozen ground foundation engineering problems will be explored in depth including refrigerated foundations and pile foundations. (Prerequisite: C.E. 681. Next Offered: 1988-89.)</td>
<td>Alternate Spring</td>
</tr>
</tbody>
</table>

**College Student Personnel Administration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSP. 651</td>
<td>3</td>
<td>Current Issues in Student Personnel Administration (3+0)&lt;br&gt;The contemporary problems and issues affecting student personnel workers in higher education. Includes an examination of the changing roles of students, student diversity, students' rights, freedoms, and responsibilities; evaluation, research and accountability; financing; and relationship to central administrative services. (Prerequisite: Permission of instructor. Next offered: 1988-89.)</td>
<td>Alternate Fall</td>
</tr>
</tbody>
</table>
CSP. 655  
3 Credits  
Fall and Spring
Practicum in Student Personnel Administration (1+6)
Supervised field experience in student service agencies. Each of two semesters will require six hours per week in the pre-arranged work setting, as well as one additional hour per week for seminar sessions with the supervisors, instructor, and other practicum students. (Prerequisite: Permission of instructor.)

CSP. 661  
3 Credits  
Fall and Spring
Practicum in Counseling: Higher Education/Agency (0+9)
(Same as Coun. 661.)
Supervised field experience, including preparatory activities in a higher educational or agency setting. This course is not open to public school counselor-trainees. (Prerequisites: Coun. 623, 624 and three approved graduate credits in the area of specialization.)

Computer Science

C.S. 301  3 Credits  
Assembly Language Programming (3+0)  
Fall
C.S. 302  3 Credits  
Alternate Spring
 Systems Programming (3+0)

C.S. 311  3 Credits  
Data Structures and Algorithms (3+0)  
Fall
C.S. 321  3 Credits  
Spring
 Operating Systems (3+0)

C.S. 331  3 Credits  
Programming Languages (3+0)  
Spring
C.S. 381  3 Credits  
Alternate Spring
 Advanced Computer Graphics (3+0)

C.S. 401  3 Credits  
Software Engineering (3+0)  
Spring
C.S. 411  3 Credits  
Spring
 Analysis of Algorithms (3+0)

C.S. 425  3 Credits  
Alternate Fall
Data Base Systems (3+0)

C.S. 442  3 Credits  
Alternate Fall
Computer Communication and Networks (3+0)

C.S. 448  3 Credits  
Alternate Fall
System Architecture (3+0)

C.S. 451  3 Credits  
Alternate Fall
Automata and Formal Languages (3+0)

C.S. 605  3 Credits  
As Demand Warrants
Artificial Intelligence (3+0)
The study and writing of programs that assimilate information, make inferences, and prove theorems. Representation of knowledge, pattern analysis, inference networks, and expert systems. Natural language analysis and synthesis. LISP as the basis for precise descriptions of AI processes. (Prerequisite: Consent of C.S. graduate advisor.)

C.S. 611  3 Credits  
Fall
Complexity of Algorithms (3+0)
Theoretical analysis of various algorithms: topics include sorting, searching, selection, polynomial evaluation, direct vs. iterative algorithms, NP completeness, decidability. (Prerequisites: C.S. 411 or consent of C.S. graduate advisor.)

C.S. 621  3 Credits  
As Demand Warrants
Advanced Systems Programming (3+0)
Multiprogramming and multiprocessor systems. File and program security. Scheduling optimization and system tuning, I/O processing, archiving and system recovery, and initialization. Study of current large systems. (Prerequisites: C.S. 311 and C.S. 321.)
C.S. 622  
Performance Evaluation  
3 Credits  
As Demand Warrants  
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: C.S. 321 or consent of C.S. graduate advisor.)

C.S. 631  
Programming Language Implementation (3+0)  
3 Credits  
Fall  
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: C.S. 331.)

C.S. 641  
Advanced Systems Architecture (3+0)  
3 Credits  
Spring  
A study of computer systems which have been developed to make processing of programs in high level languages and special types of processing more efficient or reliable. Examples include pipeline machines, array processors, tightly coupled multiprocessors, and data flow machines. (Prerequisites: C.S. 321 or consent of C.S. graduate advisor.)

C.S. 642  
Distributed Processing (3+0)  
3 Credits  
As Demand Warrants  
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 including SNA, X.21, and X.25 will be presented.

C.S. 651  
The Theory of Computation (3+0)  
3 Credits  
Spring  
Formal models of algorithms; Turing machines and recursive functions. Space and time complexity of computation and complexity classes of problems. Program verification and methods of proving program correctness. (Prerequisite: C.S. 451.)

C.S. 661  
Optimization (3+0)  
3 Credits  
As Demand Warrants  
(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.)

C.S. 662  
Mathematical Software (3+0)  
3 Credits  
As Demand Warrants  
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 C.S. graduate advisor.)

C.S. 681  
Topics in Computer Graphics (3+0)  
3 Credits  
As Demand Warrants  
Hardware, software, and techniques used in computer graphics taken from such topics as refresh, storage, and raster scan technology, clipping, windowing, three dimensional techniques, painting and shading, image processing, computer aided design. (Prerequisite: C.S. 281 or consent of C.S. graduate advisor.)

C.S. 690  
Graduate Seminar and Project (3+0)  
3 Credits  
Fall  
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 C.S. graduate advisor. C.S. 690 is prerequisite for C.S. 691.)

C.S. 691  
3 Credits  
Spring
Counseling

Coun. 615 3 Credits  Spring
Foundations of Guidance and Counseling (3+0)
Introduction to the philosophies, organization, patterns and techniques that aid counselors in preparing clients for responsible decision-making in modern society. (Prerequisite: Graduate standing.)

Coun. 623 4 Credits  Fall
Principles and Techniques of Individual Counseling (3+3)
A survey of the major theoretical systems of counseling and a limited practice in basic techniques. Major systems include cognitive, behavioral, psychodynamic, perceptual-phenomenal, and existential approaches. Actual practice in techniques of listening, helping, session management, problem identification, and goal setting. (Prerequisites: Coun. 615 and/or permission of instructor.)

Coun. 624 3 Credits  Spring
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: Coun. 615, 623 and/or permission of instructor.)

Coun. 628 3 Credits  Fall and Spring
Life Span Development (3+0)
The scientific study of the growth, development and behavioral changes of humans from conception through death, including an overview of the field of development, basic concepts and theories, history of the field, research in biological and biosocial influences on development. (Prerequisite: Graduate standing.)

Coun. 634 3 Credits  Fall
Counseling Practicum I (2+7)
A supervised counseling experience with an appropriate school that will provide direct and/or participant observation and interactions for the beginning counselor along with immediate feedback concerning the counseling experience. Weekly seminars will cover actual and role-playing situations concerning basic counseling skills, ethical issues, and advanced counseling techniques and interventions. (Prerequisites: Graduate standing and permission of instructor.)

Coun. 636 3 Credits  Fall and Spring
Counseling Practicum II (0+9)
Advanced-level supervised experience in public school settings emphasizing individual and group counseling methods and techniques. (Prerequisite: Coun. 634 or permission of instructor.)

Coun. 645 3 Credits  Alternate Spring
Behavioral Consultation (3+0)
Presentation of techniques developing skills in consultation with parents, teachers, and other socialization agents to solve developmental and educational problems of children in the elementary school. Through application of the models, consultants are taught to assist in defining problems and to apply psychological principles to the development of plans to solve problems. (Prerequisite: Graduate standing in Elementary Counseling Consulting Program. Next offered: 1988-89.)

Coun. 660 3 Credits  Fall
Cross-Cultural Counseling (3+0)
An examination of ethnic and cultural issues that affect the counseling setting, interaction, and outcome, including a review of the literature dealing with intercultural counseling, discussions of workable methods that have been used in such counseling, and examinations of target populations with whom the counselor may be involved, especially in Alaska. (Prerequisite: Permission of instructor.)

Coun. 661 3 Credits  Fall and Spring
Practicum in Counseling: Higher Education/Agency (0+9)
Supervised field experience, including preparatory activities in a higher educational or agency setting. This course is not open to public school counselor-trainees. (Prerequisites: Courses 623, 624 and three approved graduate credits in the area of specialization.)

### Economics

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<tr>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Econ. 321</td>
<td>3</td>
<td>Fall</td>
<td>Intermediate Microeconomics (3+0)</td>
</tr>
<tr>
<td>Econ. 324</td>
<td>3</td>
<td>Spring</td>
<td>Intermediate Macroeconomics (3+0)</td>
</tr>
<tr>
<td>Econ. 350</td>
<td>3</td>
<td>Fall</td>
<td>Money and Banking (3+0)</td>
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<tr>
<td>Econ. 409</td>
<td>3</td>
<td>As Dem. Wmts.</td>
<td>Industrial Organization and Public Policy (3+0)</td>
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<tr>
<td>Econ. 421</td>
<td>3</td>
<td>As Dem. Wmts.</td>
<td>Collective Bargaining (3+0)</td>
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<tr>
<td>Econ. 437</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Regional Economic Development (3+0)</td>
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<tr>
<td>Econ. 451</td>
<td>3</td>
<td>Spring</td>
<td>Public Expenditure Analysis (3+0)</td>
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<td>Econ. 475</td>
<td>1-3</td>
<td>Fall and Spring</td>
<td>Economic Internship</td>
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<td>Econ. 601</td>
<td>3</td>
<td>Fall</td>
<td>Microeconomic Theory I (3+0)</td>
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<td>Econ. 603</td>
<td>3</td>
<td>Spring</td>
<td>Macroeconomic Theory I (3+0)</td>
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<tr>
<td>Econ. 611</td>
<td>3</td>
<td>Fall</td>
<td>Principles of Economic Analysis (3+0)</td>
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<tr>
<td>Econ. 623</td>
<td>3</td>
<td>Fall</td>
<td>Mathematical Economics (3+0)</td>
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</table>
Mathematical techniques including matrix algebra, differential and integral calculus. Particular attention is given to static and comparative statics analysis and dynamic models. (Prerequisites: Math 162, Math 200, Math 273 or equivalent.)

Econ. 624  3 Credits  Fall
Managerial Economics (3+0)
This course includes the development of basic economic concepts and their application to managerial decision-making. Major topics to be covered will include: demand and cost analysis, pricing decisions, capital budgeting and capital management, and decision-making under conditions of risk and uncertainty. The case method will be used as a principle technique for application of the concepts and tools to "real world" situations. Materials fee $10. (Prerequisites: Econ. 201 and 202; or Econ. 501; and graduate standing.)

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 162, Math 200, Math 273 or equivalent; Stat. 301, Econ. 227 or equivalent.)

Econ. 635  3 Credits  Fall
Econ. 636  3 Credits  Spring
Resource Economics (3+0)
The theory, methods of analysis, and current literature of natural resource economics and policy. Topics include socially optimal intertemporal use of resources, externalities, property rights, public goods, benefit-cost analysis, amenity values and other non-market resource services, and environmental policy. (Prerequisites: Econ. 321 or equivalent; Math 162, 200, 273 or equivalent. For Econ. 636, Econ. 635.)

Econ. 670  0 Credits  Spring
Seminar in Research Methodology (1+0)
Philosophy of research and importance of the scientific method to solution of research problems. (Prerequisite: Graduate standing.)

Education

Ed. 303  3 Credits  As Dem. Wmts.  Language and Literacy Development (3+0)
(Same as Ling. 303)

Ed. 304  3 Credits  Fall and Spring  Literature for Children (3+0)

Ed. 309  3 Credits  Fall  Elementary School Music Methods (3+0)
(Same as Mus. 309)

Ed. 310  3 Credits  Fall and Spring  Modes of Creative Expression in Education (3+0)

Ed. 311  2 Credits  Spring  Audio-Visual Methods and Materials (1+3)

Ed. 330  3 Credits  Fall and Spring  Diagnosis and Evaluation of Learning (3+0)

Ed. 333  3 Credits  As Dem. Wmts.  History of Childhood (3+0)

Ed. 338  3 Credits  As Dem. Wmts.  Education and Economic Development (3+0)
(Same as R.D. 338)

Ed. 345  3 Credits  Fall  Sociology of Education (3+0)
(Same as Soc. 345)

Ed. 346  3 Credits  Fall  Structure of American Education (3+0)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Term 1</th>
<th>Term 2</th>
</tr>
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<tbody>
<tr>
<td>Ed. 350</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Communication in Cross-Cultural Classrooms (3+0)</td>
</tr>
<tr>
<td>Ed. 380</td>
<td>3</td>
<td>Spring</td>
<td>Cultural Influences in Education (3+0)</td>
</tr>
<tr>
<td>Ed. 402</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Methods of Teaching in the Secondary School (2+3)</td>
</tr>
<tr>
<td>Ed. 419</td>
<td>6</td>
<td>Fall and Spring</td>
<td>Integrated Methods and Curriculum Development (3+9)</td>
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<tr>
<td>Ed. 424</td>
<td>3</td>
<td>Fall</td>
<td>Small High School Programs (2+3)</td>
</tr>
<tr>
<td>Ed. 429</td>
<td>3</td>
<td>Spring</td>
<td>Microcomputer Application in the Classroom (2+2)</td>
</tr>
<tr>
<td>Ed. 450</td>
<td>3</td>
<td>Spring</td>
<td>Education and Cultural Transmission (3+0)</td>
</tr>
<tr>
<td>Ed. 452</td>
<td>12</td>
<td>Fall and Spring</td>
<td>Elementary Student Teaching (1+33)</td>
</tr>
<tr>
<td>Ed. 454</td>
<td>12</td>
<td>Fall and Spring</td>
<td>Student Teaching K-12 (1+33)</td>
</tr>
<tr>
<td>Ed. 462</td>
<td>3</td>
<td>Fall</td>
<td>Alaskan Environmental Education (3+0) (Same as A.L.R. 462)</td>
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<tr>
<td>Ed. 473</td>
<td>3</td>
<td>Spring</td>
<td>Marine Education (3+0)</td>
</tr>
<tr>
<td>Ed. 490</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Curriculum Development in Cultural Perspective (3+0)</td>
</tr>
<tr>
<td>Ed. 375</td>
<td>3</td>
<td>Fall and Spring</td>
<td>The Exceptional Learner (3+0)</td>
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<tr>
<td>Ed. 381</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Foundations of Literacy Development (2 1/2+1 1/2)</td>
</tr>
<tr>
<td>Ed. 407</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Reading Strategies for Secondary Teachers (3+0)</td>
</tr>
<tr>
<td>Ed. 421</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Strategies for Reading and Writing Instruction in Multi-Cultural Classrooms (2 1/2+1 1/2)</td>
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<tr>
<td>Ed. 425</td>
<td>3</td>
<td>Spring</td>
<td>Community as an Educational Resource (2+3)</td>
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<tr>
<td>Ed. 430</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Multicultural Teaching Techniques (2+3)</td>
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<tr>
<td>Ed. 451</td>
<td>1.9</td>
<td>Fall and Spring</td>
<td>Practicum in Education (0+4)</td>
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<tr>
<td>Ed. 453</td>
<td>12</td>
<td>Fall and Spring</td>
<td>Secondary Student Teaching (1+33)</td>
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<tr>
<td>Ed. 456</td>
<td>3</td>
<td>Summer</td>
<td>Orientation to Teaching in Rural Alaska (2+3)</td>
</tr>
<tr>
<td>Ed. 470</td>
<td>3</td>
<td>As Dem. Wm.</td>
<td>Human Resource Development (3+0)</td>
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<tr>
<td>Ed. 475</td>
<td>3</td>
<td>Alternate Spring</td>
<td>LOGO: A Computer Language for Teachers (3+0)</td>
</tr>
<tr>
<td>Ed. 601</td>
<td>3</td>
<td>Fall</td>
<td>Introduction to Educational Research methods (3+0)</td>
</tr>
<tr>
<td>Ed. 602</td>
<td>3</td>
<td>Spring</td>
<td>Proseminar in Applied Educational Research (1+6)</td>
</tr>
</tbody>
</table>

**Ed. 601**

- Introduction to Educational Research methods (3+0)
- Techniques of selection and evaluation of educational research methods. Use of library reference tools, review of research studies, and critical communication of quantitative and qualitative research procedures.
- (Prerequisite: Graduate standing in education.)

**Ed. 602**

- Proseminar in Applied Educational Research (1+6)
- The application of educational research methods and techniques to educational issues and problems. Using Education 601 as a foundation, the student will conduct a research project under direct supervision of...
faculty. Proposal development and application of research to practical problems is stressed. (Prerequisite: Ed. 601)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. 603</td>
<td>3</td>
<td>Field Study Methods in Educational Research (3+0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Techniques for conducting field research in a cross-cultural setting with particular attention given to research in education or a related field. Students must have access to a field setting in which to conduct a research project. (Prerequisite: Ed. 601, Ed. 610, or concurrent with Ed. 610.)</td>
</tr>
<tr>
<td>Ed. 610</td>
<td>3</td>
<td>Education and Cultural Processes (3+0)</td>
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<tr>
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<td>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.)</td>
</tr>
<tr>
<td>Ed. 611</td>
<td>3</td>
<td>Learning, Thinking and Perception in Cultural Perspective (3+0)</td>
</tr>
<tr>
<td></td>
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<td>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.)</td>
</tr>
<tr>
<td>Ed. 612</td>
<td>3</td>
<td>Cultural and Philosophical Foundations of Education (3+0)</td>
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<tr>
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<td>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 an analysis. (Prerequisite: Graduate standing in education.)</td>
</tr>
<tr>
<td>Ed. 615</td>
<td>3</td>
<td>Social Organization of Classrooms and Learning (3+0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.)</td>
</tr>
<tr>
<td>Ed. 616</td>
<td>3</td>
<td>Education and Socio-Economic Change (3+0)</td>
</tr>
<tr>
<td></td>
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<td>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.)</td>
</tr>
<tr>
<td>Ed. 618</td>
<td>3</td>
<td>Higher Education: Basic Understanding (3+0)</td>
</tr>
<tr>
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<td>Historical and philosophical foundations of higher education, both in America and abroad. Examination of curriculum development, instruction, administration, and interinstitutional cooperation, with emphasis on trends and innovations in higher education. (Prerequisites: Graduate standing and permission of the instructor.)</td>
</tr>
<tr>
<td>Ed. 619</td>
<td>3</td>
<td>Reflective Inquiry Into Multicultural Classrooms and Communities (1+6)</td>
</tr>
<tr>
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<td>Gives student and teacher the opportunity to reflect on the classroom and community contexts. Study of behavior of adolescents and young children, cultural patterns of communication, economic and political communities, and student pathways to adult life. Should be taken concurrently with student teaching. (Prerequisite: Baccalaureate degree and admission to Teacher Education Program.)</td>
</tr>
</tbody>
</table>
Ed. 620 3 Credits  Spring
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  Fall
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. 630 3 Credits  Fall
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  Spring
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. 633 3 Credits  Fall
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. 635 3 Credits  Fall and Spring
Strategies for Cooperating Teachers (3+0)
Study of effective teaching using alternative strategies appropriate to differing goals. Consideration will also be given to teaching with and/or supervising student teachers as a technique for improving instruction. (Prerequisite: Certified teacher employed in a school district.)

Ed. 636 3 Credits  Alternate Spring
The 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. Next offered 1989-90.)

Ed. 645 3 Credits  Summer
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. 650 3 Credits Fall
Organizational Behavior in Schools (3+0)
Responsibility pertaining to the organization of a school and the direction of personnel. Functions of instructional leadership in cross-cultural perspective. Public school organization in both urban and rural settings. Problems incidental to public school administration in Alaska. (Prerequisite: Graduate standing, teaching experience.)

Ed. 651 3 Credits Spring
Large and Small School Management Processes (3+0)
A comparative and analytical perspective of management processes used in dispersed educational organizations and in centralized educational organizations. Particular attention is given to management problems that confront Alaskan administrators. Case studies used reflect the nature of Alaskan schools. (Prerequisite: Graduate standing in education.)

Ed. 652 3 Credits Spring
Effective Schooling Practices (3+0)
An examination of school improvement procedures, including the history of school improvement and the analysis of contemporary methods and procedures in effective schooling practices. (Prerequisite: Graduate standing in Education.)

Ed. 653 3 Credits Spring
Instructional Leadership in Public Schools (3+0)
A study of the analytical and practical competencies necessary to understand and exercise instructional leadership in the public schools. Leadership is examined in its historical and theoretical contexts. Supervision and interpersonal communications are emphasized as they relate to instructional leadership. (Prerequisite: Graduate standing in education.)

Ed. 654 3 Credits Fall
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. 655 3 Credits Alternate Spring
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. Next offered: 1988-89.)

Ed. 660 3 Credits Spring
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. 664 3-6 Credits Fall and Spring
Internship: Principal's Endorsement (0+9)
Field work in an appropriate educational or agency setting. Each student will complete an approved field study project. (Prerequisite: Approval of student’s advisory committee.)

Ed. 665 3-6 Credits Fall and Spring
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. 682 3 Credits Late Spring/Summer
Designing Learning Environments (2+3)
Brings students together at conclusion of student teaching for a full week of study. Explores in depth specific problems students experienced during student teaching. Includes summer project in which students design learning environments for the classroom in which they expect to teach. (Prerequisites: Baccalaureate Degree, admission to Teacher Education Program and Completion of student teaching and Ed. 619.)
Ed. 690  3 Credits  
Seminar in Cross-Cultural Studies (3+0)
An investigation of current issues in cross-cultural contexts. The seminars will provide an opportunity for students to synthesize their prior graduate studies and research, and shall be taken near the terminus of their graduate programs. (Prerequisites: Advancement to candidacy, permission of student's graduate committee.)

Ed. 691  3 Credits  
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.)

Electrical Engineering

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>E.E. 303</td>
<td>4</td>
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<tr>
<td>Electrical Machinery (3+3)</td>
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<tr>
<td>E.E. 311</td>
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<tr>
<td>Applied Engineering Electromagnetics (3+0)</td>
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<tr>
<td>E.E. 312</td>
<td>3</td>
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<tr>
<td>Electromagnetic Waves and Devices (3+0)</td>
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<tr>
<td>E.E. 332</td>
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<tr>
<td>Electromagnetics Laboratory (0+3)</td>
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<tr>
<td>E.E. 334</td>
<td>4</td>
<td>Spring</td>
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<tr>
<td>Electronic Circuit Design (3+3)</td>
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<tr>
<td>E.E. 342</td>
<td>4</td>
<td>Spring</td>
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<tr>
<td>Computer Organization II (3+3)</td>
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<tr>
<td>E.E. 354</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>Engineering Signal Analysis (3+0)</td>
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<tr>
<td>E.E. 406</td>
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<td>Fall</td>
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<td>Electrical Power Engineering (3+3)</td>
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<tr>
<td>E.E. 442</td>
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<tr>
<td>Digital Systems Analysis and Design I (3+3)</td>
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<td>E.E. 451</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>Digital Signal Processing (2+3)</td>
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<td>E.E. 454</td>
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<tr>
<td>Advanced Digital Systems Application and Design (3+3)</td>
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<td>E.E. 461</td>
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<td>Communication Systems (3+3)</td>
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<td>E.E. 462</td>
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<td>Communication Systems (3+3)</td>
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<td>E.E. 464</td>
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<td>Communication Networks (3+0)</td>
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<td>E.E. 471</td>
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<td>Fundamentals of Automatic Control (4+0)</td>
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<td>E.E. 481</td>
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<td>Electronics and Instrumentation for Scientists and Engineers I (2+3)</td>
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<td>E.E. 482</td>
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<td>Spring</td>
<td>Electronics and Instrumentation for Scientists and Engineers II (2+3)</td>
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<tr>
<td>E.E. 603</td>
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<td>As Demand Warrants</td>
<td>Advanced Electric Power Engineering (3+0)</td>
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<td>E.E. 604</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Electric Power Systems Modeling and Transients (3+0)</td>
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<td>E.E. 610</td>
<td>3</td>
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<td>Linear Systems (3+0)</td>
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<td>E.E. 632</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Quantum Electronics (3+0)</td>
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<td>E.E. 635</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Advanced Electronic Circuit Design (3+0)</td>
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<tr>
<td>E.E. 662</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Communication Theory (3+0)</td>
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<tr>
<td>E.E. 664</td>
<td>3</td>
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<td>Data Communication Techniques (3+0)</td>
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<td>E.E. 671</td>
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<td>As Demand Warrants</td>
<td>Digital Control Systems (3+0)</td>
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<td>E.S. 301</td>
<td>3</td>
<td>Fall</td>
<td>Engineering Analysis (3+0)</td>
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<tr>
<td>E.S. 307</td>
<td>3</td>
<td>Fall</td>
<td>Elements of Electrical Engineering (2+3)</td>
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</table>

**Engineering Science**
### Instrumentation and Measurement (2+3)

**E.S. 308** 3 Credits  
Spring

### Mechanics of Materials (2+3)

**E.S. 331** 3 Credits  
Fall and Spring

### Elements of Material Science/Engineering (2+3)

**E.S. 334** 3 Credits  
Fall

### Fluid Mechanics (3+3)

**E.S. 341** 4 Credits  
Fall and Spring

### Basic Thermodynamics (3+0)

**E.S. 346** 3 Credits  
Fall and Spring

### Ethics and Liability in Professional Practice (2+3)

**E.S. 429** 3 Credits  
Fall

### Engineering and Science Management

### Construction Cost Estimating and Bid Preparation (3+0)

**E.S.M. 401** Credits Arr.  
Fall

### Economic Analysis and Operations (3+0)

**E.S.M. 450** 3 Credits  
Spring

### Engineers in Organization (3+0)

**E.S.M. 601** 3 Credits  
Fall

#### Development of organizations and techniques appropriate to engineering and scientific activity and personnel to organize, motivate, evaluate, develop and coordinate for maximum effectiveness, with due consideration to the goals of individuals.  
(Prerequisite: B.S. degree in engineering or physical science or consent of instructor.)

### Engineering Economy (3+0)

**E.S.M. 605** 3 Credits  
Fall

#### The science of fiscal decision-making. Graduate level studies in problems of replacement, economic selections, income tax accounting, engineering evaluation, and introduction to the problems of depreciation.

### Legal Principles for Engineering Management (3+0)

**E.S.M. 608** 3 Credits  
Fall

#### A course devoted to those aspects of law specifically related to technical management. Contracts, sales, real property, business organization, labor, patents, and insurance.  
(Prerequisite: Graduate standing.)

### Project Management (3+0)

**E.S.M. 609** 3 Credits  
Alternate Fall

#### Organizing, planning, scheduling and controlling projects. Use of CPM and PERT computer applications. Case studies of project management problems and solutions.  
(Prerequisite: Graduate standing in Engineering Management or permission of instructor. Next offered: 1989-90.)

### Statistics for E.S.M. (3+0)

**E.S.M. 620** 3 Credits  
Every Third Semester

#### 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.  
(Prerequisites: Stat. 301 and Math 202. Next offered: Fall 1989.)

### Operations Research (3+0)

**E.S.M. 621** 3 Credits  
Spring

#### Mathematical techniques for aiding managerial decision-making. Waiting line theory, inventory models, linear programming, transportation problem, dynamic programming, PERT/CPM, machine scheduling, and simulation. Emphasis on application of techniques to actual management situations.
**E.S.M. 623**  
3 Credits  
**Fall and Spring**  
Computer Programming for Engineering Managers (3+0)  
A course in basic FORTRAN programming, with applications to engineering problems. (Not offered for credit toward the Master of Science in Engineering Management or Science Management.)

**E.S.M. 684**  
3 Credits  
**Spring and Fall**  
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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Offered</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl. 301</td>
<td>3</td>
<td>Fall</td>
<td>Continental Literature in Translation: From the Ancient World through the Renaissance (3+0)</td>
</tr>
<tr>
<td>Engl. 308</td>
<td>3</td>
<td>Fall</td>
<td>Survey of British Literature: Beowulf to the Romantic Period (3+0)</td>
</tr>
<tr>
<td>Engl. 310</td>
<td>3</td>
<td>Spring</td>
<td>Literary Criticism (3+0)</td>
</tr>
<tr>
<td>Engl. 314</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Technical Writing</td>
</tr>
<tr>
<td>Engl. 340</td>
<td>3</td>
<td>Fall</td>
<td>Contemporary Native American Literature (3+0)</td>
</tr>
<tr>
<td>Engl. 350</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Literature of Alaska and the Yukon Territory (3+0)</td>
</tr>
<tr>
<td>Engl. 403</td>
<td>3</td>
<td>Every Third Spring</td>
<td>American Renaissance (3+0)</td>
</tr>
<tr>
<td>Engl. 405</td>
<td>3</td>
<td>Every Third Fall</td>
<td>British Writers of the 19th Century: Romantic Period (3+0)</td>
</tr>
<tr>
<td>Engl. 407</td>
<td>3</td>
<td>Every Third Fall</td>
<td>British Writers of the Restoration and 18th Century: Neo-Classical Period (3+0)</td>
</tr>
<tr>
<td>Engl. 414</td>
<td>3</td>
<td>Fall</td>
<td>Research Writing (3+0)</td>
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**Engl. 306**  
3 Credits  
**Fall**  
Survey of American Literature

**Engl. 309**  
3 Credits  
**Spring**  
Survey of British Literature: Romantic Period to the Present (3+0)

**Engl. 313**  
3 Credits  
**Spring**  
Writing Non-fiction Prose (3+0)

**Engl. 318**  
3 Credits  
**Fall and Spring**  
Modern English Grammar (3+0)

**Engl. 349**  
3 Credits  
**Fall**  
Narrative Art of Alaska Native Peoples (in English Translation) (3+0)

**Engl. 371**  
3 Credits  
**Fall and Spring**  
Intermediate Creative Writing (3+0)

**Engl. 404**  
3 Credits  
**Every Third Spring**  
American Realism (3+0)

**Engl. 406**  
3 Credits  
**Every Third Fall**  
British Writers of the 19th Century: Victorian Period (3+0)

**Engl. 408**  
3 Credits  
**Every Third Spring**  
American Origins (3+0)

**Engl. 421**  
3 Credits  
**Every Third Spring**  
Chaucer (3+0)
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>Engl. 422</td>
<td>3</td>
<td>Fall</td>
<td>Shakespeare: History Plays and Tragedies (3+0)</td>
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<td>Engl. 426</td>
<td>3</td>
<td>Every Third Fall</td>
<td>Milton (3+0)</td>
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<tr>
<td>Engl. 445</td>
<td>3</td>
<td>Alternate Fall</td>
<td>20th-Century Drama: From Chekhov to Ionesco (3+0)</td>
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<tr>
<td>Engl. 447</td>
<td>3</td>
<td>Alternate Spring</td>
<td>20th-Century British Prose (3+0)</td>
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<td>Engl. 452</td>
<td>3</td>
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<td>The British Novel to 1900 (3+0)</td>
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<td>Engl. 472</td>
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<td>History of the English Language (3+0)</td>
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<td>Engl. 425</td>
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<td>Shakespeare: Comedies and Non-Dramatic Poetry (3+0)</td>
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<td>Engl. 444</td>
<td>3</td>
<td>Every Third Spring</td>
<td>Fiction in Translation (3+0)</td>
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<td>Engl. 446</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Major Modern and Contemporary Poetry (3+0)</td>
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<tr>
<td>Engl. 448</td>
<td>3</td>
<td>Alternate Spring</td>
<td>20th-Century American Prose (3+0)</td>
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<tr>
<td>Engl. 462</td>
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<td>Applied English Linguistics (3+0)</td>
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<td>Engl. 485</td>
<td>3</td>
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<td>Teaching Compositions in the Schools (3+0)</td>
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<tr>
<td>Engl. 601</td>
<td>3</td>
<td>Spring</td>
<td>Bibliography, Methods, and Criticism (3+0)</td>
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<tr>
<td>Engl. 603</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Studies in British Literature: Old and Middle English (3+0)</td>
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<tr>
<td>Engl. 604</td>
<td>3</td>
<td>Every Third Fall</td>
<td>Studies in British Literature: Renaissance and 17th Century (3+0)</td>
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<tr>
<td>Engl. 607</td>
<td>3</td>
<td>Every Third Spring</td>
<td>Studies in British Literature: Restoration, 18th and 19th Centuries (3+0)</td>
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<td>Engl. 608</td>
<td>3</td>
<td>Every Third Spring</td>
<td>Studies in British Literature: 20th Century (3+0)</td>
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<tr>
<td>Engl. 609</td>
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<td>Every Third Spring</td>
<td>Studies in American Literature: Colonial Period and 19th Century (3+0)</td>
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<td>Engl. 612</td>
<td>3</td>
<td>Every Third Fall</td>
<td>Studies in American Literature: 20th Century (3+0)</td>
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</table>
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. (Prerequisites: At least two courses from Engl. 481, 482, 483, 484 and permission of instructor, or, permission of the head of the Department of English and the instructor.)

Engl. 681  3 Credits  Alternate Fall
Forms of Poetry (3+0)
Intensive study of the forms and techniques of poetry writing. Includes readings and poetry writing exercises. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1989-90.)

Engl. 682  3 Credits  Alternate Fall
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. (Prerequisite: Graduate Standing or permission of instructor. Next offered: 1988-89.)

Engl. 683  3 Credits  As Demand Warrants
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. (Prerequisite: Graduate Standing or permission of instructor.)

Engl. 684  3 Credits  Alternate Spring
Forms of Non-Fiction Prose (3+0)
Intensive study of the forms and techniques of non-fiction. Includes readings and writing exercises. (Prerequisite: Graduate Standing or permission of instructor. Next offered: 1989-90.)

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. (Prerequisite: Graduate standing.)

Engl. 692  Credits Arr.  Fall and Spring
Graduate Seminar
Intensive study of selected topics in the discipline.

Environmental Quality Engineering/Science

EQE 601  3 Credits  Every Third Semester
Environmental Quality Science Measurements (2+3)
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-waster. 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. Next offered: Fall 1989.)

EQE 602  3 Credits  Every Third Semester
Engineering Management of Water Quality (3+0)
**EQE 603**  
3 Credits  
*Solid Waste and Air Pollution (3+0)*  
Every Third Semester  
Planning, collecting, and disposing of refuse. Techniques of open dumping, land filling, sanitary land filling, composting, incineration, and resource recovery. Solid waste environmental relationships to water, air, and land pollution. Economics and case studies are included. Air pollution topics will include quantity and quality of atmospheric emissions and their effects on human beings and the environment. Identification and location of sources, and measurement of quality and standards. Materials fee: $15. (Prerequisite: Permission of instructor. Next offered: Fall 1988.)

**EQE 604**  
3 Credits  
*Environmental Quality Evaluation (3+0)*  
Every Third Semester  
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. Next offered: Spring 1989.)

**EQE 605**  
3 Credits  
*Chemical and Physical Water and Wastewater Treatment Processes (3+0)*  
Every Third Semester  
The theory and design of chemical and physical unit processes utilizing the treatment of water and wastewater. Sedimentation and flotation, ion exchange, adsorption, coagulation, precipitation, filtration, disinfection, reverse osmosis, and aeration theories will be studied. Design problems for all unit processes. (Prerequisite: Graduate standing or permission of instructor. Next offered: Spring 1989.)

**EQE 606**  
3 Credits  
*Biological Treatment Processes (3+0)*  
Every Third Semester  
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. Next offered: Fall 1989.)

**EQE 607**  
3 Credits  
*Biotechnology (3+0)*  
Alternate Spring  
(Same as ALR 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. Next offered: 1989-90.)

**Eskimo**

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<tr>
<th>Course</th>
<th>Credits</th>
<th>Semester</th>
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<tbody>
<tr>
<td>Esk. 301</td>
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<td>Fall</td>
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<tr>
<td>Advanced Yup'ik Eskimo (3+0)</td>
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<tr>
<td>Esk. 415</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>Additional Topics in Advanced Yup'ik Eskimo (3+0)</td>
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<tr>
<td>Esk. 417</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>Advanced Inupiaq Eskimo (3+0)</td>
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**Fisheries**

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<tr>
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<th>Semester</th>
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<tr>
<td>FISH 411</td>
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<td>As Dem. Wmts.</td>
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<tr>
<td>Fisheries Field Trip</td>
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<td>FISH 429</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>Introduction to Fisheries Science (2+3)</td>
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</table>
**FISH 430** 3 Credits Spring  
Fisheries Management (3+0)

**FISH 630** 3 Credits Alternate Fall  
Quantitative Fishery Science (3+0)  
Quantitative analysis and modeling of exploited fish populations. Emphasis is placed on estimates of abundance, recruitment, growth, mortality, and yield. Method and theory are presented in relation to management needs. (Prerequisites: Stat. 301 and WLF 429 or equivalents or permission of instructor. Next offered: 1988-89.)

**French**

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<th>Course</th>
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<th>Notes</th>
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<tbody>
<tr>
<td>Fren. 301</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Individual Study: Semantics</td>
</tr>
<tr>
<td>Fren. 303</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Individual Study: Translation of French Texts</td>
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**Geography**

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<tr>
<td>Geog. 301</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Geographic Field Research Techniques</td>
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<tr>
<td>Geog. 305</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Geography of Europe (except U.S.S.R.) (3+0)</td>
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<tr>
<td>Geog. 309</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Cartography (1+6)</td>
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<tr>
<td>Geog. 315</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Geography of Africa (3+0)</td>
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<tr>
<td>Geog. 339</td>
<td>3 or 4</td>
<td>Spring</td>
<td>Advanced Physical Geography (3+0) or (3+3)</td>
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<tr>
<td>Geog. 402</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Man and Nature (3+0)</td>
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<tr>
<td>Geog. 405</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Political Geography (3+0)</td>
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<tr>
<td>Geog. 302</td>
<td>3</td>
<td>Spring</td>
<td>Geography of Alaska (3+0)</td>
</tr>
<tr>
<td>Geog. 306</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Geography of the Soviet Union (3+0)</td>
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<tr>
<td>Geog. 311</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Geography of Asia (3+0)</td>
</tr>
<tr>
<td>Geog. 327</td>
<td>3</td>
<td>Spring</td>
<td>Cold Lands (3+0)</td>
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<tr>
<td>Geog. 401</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Weather and Climate (3+0)</td>
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<tr>
<td>Geog. 404</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Urban Geography (3+0)</td>
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<tr>
<td>Geog. 408</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Quantitative Research Techniques (2+3)</td>
</tr>
<tr>
<td>Geog. 327</td>
<td>3</td>
<td>Spring</td>
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# Geological Engineering

<table>
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<tr>
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<tr>
<td>G.E. 365</td>
<td>3</td>
<td>Fall</td>
<td>Geological Engineering I (3+0)</td>
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<tr>
<td>G.E. 375</td>
<td>3</td>
<td>Fall</td>
<td>Terrain Analysis (3+0)</td>
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<tr>
<td>G.E. 420</td>
<td>3</td>
<td>Spring</td>
<td>Subsurface Hydrology (2+3)</td>
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<tr>
<td>G.E. 435</td>
<td>3</td>
<td>Spring</td>
<td>Exploration Design (3+0)</td>
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<tr>
<td>G.E. 471</td>
<td>3</td>
<td>Spring</td>
<td>Remote Sensing for Engineering (3+0)</td>
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<tr>
<td>G.E. 630</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Advanced Applied Mining Geology (2+3)</td>
<td>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: G.E. 435, Geos. 432, and Geos. 432L. Next offered: 1988-89.)</td>
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<tr>
<td>G.E. 631</td>
<td>3</td>
<td>Spring</td>
<td>Electron Microprobe Methods (2+3)</td>
<td>Applications of electron micro-analysis to mineralogy, petrology, 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 are considered. (Prerequisite: M.Pr. 418B.)</td>
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<tr>
<td>G.E. 633</td>
<td>3</td>
<td>Fall</td>
<td>Fluid Inclusion Methods in Mineral and Petroleum Exploration (2+3)</td>
<td>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.)</td>
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<tr>
<td>G.E. 635</td>
<td>3</td>
<td>Spring</td>
<td>Geostatistical Ore Reserve Estimation (2+3)</td>
<td>(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.)</td>
</tr>
<tr>
<td>G.E. 666</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Advanced Engineering Geology (2+3)</td>
<td>The interaction between geology and engineering case histories, student reports. (Prerequisites: Graduate standing, G.E. 365 and G.E. 372 or permission of instructor. Next offered: 1988-89.)</td>
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<tr>
<td>G.E. 668</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Tunneled Geotechniques (3+0)</td>
<td>Tunnel design, case histories, student report. (Prerequisites: Graduate standing in geological engineering or permission of instructor. Next offered: 1988-89.)</td>
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Geoscience (Geology and Geophysics)

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<th>Course Code</th>
<th>Credits</th>
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<tr>
<td>Geos. 302</td>
<td>3</td>
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<tr>
<td>Marine Geology (3+0)</td>
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<td>Geos. 314</td>
<td>4</td>
<td>Winter</td>
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<tr>
<td>Structural Geology (3+3)</td>
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<td>Geos. 321</td>
<td>3</td>
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<tr>
<td>Sedimentology (2+3)</td>
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<td>Geos. 350</td>
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<td>Winter</td>
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<tr>
<td>Geologic Field Methods (1+3)</td>
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<td>Geos. 370</td>
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<td>Sedimentary and Structural Geology for Petroleum Engineers (3+3)</td>
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<td>Geos. 408</td>
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<td>Photogeology (1+3)</td>
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<td>Geos. 411</td>
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<tr>
<td>Seismic Exploration (2+3)</td>
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<td>Geos. 414</td>
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<td>Winter</td>
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<tr>
<td>Introduction to Glaciology (3+0)</td>
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<tr>
<td>Geos. 418</td>
<td>3</td>
<td>Winter</td>
<td>Fall</td>
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<tr>
<td>Basic Geophysics (3+0)</td>
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<td>Geos. 420</td>
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<td>Winter</td>
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<tr>
<td>Elements of Seismology (3+3)</td>
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<td>Geos. 430</td>
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<td>Winter</td>
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<tr>
<td>Statistics and Data Analysis in Geology (3+0)</td>
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<td>Geos. 304</td>
<td>3</td>
<td>Winter</td>
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<tr>
<td>Geomorphology (3+0)</td>
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<td>Geos. 316</td>
<td>4</td>
<td>Winter</td>
<td>Fall</td>
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<tr>
<td>Optical Mineralogy and Petrography (2+6)</td>
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<tr>
<td>Geos. 322</td>
<td>4</td>
<td>Winter</td>
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<tr>
<td>Stratigraphic Principles (3+3)</td>
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<td>Geos. 351</td>
<td>4 or 6</td>
<td>Winter</td>
<td>Summer</td>
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<td>Field Geology (Arranged)</td>
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<tr>
<td>Geos. 401</td>
<td>4</td>
<td>Winter</td>
<td>Fall</td>
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<td>Invertebrate Paleontology (3+3)</td>
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<td>Geos. 410</td>
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<td>Winter</td>
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<tr>
<td>Potential Methods in Geophysics (1+3)</td>
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<td>Geos. 412</td>
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<tr>
<td>Electrical Methods in Geophysics (1+3)</td>
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<td>Geos. 417</td>
<td>3</td>
<td>Winter</td>
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<tr>
<td>Introduction to Geochemistry (3+0)</td>
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<td>Geos. 419</td>
<td>4</td>
<td>Winter</td>
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<tr>
<td>Continuum Mechanics (4+0)</td>
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<td>Geos. 422</td>
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<tr>
<td>Geoscience Applications of Remote Sensing (3+0)</td>
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<td>Geos. 432</td>
<td>3</td>
<td>Winter</td>
<td>Fall</td>
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<td>Geology of Mineral Resources (3+0)</td>
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<td>Geos. 432L</td>
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<td>Fall</td>
<td>Geology of Mineral Resources Laboratory (1+3)</td>
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<td>Geos. 451</td>
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<td>Practical Field Geophysics</td>
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<td>Geos. 462</td>
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<td>Alternate Fall</td>
<td>Glacial and Periglacial Geology (3+3)</td>
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<td>Geos. 465</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Geoarchaeology (3+0) (Same as Anth. 465)</td>
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<td>Geos. 470</td>
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<td>Petroleum Geology (3+3)</td>
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<td>Geos. 482</td>
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<td>Fall and Spring</td>
<td>Geology Seminar (1+0)</td>
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<td>Geos. 601</td>
<td>1</td>
<td>Spring</td>
<td>Scanning Electron Microscopy (1/2+1) The theory and use of the scanning electron microscope. Each student will prepare their own samples and will view them in the scanning electron microscope. The X-ray energy dispersive microanalyzer and other special techniques will be introduced. A written project report will be required. (Prerequisite: Graduate standing and permission of instructor.)</td>
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<tr>
<td>Geos. 605</td>
<td>3</td>
<td>Spring</td>
<td>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.)</td>
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<tr>
<td>Geos. 606</td>
<td>2</td>
<td>Spring</td>
<td>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.)</td>
</tr>
<tr>
<td>Geos. 607</td>
<td>2</td>
<td>Spring</td>
<td>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.)</td>
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<tr>
<td>Geos. 608</td>
<td>2-4</td>
<td>As Demand Warrants</td>
<td>Advanced Exploration Geophysics (2-4+0) An advanced course covering aspects of the seismic, gravimetric, magnetometric and magneto-electric techniques in geophysical exploration. (Prerequisite: Senior or graduate standing in geophysics or permission of instructor.)</td>
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<tr>
<td>Geos. 609</td>
<td>2-4</td>
<td>Fall and Spring</td>
<td>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.)</td>
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<tr>
<td>Geos. 610</td>
<td>3</td>
<td>Alternate Spring</td>
<td>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. Next offered: 1989-90.)</td>
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<tr>
<td>Geos. 611</td>
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<td>Alternate Fall</td>
<td>Tectonics and Sedimentation (3+0) A survey of sedimentary basins in various plate-tectonic settings. Emphasis on the evolution of sedimentary basins, tectonic settings as reflected in sandstone composition, and techniques of basin analysis. (Prerequisites: Geos. 402 or permission of instructor. Next offered: 1989-90.)</td>
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</table>
Geos. 612 3 Credits  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  As Demand Warrants  
*Advanced Marine Geology (3+0)* 
A global study of the geology and structure of the ocean floors and continental margins. Geophysical signatures, including heat flow, seismicity, gravity, magnetics, and seismic structures of the major tectonic elements which make up oceanic crustal plates. (Prerequisite: Graduate standing or permission of instructor.)

Geos. 615 3 Credits  Alternate Spring  
*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. Next offered: 1989-90.)

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. Next offered: 1989-90.)

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 paleoclimatic information which they contained, and their role in engineering hydrology. (Prerequisite: Permission of instructor. Next offered: 1989-90.)

Geos. 618 2 Credits  Spring  
*Topics in Alaskan Geology (2+0)* 
Advanced study addressing specific regions or topical problems in Alaskan geology. Subject matter will vary from semester to semester. Seminar format. (Prerequisite: Permission of instructor.)

Geos. 621 3-4 Credits  Fall and Spring  
*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: $15. (Prerequisites: Geos. 214, 316.)

Geos. 622 4 Credits  Fall  
*Advanced Clastic Petrology (3+3)* 
The study of clastic sedimentary rocks, focusing on the methodology, utility and limitations of petrographic modal analysis. (Prerequisites: Geos. 321 and Geos. 316 or instructor's permission.)

Geos. 624 1-4 Credits  Fall and Spring  
*Advanced Structural Geology and Geotectonics (1-4+0)* 
An advanced course giving a detailed treatment of structural geology. Topics offered in different semesters are: (A) structural geology of metamorphic rocks; (B) advanced structural geology; (C) geotectonics. Laboratory fee: $10.00. (Prerequisite: Geos. 314 or permission of instructor.)

Geos. 625 3 Credits  Fall  
*Mountain Belts of the World (3+0)* 
Characteristics and evolution of mountain belts throughout the world. Geologic processes important in the evolution and architecture of mountain belts will be examined first, including plate tectonics, deformation, magmatism, metamorphism, and sedimentation. Then well-documented examples of mountain belts will be studied to illustrate the similarities and variations in the world's mountain belts. (Prerequisites: Geos. 314, Geos. 624C or equivalents. Instructor permission required. Next offered: 1988-89.)
Geos. 631 3 credits  Alternate Spring
Advanced Geochemistry (1-3+0)
An advanced course providing an in-depth treatment of physical geochemistry. Specific topics to be presented in different semesters include: (A) geochemistry of hydrothermal fluids, (B) thermodynamics, and (C) phase equilibria. Each time the course is offered only one such topic will be presented. (Prerequisites: Geos. 417, or Chem. 331, or MSL. 660, or permission of instructor. Next offered: 1988-89.)

Geos. 632 4 Credits  Spring
Advanced Study of Mineral Deposits (3+3)
A study of regional metallogeny and metatectonics, ore genesis, geochemical exploration, and application of isotopes and trace element. Laboratory exercises consist of integrated studies of drill core and hand specimens with reflected light and transmitted light petrography and X-ray diffraction analysis. Field mapping exercises will be held in late spring. Laboratory fee: $10. (Prerequisites: Geos. 316, 407, and 417.)

Geos. 635 1-4 Credits  Fall and Spring
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 or sequentially within one semester. 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. 640 4 Credits  Alternate Spring
Petrology of Carbonate Rocks (3+3)
Origin, depositional environments, diageneis and classification of limestones, dolostones and related rocks. (Prerequisite: Geos. 401 or permission of instructor.)

Geos. 641 1-3 Credits  As Demand Warrants
Advanced Paleontology (1-3+0)
An advanced course providing a detailed treatment of various topics in paleontology. Specific topics to be presented in different semesters include: (A) vertebrate paleontology, (B) invertebrate paleontology, (C) micropaleontology, and (D) paleobotany. Each time the course is offered only one such topic will be presented. (Prerequisite: Geos. 401 or permission of instructor.)

Geos. 642 3 Credits  Spring
Advanced Sedimentary Petrology (2+3)
Description and interpretation of sediments and sedimentary rocks with emphasis on the major types and current ideas regarding their processes of formation. Laboratories are designed to provide familiarity with a broad spectrum of sedimentary rock features as seen in hand specimens and thin sections. (Prerequisites: Previous coursework in sedimentation and sedimentary petrology; graduate standing 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. Next offered: 1989-90.)

Geos. 644 3 Credits  Spring
Advanced Stratigraphy (3+0)
An advanced course covering concepts of stratigraphic classification and stratigraphic units, physical stratigraphy, biostratigraphy, and chronostratigraphy. Emphasis on theory and on discerning geologic time from stratified rocks. (Prerequisites: Undergraduate stratigraphy and graduate standing or permission of instructor.)

Geos. 645 3 Credits  Alternate Fall
Advanced Carbonate Sedimentology (3+0 or 2+3)
An advanced course providing detailed treatment of various topics in carbonate sedimentology. Specific topics to be considered in different semesters include: (A) carbonate petroleum reservoirs, (B) evolution of
carbonate platforms, (C) deep-water carbonates, and (D) dolomitization and diagenesis. (Prerequisite: Course in carbonate sedimentology or permission of instructor. Next offered: 1989-90.)

**Geos. 646**  
3 Credits  
Alternate Spring  
**Seismic Stratigraphy (2+3)**  
A practical course treating the stratigraphic analysis of reflection seismic data as applied to regional basin analysis and petroleum exploration. Lectures describe the geologic basis for interpreting reflection profiles, the nature of acoustic velocity impedance contrasts along geologic horizons, the record and effect of sea-level variation and the global correlation of seismic sequences. Laboratory exercises are designed to provide "hands on" experience in reconstructing basin architecture using seismic sections from Alaska's North Slope and other basins from around the world. (Prerequisite: Geos. 411 or permission of instructor. Next offered: 1988-89.)

**Geos. 647**  
3 Credits  
Alternate Fall  
**Advanced Sedimentology (3+0)**  
An advanced treatment of basic principles of sediment transport, deposition, bedform evolution, and the development and preservation of primary sedimentary structures. Emphasis on character, physical basis, and recognition of sedimentary structures and textures. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1988-89.)

**Geos. 648**  
3 Credits  
Alternate Fall  
**Sedimentary Basin Analysis (3+0 or 2+3)**  
Application of stratigraphic, sedimentologic, geophysical, and tectonic principles to the analysis of sedimentary basins and their evolution. The course begins with a review of pertinent methods of analysis and then focuses on their application to specific sedimentary basins. (Prerequisites: Geos. 321, Geos. 322, or equivalent. Next offered: 1988-89.)

**Geos. 649**  
3 Credits  
Alternate Spring  
**Geomorphology of the Unglaciated 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 paleo-ecology, Quaternary history, and economic geology. (Prerequisite: Geos. 101 and 304 desirable, but not required. Next offered: 1989-90.)

**Geos. 650**  
3 Credits  
Alternate Fall  
**Paleocology 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. Next offered: 1989-90)

**German**

**Ger. 301**  
3 Credits  
Alternate Fall  
**Ger. 387**  
2 Credits  
Fall  
**Individual Study: Semantics**

**Ger. 303**  
3 Credits  
Alternate Fall  
**Ger. 432**  
3 Credits  
Alternate Spring  
**Ger. 487**  
2 Credits  
Alternate Fall  
**Studies in German Literature and Culture (3+0)**  
**Individual Study: Translation of German Texts**

**Ger. 488**  
3 Credits  
As Dem. Wmts.  
**Individual Study: Senior Project**

**History**
GRADUATE SCHOOL

Hist. 305  3 Credits  Alternate Fall  Europe: 1789 to 1850 (3+0)
Hist. 315  3 Credits  Alternate Fall  Europe: 1900-1945 (3+0)
Hist. 320  3 Credits  Every Third Spring  Modern Scandinavia (3+0)
Hist. 331  3 Credits  Alternate Spring  Modern Japan (3+0)
Hist. 344  3 Credits  Every Third Spring  Modern Russia (3+0)
Hist. 354  3 Credits  Alternate Fall  Canadian History to 1867 (3+0)
Hist. 375  3 Credits  Alternate Fall  History of the Northern Pacific (3+0)
Hist. 401  3 Credits  Every Third Fall  Renaissance and Reformation Europe (3+0)
Hist. 403  3 Credits  Every Third Fall  The French Revolution and Napoleon (3+0)
Hist. 420  3 Credits  Every Third Spring  Approaches to Women's History (3+0)
Hist. 435  3 Credits  Alternate Spring  Civil War and Reconstruction (3+0)
Hist. 441  3 Credits  Alternate Spring  The Development of the American and Canadian West 1867-Present (3+0)
Hist. 455  3 Credits  Alternate Fall  Military History (3+0)
Hist. 484  Credits Arr.  Alternate Spring  Seminar in Northern Studies
Hist. 306  3 Credits  Alternate Spring  Europe: 1850 to 1900 (3+0)
Hist. 316  3 Credits  Alternate Spring  Europe since 1945 (3+0)
Hist. 330  3 Credits  Alternate Fall  Modern China (3+0)
Hist. 341  3 Credits  Fall  History of Alaska (3+0)
Hist. 350  3 Credits  Alternate Spring  History of the People's Republic of China (3+0)
Hist. 355  3 Credits  Alternate Spring  Canadian History: 1867 to present (3+0)
Hist. 380  3 Credits  Alternate Spring  Polar Exploration and its Literature (3+0)
Hist. 402  3 Credits  Every Third Fall  Seventeenth and Eighteenth Century Europe (3+0)
Hist. 405  3 Credits  Alternate Fall  Modern Germany (3+0)
Hist. 430  3 Credits  Alternate Fall  American Colonial History (3+0)
Hist. 440  3 Credits  Alternate Fall  U.S. Westward Expansion 1763-1867 (3+0)
Hist. 450  3 Credits  Alternate Spring  Twentieth Century America (3+0)
Hist. 475  3 Credits  Fall  Historiography and Historical Method (3+0)
Hist. 476  3 Credits  Spring  Researching and Writing Academic and Public Northern History (1+2)

Human Services

HMSV 330  3 Credits  Spring  Alcoholism: Treatment and Prevention
HMSV 351  3 Credits  Spring  Foundations of Counselling II (3+0)
             (Same as Psy. 356)
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<td>HMSV 410</td>
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<td>Management of Human Services Programs (3+0)</td>
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<td>HMSV 445</td>
<td>3</td>
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<td>Community Psychology (3+0)</td>
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<td>Practiceum in Human Services</td>
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<td>Hum. 329</td>
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<td>The Modern Media: Search for Communication (3+0)</td>
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<td>Hum. 342</td>
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<td>Synthesis in Musical Expression (3+0)</td>
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<td>Senior Seminar (3+0)</td>
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<td>Jpn. 301</td>
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<td>Jpn. 332</td>
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<td>Japanese Cultural Traditions (3+0)</td>
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<td>Jpn. 333</td>
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<td>Twentieth Century Japanese Prose Fiction (3+0)</td>
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<td>J-B 301</td>
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<td>Basic Newsgathering and Processing (2+4)</td>
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<td>J-B 311</td>
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<td>Magazine Article Writing (2+1)</td>
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<td>J-B 317</td>
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<td>Broadcast Journalism (3+0)</td>
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<td>Magazine Editing (3+0)</td>
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<td>Principles of Advertising (3+0)</td>
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<td>Group Processes (3+0)</td>
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<td>Varieties of Visual Expressions: Art as Image and Idea (3+0)</td>
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<td>Approaches to the Study of Mass Communication (3+0)</td>
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<td>J-B 340</td>
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<td>Intermediate Photography (2+3)</td>
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<td>Television Production (2+4)</td>
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<td>J-B 320</td>
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<td>Journalism in Perspective (3+0)</td>
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<td>J-B 324</td>
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<td>Typography and Publication Design (2+2)</td>
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**GRADUATE SCHOOL**

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<tr>
<td>J-B 372</td>
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<td>Methods of Instructional Broadcasting (3+0)</td>
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<td>J-B 402</td>
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<td>Advanced Photography (2+3)</td>
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<td>J-B 411</td>
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<td>Advanced Writing for Publication (3+0)</td>
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<td>J-B 415</td>
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<td>News/Documentary Television Production (2+2)</td>
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<td>Magazine Production (2+3)</td>
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<td>Advanced News Gathering and Processing (2+4)</td>
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<td>Advanced Media Practicum (1+6)</td>
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<td>J-B 407</td>
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<td>Programming and Production (3+0)</td>
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<td>Mass Media Law and Regulations (3+0)</td>
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<td>Advanced Broadcast Production (1+6)</td>
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<td>J-B 433</td>
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**Justice**

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<th>Course No.</th>
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<tr>
<td>Just. 303</td>
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<td>Fall</td>
<td>Introduction to Legal Processes (3+0) (Same as P.S. 303)</td>
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<td>Just. 320</td>
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<td>Fall and Spring</td>
<td>Practicum</td>
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<td>Just. 352</td>
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<td>Criminal Law (3+0)</td>
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<td>Spring</td>
<td>Introduction to Legal Research and Writing (3+0) (Same as P.S. 404)</td>
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<td>3</td>
<td>Spring</td>
<td>Comparative Criminal Justice (3+0)</td>
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<tr>
<td>Just. 475</td>
<td>3</td>
<td>Fall and Spring</td>
<td>Internship</td>
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<tr>
<td>Just. 310</td>
<td>3</td>
<td>Spring</td>
<td>Principles of Corrections (3+0)</td>
</tr>
<tr>
<td>Just. 330</td>
<td>3</td>
<td>Spring</td>
<td>Law and Society (3+0) (Same as P.S. 330)</td>
</tr>
<tr>
<td>Just. 354</td>
<td>3</td>
<td>Spring</td>
<td>Procedural Law (3+0)</td>
</tr>
<tr>
<td>Just. 451</td>
<td>3</td>
<td>Fall</td>
<td>Research Methods (3+0)</td>
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<tr>
<td>Just. 460</td>
<td>3</td>
<td>Fall</td>
<td>Justice Processes (3+0)</td>
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<tr>
<td>Just. 492</td>
<td>Var.</td>
<td>Fall and Spring</td>
<td>Seminar</td>
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**Library Science**

<table>
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<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>L.S. 307</td>
<td>1</td>
<td>Spring</td>
<td>Information Sources for Educators (1+0)</td>
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<tr>
<td>L.S. 309</td>
<td>1</td>
<td>As Dem. Wmts.</td>
<td>Information Resources</td>
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**Linguistics**
<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>Ling. 303</td>
<td>3</td>
<td>As Dem. Wmts.</td>
<td>Language and Literacy Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Same as Ed. 303)</td>
<td></td>
</tr>
<tr>
<td>Ling. 318</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Introduction to Phonetics and Phonology (3+0)</td>
</tr>
<tr>
<td>Ling. 320</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Introduction to Syntactic Theory (3+0)</td>
</tr>
<tr>
<td>Ling. 350</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Historical Linguistics (3+0)</td>
</tr>
<tr>
<td>Ling. 410</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Theory and Methods of Second Language Teaching (3+0)</td>
</tr>
<tr>
<td>Ling. 450</td>
<td>3</td>
<td>Every third Spring</td>
<td>Language Policy and Planning (3+0)</td>
</tr>
<tr>
<td>Ling. 482</td>
<td>3</td>
<td>Every Third Year</td>
<td>Seminar in Linguistics (3+0)</td>
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**Marine Science and Limnology**

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MSL 411</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Current Topics in Oceanographic Research (3+0)</td>
</tr>
<tr>
<td>MSL 435</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Acoustical Oceanography (3+0)</td>
</tr>
<tr>
<td>MSL 610</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Marine Biology (3+0)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>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. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>MSL 611</td>
<td>5</td>
<td>Alternate Summer</td>
<td>Field Problems in Marine Biology (0+Arr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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 Seward Marine Center. (Prerequisites: Graduate standing or permission of instructor; invertebrate zoology or equivalent. Next offered: Summer 1988.)</td>
</tr>
<tr>
<td>MSL 615</td>
<td>2</td>
<td>Alternate Fall</td>
<td>Physiology of Marine Organisms (2+0)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>A study of the physiological adaptation of the marine environment, intertidal, pelagic, and deep benthos environment and energy flows will be discussed. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1989-90.)</td>
</tr>
<tr>
<td>MSL 620</td>
<td>4</td>
<td>Fall</td>
<td>Physical Oceanography (3+3)</td>
</tr>
<tr>
<td></td>
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<td>Physical description of the sea, physical properties of sea water, methods and measurements, boundary processes, currents, tides and waves, and regional oceanography. (Prerequisite: Science or engineering degree, or permission of instructor.)</td>
</tr>
<tr>
<td>MSL 621</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Polar Marine Science (3+0)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>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. Next offered: 1989-90)</td>
</tr>
<tr>
<td>MSL 622</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Satellite Oceanography (3+0)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Credits</td>
<td>Semester</td>
<td>Description</td>
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</tr>
<tr>
<td>MSL 625</td>
<td>2</td>
<td>Spring</td>
<td><strong>Shipboard Techniques (2+3)</strong> - A comprehensive introduction to modern oceanographic shipboard sampling and analysis techniques. (Prerequisite: Graduate standing or permission of instructor.)</td>
</tr>
<tr>
<td>MSL 629</td>
<td>3</td>
<td>Alternate Fall</td>
<td><strong>Methods of Numerical Simulation in Fluids and Plasma (3+0)</strong> (Same as Phys. 629) - The fundamentals of computer simulation including time and spatial differencing and stability theory applied to partial differential equations describing convection 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. Next offered: 1989-90.)</td>
</tr>
<tr>
<td>MSL 630</td>
<td>3</td>
<td>Spring</td>
<td><strong>Geological Oceanography (3+0)</strong> - Topography and structure of the ocean floor. Ocean basins, continental slope, shelf and coastal environments. Major sediment types and distributions. Hydrodynamics and sediment transport and deposition, including actions of waves, currents, and submarine gravity flows. (Prerequisite: Introductory college geology or permission of instructor.)</td>
</tr>
<tr>
<td>MSL 640</td>
<td>3</td>
<td>Alternate Spring</td>
<td><strong>Fisheries Oceanography (3+0)</strong> - Oceanography of marine processes supporting commercially important higher trophic levels (fishes and shellfish) including details of food webs and rates of organic matter transfer, natural mortality and recruitment schedules, competition, and prey-predator relationships during early life history, and distribution and abundance related to specific physical, chemical, biological, geological, and meteorological conditions in the sea. Examples taken from many of the world's commercial fisheries. (Prerequisite: MSL 650 or permission of instructor. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>MSL 650</td>
<td>3</td>
<td>Fall</td>
<td><strong>Biological Oceanography (3+0)</strong> - 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.)</td>
</tr>
<tr>
<td>MSL 652</td>
<td>3</td>
<td>Alternate Spring</td>
<td><strong>Management of Marine Ecosystems</strong> - The sea as a biological environment, organisms in the ocean, factors influencing the growth of organisms, nutrient cycles, productivity, food web, and interdependence of organisms. Several field trips may be required. (Prerequisites: Biol. 271, Chem. 212, 322; Geol. 411 or permission of the instructor. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>MSL 660</td>
<td>3</td>
<td>Spring</td>
<td><strong>Chemical Oceanography (3+0)</strong> (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.)</td>
</tr>
</tbody>
</table>
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. Next offered: 1989-90.)

MSL 662 3 Credits Alternate Spring
Fjord Oceanography (3+0)
A comprehensive, interdisciplinary treatment of fjords and fjord environments within the context of estuarine oceanography. Emphasis on Alaskan examples. (Prerequisite: Graduate standing or permission of instructor. Next offered: 1989-90.)

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: Chem. 425 or equivalent; permission of instructor.)

MSL 670 2 Credits Alternate Fall
Nutrient Dynamics (2+0)
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.)

MSL 680 3 Credits Alternate Spring
Physical-Chemical Limnology (3+0)
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. Next offered: 1989-90.)

Mathematics

Math. 302 3 Credits Fall and Spring
Differential Equations (3+0)

Math. 306 3 Credits Alternate Spring
Introduction to the History and Philosophy of Mathematics (3+0)

Math. 308 3 Credits Spring
Abstract Algebra (3+0)

Math. 314 3 Credits Spring
Linear Algebra (3+0)

Math. 401 3 Credits Fall
Math. 402 3 Credits Spring
Advanced Calculus (3+0)

Math. 408 3 Credits As Dem. Wmts.
Mathematical Statistics (3+0)

Math. 305 3 Credits As Dem. Wmts.
Geometry (3+0)

Math. 307 3 Credits Fall
Discrete Mathematics (3+0)

Math. 310 3 Credits Fall
Numerical Analysis (3+0)

Math. 371 3 Credits As Dem. Wmts.
Probability (3+0)

Math. 404 3 Credits As Dem. Wmts.
Topology (3+0)

Math. 421 4 Credits Fall
Applied Analysis I (4+0)
<table>
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<tr>
<th>Course Code</th>
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<th>Semester</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>Math. 422</td>
<td>4</td>
<td>Spring</td>
<td>Applied Analysis II (4+0)</td>
<td>Math. 421 and Math. 423</td>
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<tr>
<td>Math. 423</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Applied Mathematics (3+0)</td>
<td>Math. 341 and Math. 422</td>
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<tr>
<td>Math. 460</td>
<td>3</td>
<td>Fall</td>
<td>Mathematical Modeling (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 603</td>
<td>3</td>
<td>Fall</td>
<td>Real and Complex Analysis I (3+0)</td>
<td>Math. 421 and Math. 422</td>
</tr>
<tr>
<td>Math. 604</td>
<td>3</td>
<td>Spring</td>
<td>Real and Complex Analysis II (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 608</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Partial Differential Equations (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 611</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Mathematical Physics (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 612</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Mathematical Physics (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 615</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Applied Numerical Analysis (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 621</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Advanced Applied Analysis (3+0)</td>
<td>Math. 421 and Math. 422</td>
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<tr>
<td>Math. 622</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Topics in Applied Analysis (3+0)</td>
<td>Math. 421 and Math. 422</td>
</tr>
<tr>
<td>Math. 630</td>
<td>3</td>
<td>Fall</td>
<td>Advanced Linear Algebra and its Applications (3+0)</td>
<td>Math. 421 and Math. 422</td>
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Math. 631  3 Credits  Spring
Theory of Modern Algebra (3+0)
The Sylow Theorems, normal series and other topics from group theory. The theory of rings and fields including polynomial rings, unique factorization domains and Galois Theory. (Prerequisites: Math. 308 and graduate standing or permission of instructor.)

Math. 651  3 Credits  Every Third Year
Topological Spaces (3+0)
Treatement of the fundamental concepts of topology. Topologies on a set, connectedness, compactness, paracompactness, metrization problems, maps, convergence via nets and filters, homotopy, fundamental groups and covering spaces, homology theory, degree theory. (Prerequisites: Math. 401-402 or Math. 404 or permission of instructor. Next offered: Spring 1990.)

Math. 660  3 Credits  Alternate Spring
Advanced Mathematical Modeling (3+0)
An 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 normally be expected to develop a modeling project as part of the course requirements. (Prerequisite: Consent of instructor. Next offered: 1988-89.)

Math. 661  3 Credits  As Demand Warrants
Optimization (3+0)
(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 condition. Applications to management, physical, and life sciences. Computational work with the computer. (Prerequisites: Knowledge of calculus, linear algebra, and computer programming.)

Math. 663  3 Credits  Alternate Spring
Applied Combinatorics and Graph Theory (3+0)
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: 1989-90.)

**Mechanical Engineering**

<table>
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<th>Title</th>
<th>Credits</th>
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<tr>
<td>M.E. 302</td>
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<td>Mechanical Design (3+3)</td>
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<td>M.E. 321</td>
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<td>Industrial Processes (2+3)</td>
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<td>M.E. 404</td>
<td>3</td>
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<td>Stress Analysis (3+0)</td>
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<td>M.E. 409</td>
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<td>Controls (2+2)</td>
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<td>M.E. 415</td>
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<td>Thermal Systems Laboratory (1+3)</td>
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<td>M.E. 441</td>
<td>3</td>
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<td>Heat and Mass Transfer (3+0)</td>
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<td>M.E. 313</td>
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<td>Mechanical Engineering Thermodynamics (3+0)</td>
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<td>M.E. 403</td>
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<td>Mechanical Design II (3+2)</td>
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<td>M.E. 408</td>
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<td>Dynamics of Systems (2+2)</td>
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<td>M.E. 414</td>
<td>3</td>
<td>Fall</td>
<td>Thermal Systems Design (3+0)</td>
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<td>M.E. 416</td>
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<td>Fall</td>
<td>Design of Mechanical Equipment for the Petroleum Industry (3+0)</td>
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<tr>
<td>M.E. 450</td>
<td>3</td>
<td>As Dem. Wmts.</td>
<td>Theory of Flight (3+0)</td>
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</table>
M.E. 464  3 Credits  Spring  M.E. 487  3 Credits  Spring
Corrosion Engineering (3+0)  Design Project

M.E. 601  3 Credits  Alternate Fall
Finite Element Analysis in Engineering (3+0)
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. Next offered: 1989-90.)

M.E. 604  3 Credits  Alternate Spring
Experimental Mechanics (2+3)
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. Next offered: 1989-90.)

M.E. 617  3 Credits  As Demand Warrants
Power Analysis (3+0)
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: M.E. 313.)

M.E. 631  3 Credits  Alternate Fall
Advanced Mechanics of Materials (3+0)
Theories of elasticity and plasticity for small and large deformations. Applications to engineering problems. (Prerequisites: Graduate standing in engineering, ES 331 or equivalent. Next offered: 1989-90.)

M.E. 634  3 Credits  Alternate Spring
Advanced Materials Engineering (3+0)
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. Next offered: 1989-90.)

M.E. 641  3 Credits  Alternate Spring
Advanced Fluid Mechanics (3+0)
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. Next offered: 1989-90.)

M.E. 642  3 Credits  Alternate Spring
Advanced Heat Transfer (3+0)
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: 1988-89.)

M.E. 685  3 Credits  Alternate Spring
Arctic Heat and Mass Transfer (3+0)
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: C.E. 603. Next offered: 1989-90.)

M.E. 687  3 Credits  Alternate Spring
Arctic Materials Engineering (3+0)
A study of engineering material performance at low temperatures. (Prerequisites: Senior or graduate standing in science or engineering and C.E. 603 or equivalent. Next offered: 1987-88.)
Military Science

Mils. 300 1 Credit Fall and Spring
Outdoor Skills Laboratory (0+2)

Mils. 301 3 Credits Spring
Theory and Dynamics of Tactical Operations (3+1)

Mils. 303 3 Credits Fall
Advanced Leadership (3+1)
(Same as B.A. 303)

Mils. 350 3 Credits Summer
Advanced Camp

Mils. 351 2 Credits Summer
Cadet Troop Leadership Training

Mils. 400 1 Credit Fall and Spring
Outdoor Skills Laboratory (0+2)

Mils. 401 3 Credits Fall
Seminar on Tactical Operations (3+1)

Mils. 402 3 Credits Spring
Seminar in Leadership and Management (3+0)

Mineral Preparation Engineering

M.Pr. 304 3 Credits Alternate Fall
Introduction to Metallurgy (3+0)

M.Pr. 305 3 Credits Alternate Fall
Introduction to Mineral Preparation (2+3)

M.Pr. 314 3 Credits Alternate Spring
Unit Preparation Processes (1+6)

M.Pr. 313 3 Credits Alternate Fall
Introduction to Mineral Preparation (2+3)

M.Pr. 418 3 Credits Spring
Emission Spectroscopy, X-Ray Spectroscopy, and Atomic Absorption
(2+3)

M.Pr. 410 3 Credits Alternate Fall
Surface Materials Handling Systems (2+3)

M.Pr. 501 3 Credits Spring
Froth Floatation (2+3)
Theory and application of bulk and differential froth flotation to metallic minerals, non-metallic minerals, and coal. (Admission by arrangement.)

M.Pr. 601 3 Credits Spring
Froth Floatation (2+3)

M.Pr. 606 3 Credits Spring
Plant Design (1+6)
Selection, design and layout of equipment for erection and operation of mineral and coal beneficiation plants for specific custom and milling problems. (Admission by arrangement.)

M.Pr. 684 3 Credits Fall
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.)

M.Pr. 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.)
### Mining Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Term</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. 301</td>
<td>3</td>
<td>Spring</td>
<td>Mine Plant Design (3+0)</td>
</tr>
<tr>
<td>Min. 370</td>
<td>3</td>
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<td>Mineral Industry and the Environment (2+0)</td>
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<td>Min. 409</td>
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<td>Operations Research and Computer Applications in Mineral Industry (3+0)</td>
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<td>Rock Fragmentation (3+0)</td>
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<td>Underground Mining Methods and Their Design (3+0)</td>
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<td>Min. 472</td>
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<td>Fall</td>
<td>Design, Construction and Stability of Mining Openings (3+0)</td>
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<td>Advanced Mineral Economics (3+0)</td>
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<td>Research Methods in Mineral Engineering (3+3)</td>
</tr>
<tr>
<td>Min. 635</td>
<td>3</td>
<td>Spring</td>
<td>Geostatistical Ore Reserve Estimation (2+3)</td>
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#### Geostatistical Ore Reserve Estimation (2+3)

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  
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. Next offered: 1988-89.)

Min. 646 3 Credits  
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. Next offered: 1989-90.)

Min. 647 2 Credits  
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. Next offered: 1989-90.)

Min. 652 3 Credits  
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. Next offered: 1988-89.)

Min. 673 3 Credits  
Theoretical and Experimental Methods In 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. Next offered: 1988-89.)

Min. 674 3 Credits  
Selected Topics in Rock Mechanics (2+3)  
A study of current rock mechanics 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. Next offered: 1988-89.)

Min. 688 1 Credit  
Graduate Seminar I (1+0)  
(Same as M.Pr. 688)  
Preparation and presentation of research outlines by graduate students and participation in regularly organized Mineral Engineering Department seminars. (Prerequisite: Admission to graduate program.)

Min. 689 1 Credit  
Graduate Seminar II (1+0)  
Presentation of graduate research by graduate students and participation in regularly organized Mineral Engineering Department seminars. (Prerequisite: Admission to graduate program.)
### Museum Studies

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<td>MSM 487</td>
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<td>As Dem. Wmts.</td>
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### Music

#### Music Ensembles And Class Lessons

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<tr>
<td>Mus. 307</td>
<td>1</td>
<td>Fall and Spring</td>
<td>Chamber Music (0+3)</td>
</tr>
<tr>
<td>Mus. 317</td>
<td>1</td>
<td>Fall and Spring</td>
<td>Arctic Chamber Orchestra (0+3)</td>
</tr>
<tr>
<td>Mus. 606</td>
<td>1-2</td>
<td>As Demand Warrants</td>
<td>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.)</td>
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#### Applied Music

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<tr>
<td>Mus. 661</td>
<td>2 or 4</td>
<td>Fall and Spring</td>
<td>Advanced Private Lessons Private instruction in piano, voice, or orchestral instruments consisting of one private lesson and one master class per week. Repeatable for credit. Private lesson fee: $125. (Prerequisite: Music 462 or equivalent and by audition.)</td>
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#### Music Theory, Music History, and Music Education

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<tr>
<td>Mus. 309</td>
<td>3</td>
<td>Fall</td>
<td>Elementary School Music Methods (3+0) (Same as Ed. 309)</td>
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<tr>
<td>Mus. 331</td>
<td>3</td>
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<td>Form and Analysis (3+0)</td>
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<td>Mus. 405</td>
<td>3</td>
<td>Spring</td>
<td>Secondary School Music Methods (2+3)</td>
</tr>
<tr>
<td>Mus. 422</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Music in the Seventeenth and Eighteenth Centuries (3+0)</td>
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<tr>
<td>Mus. 424</td>
<td>3</td>
<td>Fall</td>
<td>Music in the Twentieth Century (3+0)</td>
</tr>
<tr>
<td>Mus. 315</td>
<td>2</td>
<td>Fall and Spring</td>
<td>Music Methods and Techniques (1+2)</td>
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<tr>
<td>Mus. 351</td>
<td>3</td>
<td>Fall</td>
<td>Conducting (3+0)</td>
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<tr>
<td>Mus. 421</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Music before 1620 (3+0)</td>
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<td>Mus. 423</td>
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<td>Music of the Nineteenth Century (3+0)</td>
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<tr>
<td>Mus. 431</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Counterpoint (3+0)</td>
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<tr>
<td>Course</td>
<td>Credits</td>
<td>Term</td>
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<tr>
<td>Mus. 432</td>
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<td>Orchestration and Arranging (3+0)</td>
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<td>Mus. 433</td>
<td>2-3</td>
<td>Alternate Fall</td>
<td>Seminar in Musical Composition (2+0, 3+0)</td>
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<tr>
<td>Mus. 441</td>
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<td>Alaska Native Music and Social Change (3+0)</td>
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<td>Mus. 601</td>
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<td>Fall</td>
<td>Introduction to Graduate Study (3+0)</td>
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<td>Mus. 607</td>
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<td>As Demands Warrants</td>
<td>Seminar in Elementary and Secondary General Classroom Music (3+0)</td>
</tr>
<tr>
<td>Mus. 608</td>
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<td>As Demand Warrants</td>
<td>Seminar in Secondary Music Ed. (2+0)</td>
</tr>
<tr>
<td>Mus. 625</td>
<td>1-3</td>
<td>As Demand Warrants</td>
<td>Topics in Music History (1-3+0)</td>
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<td>Mus. 631</td>
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<td>Seminar in Music Theory: History and Pedagogy (3+0)</td>
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<td>Mus. 641</td>
<td>3</td>
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<td>Methods of Ethnomusicological Research (3+0)</td>
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<tr>
<td>Mus. 651</td>
<td>2-3</td>
<td>As Demand Warrants</td>
<td>Advanced Conducting and Rehearsal Techniques (2-3+0)</td>
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<tr>
<td>Mus. 671</td>
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<td>As Demand Warrants</td>
<td>Psychology of Music (3+0)</td>
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<td>Mus. 690</td>
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<td>Fall and Spring</td>
<td>Graduate Recital</td>
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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.

Study of 1) historical development of music theory, and 2) music theory pedagogy (current teaching practices, and survey of available teaching materials.)

Bibliography and research methods in non-Western music. New ethnomusicological research and approaches.

Study of conducting style and techniques and their application to representative compositions for different instrumental and vocal mediums. Repeatable for credit.

Study of the relationship of music to the human mind emphasizing such factors as musical perception, pattern recognition, psychoacoustics, and related topics.

Full length solo performance recital. (Prerequisite: Mus. 490 or equivalent, graduate standing in applied music study, permission of instructor.)
Petroleum Engineering

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<tr>
<td>Pet.E. 301</td>
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<td>Reservoir Rock Properties (2+3)</td>
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<td>Pet.E. 305</td>
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<td>Underground Fluids Behavior (3+3)</td>
<td>Spring</td>
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<td>Pet.E. 400</td>
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<td>Practical Engineering Report (0+3)</td>
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<td>Pet.E. 421</td>
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<td>Subsurface Engineering (3+0)</td>
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<td>Pet.E. 431</td>
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<td>Natural Gas Engineering (2+0)</td>
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<td>Pet.E. 466</td>
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<td>Petroleum Recovery Methods (3+0)</td>
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<td>Pet.E. 478</td>
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<td>Well Test Analysis (2+0)</td>
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<td>Pet.E. 610</td>
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<td>Pet.E. 620</td>
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<td>Graduate Research Seminar (1+0)</td>
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<td>Pet.E. 650</td>
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<td>Advanced Topics in Petroleum Engineering (2+0)</td>
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<tr>
<td>Pet.E. 661</td>
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<td>Advanced Well Testing (3+0)</td>
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<tr>
<td>Pet.E. 662</td>
<td>3</td>
<td>Enhanced Oil Recovery (3+0)</td>
<td>Every Third Semester</td>
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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: Pet.E. 476 or permission of instructor.)

Introduction to research methodology including topics on structuring research proposals, methods of experimental design, and technical report writing; will include lectures by faculty in petroleum engineering outlining their research interests. (Prerequisite: Graduate standing in petroleum engineering.)

A series of lectures by the faculty and outside speakers covering "state of the art" technology in selected topics of interest to petroleum engineers. Among others, topics will include the subject matter of graduate courses not offered during the semester at hand. (Prerequisite: Graduate standing in petroleum engineering or permission of instructor.)

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: Pet.E. 476 or Pet.E. 610.)

Secondary and tertiary oil recovery processes, including waterflooding and chemical and thermal recovery methods. (Prerequisite: Pet.E. 476 or Pet.E. 610. Next offered: Spring 1989.)
Pet.E. 663 3 Credits  
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 Pet.E. 610.)  

Fall

Pet.E. 664 3 Credits  
Geothermal Reservoir Engineering (3+0)  
Quantitative treatment of broad problems associated with the development of a geothermal fluid reservoir system. (Prerequisite: Graduate standing in an engineering discipline or approval of the instructor. Next offered: Fall 1990.)

Every Third Semester

Pet.E. 665 3 Credits  
Advanced Phase Behavior (3+0)  
The development and application of phase equilibrium simulators to predict fluid properties for reservoir fluids. (Prerequisites: Pet.E. 321 or permission of instructor. Next offered: Fall 1988.)

Every Third Semester

Pet.E. 666 3 Credits  
Arctic Drilling and Well Completion (3+0)  
Offshore and onshore methods of drilling and completing oil and gas wells in the Arctic; problems of permafrost and ice flow, environmental considerations. (Prerequisite: Graduate standing in engineering discipline or permission of instructor. Next offered: Fall 1988.)

Every Third Semester

Philosophy

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<td>Phil. 341</td>
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<td>Phil. 351</td>
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<td>Phil. 352</td>
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<td>Phil. 481</td>
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<td>Phil. 483</td>
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Physical Education

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**Physics**

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<td>Phys. 311</td>
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<td>Mechanics I (4+0)</td>
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<td>Phys. 313</td>
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<td>Thermodynamics and Statistical Physics (4+0)</td>
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<td>Electricity and Magnetism (3+0)</td>
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<td>Phys. 611</td>
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<td>Mathematical Physics (3+0)</td>
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<td>Advanced consideration of such topics as transform methods, asymptotic methods, Green's function, Surow-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. Next offered: 1988-89)</td>
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<td>Classical Mechanics (3+0)</td>
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<td>Statistical Mechanics (3+0)</td>
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<td>Classical and quantum statistics of independent particles, ensemble theory, and applications. (Admission by arrangement. Next offered: 1988-89.)</td>
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<td>Fundamentals of Plasma Physics (3+0)</td>
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<td>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 in SPAS. Next offered: 1989-90.)</td>
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<td>Phys. 627</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Advanced Plasma Physics (3+0)</td>
</tr>
<tr>
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<td>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 in SPAS. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>Phys. 628</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Digital Time Series Analysis (3+0)</td>
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<td>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. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>Phys. 629</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Methods of Numerical Simulation in Fluids and Plasma (3+0)</td>
</tr>
<tr>
<td></td>
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<td>(Same as MSL 629)</td>
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<td>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. Next offered: 1989-90.)</td>
</tr>
</tbody>
</table>
**Phys. 631**  3 Credits  Alternate Fall  Electromagnetic Theory (3+0)  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. Next offered: 1988-89.)

**Phys. 632**  3 Credits  Alternate Spring  Electromagnetic: Theory (3+0)

**Phys. 640**  3 Credits  Alternate Spring  Aurora Physics (3+0)  The physical and chemical processes that underline the formation of the aurora. The interaction of energetic particles with the atmosphere in producing various aurorally associated phenomena, optical emissions, ionization, x-rays, and chemical-ionic changes. Effects of electric fields. The auroral energy budget. (Prerequisite: Graduate standing in geosciences or permission of instructor. Next offered: 1988-89.)

**Phys. 645**  3 Credits  Alternate Fall  Fundamentals of Geophysical Fluid Dynamics (3+0)  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 in SPAS. Next offered: 1988-89.)

**Phys. 650**  3 Credits  Alternate Fall  Aeronomy (3+0)  The physical and chemical processes that govern the response of planetary atmospheres to solar radiation, surface phenomena. Composition of the neutral and ionized gases. Chemical and ionic reactions in the thermosphere, mesosphere, and stratosphere. Dynamical processes and upper air winds. The airglow. Electrodynamic processes and ionospheric currents. (Prerequisite: Graduate standing in SPAS or permission of instructor. Next offered: 1988-89.)

**Phys. 651**  3 Credits  Alternate Fall  Quantum Mechanics (3+0)  Schrodinger's equations, operator formalism, correspondence principle, central force problems, perturbation theory, quantumstatistical mechanics and applications of quantum mechanics to collision problems, radiation, and spectroscopy. (Permission of instructor and Phys. 651, or the equivalent, for Phys. 652. Next offered: 1988-89.)

**Phys. 652**  3 Credits  Alternate Spring  Quantum Mechanics (3+0)

**Phys. 672**  3 Credits  Alternate Fall  Magnetospheric Physics (3+0)  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 in SPAS. Next offered: 1989-90.)

**Phys. 673**  3 Credits  Alternate Spring  Space Physics (3+0)  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 in SPAS. Next offered: 1989-90.)

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**Political Science**

**P.S. 301**  3 Credits  Alternate Fall  American Presidency (3+0)

**P.S. 302**  3 Credits  Alternate Spring  Congress and Public Policy (3+0)
<table>
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<tr>
<td>P.S. 303</td>
<td>3</td>
<td>Fall</td>
<td>Fall</td>
<td>Introduction to Legal Processes (3+0)  (Same as Just. 303)</td>
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<tr>
<td>P.S. 311</td>
<td>3</td>
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<td>Spring</td>
<td>Government and Politics of the Soviet Union (3+0)</td>
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<tr>
<td>P.S. 315</td>
<td>3</td>
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<td>American Political Thought (3+0)</td>
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<tr>
<td>P.S. 322</td>
<td>3</td>
<td>Alternate</td>
<td>Spring</td>
<td>International Law and Organizations (3+0)</td>
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<tr>
<td>P.S. 330</td>
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<td>Spring</td>
<td></td>
<td>Law and Society (3+0)  (Same as Just. 330)</td>
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<td>P.S. 401</td>
<td>3</td>
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<td>Political Behavior: Organizations (3+0)</td>
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<td>P.S. 403</td>
<td>3</td>
<td>Alternate</td>
<td>Spring</td>
<td>Public Policy (3+0)</td>
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<td>P.S. 411</td>
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<td>Classical Political Theory (3+0)</td>
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<td>P.S. 415</td>
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<td>Contemporary Political Theory (3+0)</td>
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<tr>
<td>P.S. 436</td>
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<td>Spring</td>
<td>The Courts and Civil Liberties (3+0)</td>
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<tr>
<td>P.S. 475</td>
<td>3</td>
<td>Fall and</td>
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<td>Internship in Public Affairs (3+0)</td>
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<td>P.S. 480A</td>
<td>3</td>
<td>Fall</td>
<td></td>
<td>Model U.N.: Member Nations</td>
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<tr>
<td>P.S. 480B</td>
<td>3</td>
<td>Spring</td>
<td></td>
<td>Model U.N.: Simulation</td>
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<tr>
<td>P.S. 480C</td>
<td>3</td>
<td>Spring</td>
<td></td>
<td>Model U.N.: Conference Participation</td>
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<tr>
<td>P.S. 430</td>
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<td>Fall</td>
<td>The Politics of Post-Industrial States (3+0)  (Same as Just. 310)</td>
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<tr>
<td>P.S. 312</td>
<td>3</td>
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<td>Fall</td>
<td>Government and Politics of China (3+0)</td>
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<tr>
<td>P.S. 321</td>
<td>3</td>
<td>Fall</td>
<td></td>
<td>International Politics (3+0)</td>
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<tr>
<td>P.S. 325</td>
<td>3</td>
<td>Spring</td>
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<td>Native Self Government (3+0)  (Same as ANS 325)</td>
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<tr>
<td>P.S. 400</td>
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<td>Fall</td>
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<td>Political Science Research Methods (3+0)</td>
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<td>P.S. 402</td>
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<td>Spring</td>
<td>Political Behavior: Individuals (3+0)</td>
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<tr>
<td>P.S. 404</td>
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<td>Spring</td>
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<td>Introduction to Legal Research and Writing (3+0)  (Same as Just. 404)</td>
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<tr>
<td>P.S. 412</td>
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<td>Spring</td>
<td>Modern Political Theory (3+0)</td>
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<td>P.S. 435</td>
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<td>Fall</td>
<td>The Supreme Court and the American Legal System (3+0)</td>
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<td>P.S. 437</td>
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<td>Spring</td>
<td>Foreign Policy (3+0)</td>
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<tr>
<td>P.S. 480</td>
<td>1-3</td>
<td>Fall and</td>
<td>Spring</td>
<td>Model United Nations (1-3+0)</td>
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<tr>
<td>P.S. 481</td>
<td>3</td>
<td>As Dem. Wmts.</td>
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<td>Geopolitics and the International Environment (3+0)</td>
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**Psychology**

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<tr>
<td>Psy. 304</td>
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<td>Fall</td>
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<td>Personality (3+0)  (Same as Soc. 304)</td>
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<tr>
<td>Psy. 345</td>
<td>3</td>
<td>Fall</td>
<td></td>
<td>Abnormal Psychology (3+0)</td>
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<tr>
<td>Psy. 330</td>
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<td>Spring</td>
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<td>Social Psychology (3+0)  (Same as Soc. 330)</td>
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<td>Psy. 350</td>
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<td>Comparative Psychology (3+0)</td>
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<td>Course Code</td>
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<tr>
<td>Psy. 356</td>
<td>3</td>
<td>Spring</td>
<td>Foundations of Counselling II (3+0)</td>
<td>(Same as HMSV 351)</td>
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<td>Psy. 380</td>
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<td>Human Behavior in the Arctic (3+0)</td>
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<tr>
<td>Psy. 445</td>
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<td>Community Psychology (3+0)</td>
<td>(Same as HMSV 445)</td>
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<tr>
<td>Psy. 460</td>
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<td>Physiological Psychology (3+3)</td>
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<tr>
<td>Psy. 473</td>
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<td>Fall</td>
<td>Social Science Research Methods (3+0)</td>
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<tr>
<td>Psy. 610</td>
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<td>Alcohol: Pharmacology and Behavior (3+0)</td>
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<td>Psy. 615</td>
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<td>Drug Action: Physiology and Behavior (3+0)</td>
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<td>Psy. 618</td>
<td>3</td>
<td>Spring</td>
<td>Community Treatment Alternatives (3+0)</td>
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<tr>
<td>Psy. 620</td>
<td>3</td>
<td>Spring</td>
<td>Treatment of Drug and Alcohol Dependency (3+0)</td>
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<tr>
<td>Psy. 625</td>
<td>3</td>
<td>Spring</td>
<td>Prevention of Alcohol and Drug Dependency (3+0)</td>
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<tr>
<td>Psy. 630</td>
<td>3</td>
<td>Fall</td>
<td>Community Psychology (3+0)</td>
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<tr>
<td>Psy. 631</td>
<td>3</td>
<td>Spring</td>
<td>Community Psychology: Cross-Cultural Applications &amp; the Ethics of Change (3+3 hrs. Community Practicum)</td>
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</table>
spiritual dimension of socio-economic development. A community-based practicum is central to the course, as is participation in Native elders and community providers. (Prerequisites: Graduate standing in community psychology master's program and 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: Permission of instructor.)

Psy. 638  
3 Credits  
Spring  
Social Policy and Social Change (3+0)  
(Same as Soc. 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.)

Psy. 645  
3 Credits  
Spring  
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: Permission of instructor.)

Psy. 646  
3 Credits  
Fall  
Consultation (3+3)  
(Same as SOC 646)  
Experiences and training in consultation skills as a professional who can be looked to for expert help in specific areas related to preparation in community psychology and related disciplines. Consultation as problem solving, as indirect service and as a colleague relationship in behavior dynamics, personal and interpersonal relationships, communication skills and community network support services is emphasized. (Prerequisite: Permission of instructor.)

Psy 650  
3 Credits  
Fall  
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./Soc. 340 and/or permission of instructor.)

Psy 655  
3 Credits  
Spring  
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: Permission of instructor.)

Psy. 660  
4 Credits  
Fall  
Principles and Techniques of Individual Counseling (3+3)  
(Same as Coun. 623)  
A survey of the major theoretical systems of counseling and a limited practice in basic techniques. Major systems include cognitive, behavioral, psychodynamic, perceptualphenomenological, and existential approaches. Actual practice in techniques of listening, helping, session management, problem identification, and goal setting. (Prerequisite: Coun. 615 and/or permission of instructor.)

Psy. 661  
3 Credits  
Spring  
Cross-Cultural Counseling (3+0)
An examination of the ethnic and cultural issues that affect the counseling setting, interaction, and outcome. There will be a review of the literature dealing with intercultural counseling, discussions of workable methods that have been used in such counseling, and examinations of target populations with whom the counselor may be involved, especially in Alaska. (Prerequisite: Permission of instructor.)

**Psy. 662**  
3 Credits  
**Fall**  
Transformational Development and Psychotherapy (3+0)  
Depth psychological perspectives, including both modern psychodynamic approaches and mythological traditions from various cultures, of the development of consciousness and the self. The relationship of suffering and psychopathology to stages of development. Self-study and clinical methods which draw upon expressions of the unconscious, focusing therapeutic work with dreams. (Prerequisite: Graduate standing in community psychology or permission of the instructor. Next offered: 1989-90.)

**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 status in Community Psychology or permission of instructor.)

**Psy. 664**  
3 Credits  
**Spring**  
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: Permission of instructor.)

**Psy. 665**  
3 Credits  
**Alternate Fall**  
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: Permission of instructor.)

**Psy. 666**  
3 Credits  
**Spring**  
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: Permission of instructor.)

**Psy. 667**  
3 Credits  
**Alternate Spring**  
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: Permission of instructor. Next offered: 1988-89.)

**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: Permission of instructor.)

**Psy. 670**  
3 Credits  
**Spring**  
Advanced Cross-Cultural Psychology (3+0)  
Culture's impact on the basic psychological processes and human behavior in general. Topics covered include perception, cognition, personality, abnormal behavior, and social psychology. This course emphasizes that no culture exists in isolation and considers that fact when looking at traditional topics in psychology. The course draws heavily on data from sociology and anthropology. As much evidence as is
available from those ethnic groups and subcultures in Alaska will be the basic material for the course.
(Prerequisite: Permission of instructor.)

Psy. 674  3 Credits  Spring
Group Counseling (3+0)
(Same as Coun. 624)
Kinds and types of groups with emphasis on methods, problems and needed skills in working with groups
in a counseling situation. (Prerequisite: Permission of instructor.)

Psy. 677  3 Credits  Alternate Spring
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: Permission of instructor.)

Psy. 678  3 Credits  Alternate 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: Permission of instructor.)

Psy. 683  3 Credits  Spring
Biological Bases of Behavior and Behavioral Change (3+0)
A review and extension of neuroanatomy and neurophysiology which emphasizes the basic function and
structure of both the central and peripheral nervous systems. Systematic examination includes advanced
topics in clinical neuropsychology, clinical neurology, psychopharmacology, psychoneuroendocrinology,
and the biochemical processes underlying dysfunction, as well as treatment approaches to the various
neuropsychological and psychological disorders. (Prerequisite: Permission of instructor.)

Psy. 688  3 Credits  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: Permission of instructor.)

Psy. 690  3-12 Credits  Semester
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.)

Rural Development

R.D. 300  3 Credits  As Dem. Wmts.
Rural Development in a Global Perspective (3+0)

R.D. 338  3 Credits  As Dem. Wmts.
Education and Economic Development (3+0)

R.D. 375  3 Credits  As Dem. Wmts.
Women and Development (3+0)

R.D. 325  3 Credits  As Dem. Wmts.
Community Organization and Development Strategies (3+0)

R.D. 350  3 Credits  As Dem. Wmts.
Community Research and Planning Techniques (3+0)

R.D. 400  3 Credits  As Dem. Wmts.
Rural Development Internship
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<td>R.D. 425</td>
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<td>Cultural Impact Analysis (3+0)</td>
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<tr>
<td>R.D. 475</td>
<td>3</td>
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<td>Rural Development Senior Project</td>
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<tr>
<td>R.D. 450</td>
<td>3</td>
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<td>Managing Community Development Project and Programs (3+0)</td>
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### Russian

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<td>Russ. 301</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Advanced Russian (3+0)</td>
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<td>Russ. 303</td>
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<td>Advanced Russian (3+0)</td>
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<td>Russ. 432</td>
<td>3</td>
<td>Spring</td>
<td>Studies in Russian Literature and Civilization (3+0)</td>
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<td>Russ. 387</td>
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<td>Alternate Fall</td>
<td>Individual Study: Semantics</td>
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<td>Russ. 487</td>
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<td>Individual Study: Translations (2+0)</td>
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### Social Work

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<tr>
<td>SWK. 306</td>
<td>3</td>
<td>Spring</td>
<td>Social Welfare: Policies and Issues (3+0)</td>
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<tr>
<td>SWK. 360</td>
<td>3</td>
<td>Alternate Spring</td>
<td>The Helping Role in Child Abuse and Neglect (3+0)</td>
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<td>SWK. 460</td>
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<td>Fall</td>
<td>Social Work Practice (3+0)</td>
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<td>SWK. 463</td>
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<td>Social Work Practice II</td>
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<td>SWK. 484</td>
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<td>Seminar in Social Work Practice Areas (3+0)</td>
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<tr>
<td>SWK. 320</td>
<td>3</td>
<td>Fall</td>
<td>Rural Social Work (3+0)</td>
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<tr>
<td>SWK. 442</td>
<td>3</td>
<td>Fall</td>
<td>Human Behavior in the Social Environment (3+0)</td>
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<tr>
<td>SWK. 461</td>
<td>6</td>
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<td>Practicum in Social Work I</td>
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<tr>
<td>SWK. 464</td>
<td>6</td>
<td>Spring</td>
<td>Practicum in Social Work II</td>
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</tbody>
</table>

### Sociology

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>Soc. 301</td>
<td>3</td>
<td>Spring</td>
<td>Rural Sociology (3+0)</td>
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<tr>
<td>Soc. 309</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Urban Sociology (3+0)</td>
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<tr>
<td>Soc. 330</td>
<td>3</td>
<td>Spring</td>
<td>Social Psychology (3+0) (Same as Psy. 330)</td>
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<tr>
<td>Soc. 345</td>
<td>3</td>
<td>Fall</td>
<td>Sociology of Education (3+0) (Same as Ed. 345)</td>
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<tr>
<td>Soc. 307</td>
<td>3</td>
<td>Spring</td>
<td>Demography (3+0)</td>
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<tr>
<td>Soc. 310</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Sociology of Later Life (3+0)</td>
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<tr>
<td>Soc. 335</td>
<td>3</td>
<td>Fall</td>
<td>Sociology of Deviant Behavior (3+0)</td>
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<tr>
<td>Soc. 363</td>
<td>3</td>
<td>Fall</td>
<td>Social Stratification (3+0)</td>
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</table>
Soc. 370 3 Credits Alternate Fall Drugs and Drug Dependence (3+0) (Same as Psy. 370)

Soc. 405 3 Credits Alternate Spring Social Change (3+0)

Soc. 407 3 Credits Alternate Spring Formal Organization (3+0)

Soc. 473 3 Credits Fall Social Science Research Methods (3+0) (Same as Psy. 473)

Soc. 638 3 Credits Spring 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.)

Soc. 645 3 Credits Spring Prevention Theories and Strategies (3+0) (Same as Psy. 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 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.)

Soc. 646 3 Credits Fall Consultation (3+3) (Same as Psy. 646)
Experiences and training in consultation skills as a professional who can be looked to for expert help in specific areas related to their preparation in Community Psychology and related disciplines. Consultation as problem solving, as indirect service and as a colleague relationship in behavior dynamics, personal and interpersonal relationships, communication skills and community network support services is emphasized. (Prerequisite: Permission of instructor.)

Spanish

Span. 301 3 Credits Alternate Fall Advanced Spanish (3+0)

Span. 303 3 Credits Alternate Fall Individual Study: Semantics

Span. 432 3 Credits Spring Studies in Hispanic Literature and Culture (3+0)

Span. 487 2 Credits Alternate Fall Individual Study: Translation of Texts

Span. 488 3 Credits As Dem. Wmts. Individual Study: Senior Project
Speech Communication

Sp.C. 320  3 Credits  Alternate Years  Sp.C. 321  3 Credits  Alternate Years
Communication and Language (3+0)  Nonverbal Communication (3+0)

Sp.C. 322  3 Credits  Alternate Years  Sp.C. 330  3 Credits  Alternate Years
Interpersonal Communication (3+0)  Intercultural Communication (3+0)

Sp.C. 331  3 Credits  Alternate Years  Sp.C. 335  3 Credits  Alternate Years
Group Communication (3+0)  Organizational Communication (3+0)

Sp.C. 342  3 Credits  Alternate Years  Sp.C. 425  3 Credits  Alternate Years
Advanced Public Speaking (3+0)  Communication Theory (3+0)

Sp.C. 441  3 Credits  Alternate Years  Sp.C. 443  3 Credits  Alternate Years
Persuasion (3+0)  Rhetorical Theory (3+0)

Sp.C. 475  3 Credits  Alternate Years  Sp.C. 482  3 Credits  Alternate Years
Speech Communication in Education and  Seminar in Speech Communication
Training (3+0)  (3+0)

Statistics

Stat. 301  3 Credits  Fall and Spring  Stat. 351  2 Credits  Spring
Elementary Probability and Statistics  Statistical Computing Packages (1+3)
(3+0)

Stat. 400  3 Credits  Fall  Stat. 401  4 Credits  Fall
Statistics (3+0)  Experimental Design and Regression  (3+3)

Stat. 402  3 Credits  Fall and Spring  Stat. 431  3 Credits  Alternate Fall
Scientific Sampling (2+3)  Applied Nonparametric Statistics  (3+0)

Stat. 461  3 Credits  Alternate Spring  As Demand Warrants
Applied Multivariate Statistics (3+0)

Stat. 602  3 Credits  Experimental Design (3+0)
Constructing and analyzing designs for experimental investigations; completely randomized, randomized
block and Latin-square designs, split-plot design, incomplete block design, confounded factorial designs,
lattice and cubic lattice designs, treatment of missing data, comparison of designs. (Prerequisites: Stat. 401
or consent of instructor.)

Stat. 680  4 Credits  Data Analysis in Biology (3+3)
(Alternate Fall)
(3+3)

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, computer programming, use of
statistical packages, and plotting routines. Each student will analyze a data set appropriate to the student’s
research interests. (Prerequisites: Stat. 301, 302 and either graduate standing in a biologically oriented
field or permission of instructor. Next offered: 1989-90.)
Note: The following courses are statistical in orientation. A course description and listing of prerequisites may be found in the appropriate departmental course listings.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Semester</th>
<th>Notes</th>
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<tr>
<td>Anth. 421</td>
<td>Analytical Techniques</td>
<td>3</td>
<td>Fall</td>
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<td>B.A. 360</td>
<td>Operations Management</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>B.A. 606</td>
<td>Quantitative Analysis</td>
<td>3</td>
<td>Fall</td>
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<td>B.A. 684</td>
<td>Quantitative Methods for Management</td>
<td>3</td>
<td>Spring</td>
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<tr>
<td>Geos. 430</td>
<td>Statistical and Data Analysis Geology</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>Econ. 226</td>
<td>Introduction to Statistics for Economics and Business</td>
<td>3</td>
<td>Fall</td>
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<td>Econ. 227</td>
<td>Statistical Methods</td>
<td>3</td>
<td>Spring</td>
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<td>Econ. 626</td>
<td>Econometrics</td>
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<td>Fall</td>
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<tr>
<td>E.S.M. 620</td>
<td>Statistics for E.S.M</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>E.S.M. 621</td>
<td>Operations Research</td>
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<td>Spring</td>
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<tr>
<td>Math. 371</td>
<td>Probability</td>
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<td>Fall</td>
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<td>Math. 408</td>
<td>Mathematical Statistics</td>
<td>3</td>
<td>Spring</td>
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<td>Psy. 250</td>
<td>Introduction to Statistics for Behavioral Sciences</td>
<td>3</td>
<td>Fall</td>
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<td>Psy. 360</td>
<td>Psychological Tests and Measurements</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>WLF 621</td>
<td>Vertebrate Population Dynamics</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>WLF 630</td>
<td>Quantitative Fisheries Science</td>
<td>3</td>
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**Theater**

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<tr>
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<td>Thr. 401</td>
<td>1-3 Credits</td>
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<td>Thr. 325</td>
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<td>Alternate Fall</td>
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<td>Thr. 341</td>
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<td>Alternate Years</td>
<td>3 Credits</td>
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<td>Thr. 347</td>
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<td>Alternate Spring</td>
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<td>Spring</td>
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<td>Thr. 354</td>
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<td>Thr. 361</td>
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<td>Thr. 356</td>
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<td>Thr. 413</td>
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<tr>
<td>Thr. 421</td>
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<td>3 Credits</td>
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<td>3 Credits</td>
<td>Methods in Secondary Theater Education (3+0)</td>
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## Wildlife

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<tr>
<td>WLF 302</td>
<td>2</td>
<td>Alternate Fall</td>
<td>Fish and Wildlife Ecology and Management (1+3)</td>
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<tr>
<td>WLF 304</td>
<td>1-3</td>
<td>Fall and Spring</td>
<td>Wildlife Internships</td>
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<td>WLF 360</td>
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<td>Fall</td>
<td>Nutrition and Physiological Ecology of Wildlife (3+0)</td>
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<tr>
<td>WLF 417</td>
<td>2</td>
<td>Alternate Spring</td>
<td>Wildlife Management: Forest and Tundra (2+0)</td>
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<tr>
<td>WLF 420</td>
<td>3</td>
<td>Spring</td>
<td>Wildlife Policy and Administration (3+0)</td>
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<td>WLF 410</td>
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<td>Spring</td>
<td>Wildlife Populations and Their Management (2+3)</td>
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<td>WLF 419</td>
<td>3</td>
<td>Alternate Fall</td>
<td>Waterfowl and Wetlands Ecology and Management (3+0)</td>
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<td>WLF 611</td>
<td>Credits Arr.</td>
<td>As Demand Warrants</td>
<td>Wildlife Field Trip</td>
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<td>WLF 612</td>
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<tr>
<td>WLF 614</td>
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<td>Grazing Ecology (2+0)</td>
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<td>(Same as Biol. 614)</td>
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<td>WLF 615</td>
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<td>Advanced Topics in Wildlife Management (2+0)</td>
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<td>Political, economic, administrative and ecologic aspects of wildlife management in northern regions. (Prerequisite: graduate standing in biology or wildlife or permission of instructor. Next offered: 1989-90.)</td>
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<tr>
<td>WLF 621</td>
<td>3</td>
<td>Alternate Spring</td>
<td>Vertebrate Population Dynamics (2+3)</td>
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<tr>
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<td>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: $10. (Prerequisites: Admission by arrangement: minimal preparation, equivalent to Biol. 271, Math. 200 and Stat. 301. Next offered: 1988-89.)</td>
</tr>
<tr>
<td>WLF 692</td>
<td>1</td>
<td>Fall and Spring</td>
<td>Graduate Seminar (0+0+1)</td>
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<td>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.)</td>
</tr>
</tbody>
</table>

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.)

WLF 614

Grazing Ecology (2+0)

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. Next offered: 1988-89.)

WLF 615

Advanced Topics in Wildlife Management (2+0)

Political, economic, administrative and ecologic aspects of wildlife management in northern regions. (Prerequisite: graduate standing in biology or wildlife or permission of instructor. Next offered: 1989-90.)

WLF 621

Vertebrate Population Dynamics (2+3)

Assembling, 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: $10. (Prerequisites: Admission by arrangement: minimal preparation, equivalent to Biol. 271, Math. 200 and Stat. 301. Next offered: 1988-89.)

WLF 692

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.)
Faculty are listed from those departments which grant graduate degrees. Faculty in other departments also participate on some graduate student advisory committees. The date following each name designates the time of original appointment to the University faculty or staff. (Dates of resignations and reappointments are not indicated.)

A second date in parentheses follows each member's present rank and indicates the beginning of service in that rank.

The abbreviation that follows this second date indicates the University of Alaska Fairbanks unit in which the employee works.

The abbreviations are:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AFES</td>
<td>Agricultural and Forestry Experiment Station</td>
</tr>
<tr>
<td>ATHREC</td>
<td>Athletics and Recreation</td>
</tr>
<tr>
<td>CLA</td>
<td>College of Liberal Arts</td>
</tr>
<tr>
<td>CNS</td>
<td>College of Natural Sciences</td>
</tr>
<tr>
<td>CES</td>
<td>Cooperative Extension Service</td>
</tr>
<tr>
<td>FTTC</td>
<td>Fishery Industrial Technology Center</td>
</tr>
<tr>
<td>GI</td>
<td>Geophysical Institute</td>
</tr>
<tr>
<td>LAB</td>
<td>Institute of Arctic Biology</td>
</tr>
<tr>
<td>IMS</td>
<td>Institute of Marine Science</td>
</tr>
<tr>
<td>INE</td>
<td>Institute of Northern Engineering</td>
</tr>
<tr>
<td>JCFOS</td>
<td>Juneau Center for Fisheries and Ocean Sciences</td>
</tr>
<tr>
<td>LIB</td>
<td>Elmer Rasmuson Library</td>
</tr>
<tr>
<td>MAP</td>
<td>Marine Advisory Program</td>
</tr>
<tr>
<td>RC</td>
<td>College of Rural Alaska</td>
</tr>
<tr>
<td>SALRM</td>
<td>School of Agriculture and Land Resources Management</td>
</tr>
<tr>
<td>SCEE</td>
<td>School of Career and Continuing Education</td>
</tr>
<tr>
<td>SOE</td>
<td>School of Engineering</td>
</tr>
<tr>
<td>SFOS</td>
<td>School of Fisheries and Ocean Sciences</td>
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<tr>
<td>SOM</td>
<td>School of Management</td>
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<td>SME</td>
<td>School of Mineral Engineering</td>
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<td>STUAFF</td>
<td>Student Affairs</td>
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<td>University of Alaska Museum</td>
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<td>VCA</td>
<td>Vice Chancellor for Administration</td>
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<tr>
<td>VCAA</td>
<td>Vice Chancellor for Academic Affairs</td>
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<tr>
<td>VCR</td>
<td>Vice Chancellor for Research</td>
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</table>
Adu-Asamoah, Richard -- 1987 -- Visiting Assistant Professor of Economics (1987), SOM. University of Science and Technology, Ghana '79, B.S.; Cornell University '83, M.S.; Oregon State University '87, Ph.D.

Aigner, Jean S. -- 1978 -- Professor of Anthropology (1978), CLA. University of Wisconsin '64, B.A.; '66, M.A.; '69, Ph.D.

Akasofu, Syun-ichi -- 1958 -- Director of the Geophysical Institute (1986) and Professor of Geophysics (1964), OI, CNS. Tohoku University '53, B.S.; '57, M.S.; University of Alaska '61, Ph.D.

Alexander, Vera -- 1962 -- Director, Institute of Marine Science (1979), Acting Dean, School of Fisheries and Ocean Sciences (1987) and Professor of Marine Science (1974), IMS, SFOS. University of Wisconsin '55, B.A.; '62, M.S.; University of Alaska '65, Ph.D.

Andresen, Marvin J. -- 1985 -- Associate Professor of Business Administration (1985), SOM. University of Illinois Urbana '55, B.S.; '56, M.S.; University of Missouri '60, Ph.D.

Andresen, Patricia A. -- 1967 -- Associate Professor of Mathematics (1977), CLA. University of Illinois '55, B.S.; University of Missouri '58, M.A.; University of California, Santa Barbara '76, Ph.D.

Armbruster, W. Scott -- 1980 -- Associate Professor of Botany (1987), IAB, CNS. University of California, Santa Barbara '72, B.A.; University of California, Davis '77, M.S.; '81, Ph.D.

Aspnes, John D. -- 1978 -- Professor of Electrical Engineering (1981), and Head, Department of Electrical Engineering (1983), SOE. University of Wisconsin '65, M.S.; Montana State University '76, Ph.D.; P.E.

Baker, Grant C. -- 1988 -- Visiting Assistant Professor of Mechanical Engineering (1988), SOE. University of Washington '78, B.S.; University of Alaska Fairbanks '83, M.S.; '87, Ph.D.

Baker, Jill H. -- 1987 -- Assistant Professor of Social Work (1988), RC. University of Texas '68, B.A.; University of Hawaii '81, M.S.W.

Bandopadhyay, Sukumar -- 1982 -- Associate Professor of Mining Engineering (1987), SME. Banaras Hindu University, India, '70, B.Sc.; '75, M.Tech.; Pennsylvania State University '79, M.S.; '81, Ph.D.

Barber, Willard E. -- 1976 -- Associate Professor of Fisheries (1988), CNS. Arizona State University '65, B.A.; '68, M.S.; Michigan State University '70, Ph.D.

Barnes, Brian M. -- 1986 -- Assistant Professor of Zoophysics (1988), IAB, CNS. University of California, Riverside '77, B.S.; University of Washington '83, Ph.D.

Barnhardt, Raymond J. -- 1970 -- Professor of Education (1980), RC. North Dakota State University '65, B.S.; Johns Hopkins University '67, M.Ed.; University of Oregon, '70, Ph.D.

Bartlett, Doris Ann -- 1982 -- Instructor of English and Humanities (1985), CLA. Middlebury College '55, B.A.; University of Alaska-Anchorage '73, M.A.; University of Oregon '77, Ph.D.; '81, M.A.

Bartlett, Thomas E. -- 1974 -- Associate Professor of Accounting (1979), SOM. Southwestern at Memphis '67, B.A.; Emory University '69, M.B.A.; State of Georgia '73, C.P.A.; State of Alaska '78, C.P.A.

Basham, Charlotte S. -- 1983 -- Assistant Professor of Anthropology, Coordinator of
Cross Communications (1987), CLA. Arizona State University '67, B.A.; San Jose State University '77, M.A.; University of Michigan '86, Ph.D.

*Beget, James E.* -- 1984 -- Assistant Professor of Geology (1984), CNS. Columbia University '74, B.S.; University of Washington '77, M.S.; '81, Ph.D.

*Bennett, F. Lawrence* -- 1968 -- Professor of Engineering Management (1974) and Head, Department of Engineering and Science Management (1963), SOE. Renssalaer Polytechnic Institute '61, B.C.E.; Cornell University '63, M.S.; '66, Ph.D.; P.E.; L.S.

*Benson, Carl S.* -- 1960 -- Professor Emeritus of Geophysics (1987), GI, CNS. University of Minnesota '50, B.A.; '56, M.S.; California Institute of Technology '60, Ph.D.

*Ben-Ur, Joseph* -- 1987 -- Assistant Professor of Business Administration (1987), SOM. Hebrew University of Jerusalem, Israel '74, B.A.; '77, M.B.A.; University of Illinois at Champaign-Urbana '87, Ph.D.

*Berman, Gerald S.* -- 1980 -- Associate Professor of Sociology and Social Work (1980) and Head, Department of Behavioral Sciences and Human Services (1988), RC. University of Michigan '56, B.A.; Case Western Reserve University '63, M.S.W.; '70, Ph.D.

*Bleslot, Peter G.* -- 1980 -- Professor of Business Administration (1980) and Head, Department of Business Administration, SOM. University of Washington '42, B.A.; University of Nebraska '51, M.S.; Cornell University '58, M.B.A.; University of Southern California '66, D.B.A.

*Bird, Roy K.* -- 1984 -- Associate Professor of English (1986), CLA. Brigham Young University '72, B.A.; '74, M.A.; William Marsh Rice University '82, Ph.D.

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Craig Schneider (right), a senior geology major, and Gina Cruse, a senior geophysics major, lead a group of summer geology field camp participants to the top of Miller Mountain in the Alaska Range. UAF photo/Sam Winch
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