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 (email electronic copy to fyssenat@uaf.edu)

REQUEST FOR CORE WRITING INTENSIVE DESIGNATOR

SUBMITTED BY:

Department	Biology	College/School	CNSM
Prepared by	Barbara Taylor	Phone	474-2487
Email Contact	betaylor@alaska.edu	Faculty Contact	Barbara Taylor

See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

1. COURSE IDENTIFICATION:

Dept	BIOL	Course #	4XX	No. of Credits	4
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COURSE TITLE

Existing Course	<input type="checkbox"/>	New Course Pending Approval*	<input checked="" type="checkbox"/>
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*Must be approved by appropriate Curriculum Council.)

2. Proposed CATALOG DESCRIPTION AS IT APPEARS IN THE CATALOG: including dept., number, title and credits

BIOL F4XX W Metabolism and Biochemistry
 4 Credits Offered Fall
 Studies of the cells, genomics and proteomics of the nematode *Caenorhabditis elegans* have become a cornerstone of current biology. Using this simple and malleable animal model, students will conduct their own biological investigations and, through this research learning, will gain an understanding of intermediary metabolism. Topics include major pathways of carbon, nitrogen, and lipid metabolism, structure and function of proteins, biological regulation and signaling, and longevity and aging.
Prerequisites: COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; CHEM 105; CHEM 106; BIOL 3XX; or permission of instructor. (1.5+7.5)

Note to Registrar: BIOL F3XX refers to Cell and Molecular Biology, formerly BIOL 261

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course designator applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

In keeping with its writing-intensive designator, Metabolism and Biochemistry requires students to engage in numerous writing activities throughout the semesters. The instructors (professor and TA) will regularly evaluate students' writing and inform students of their progress. The major written project (research project) that is part of the course is supervised in stages over the last ten weeks of the semester as seen in the schedule above. In addition, each student will have at least one personal conference with the instructors, which will be devoted to the student's writing, and draft components of the research report will receive evaluation from the instructors and other students in the course. Also, note that written materials comprise a majority of the graded work in the course. This "written material" consists of exams with short answers, components of the research report that are submitted during the semester, and the complete research report submitted at the end of the semester.

RECEIVED

OCT - 2 2012

Dean's Office


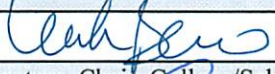
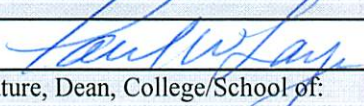
College of Natural Science & Mathematics

Governance
10/3/12 TUP

The attached syllabus must clearly reflect the following basic elements for a class to be **WRITING INTENSIVE**. Please note them directly on the syllabus, using the corresponding letter. (See Guidelines in this manual.)

- A A majority of the final grade is derived from writing activities
- B A research paper/project
- C Personal conference with the student
- D Drafts/revisions/Feedback

APPROVALS:

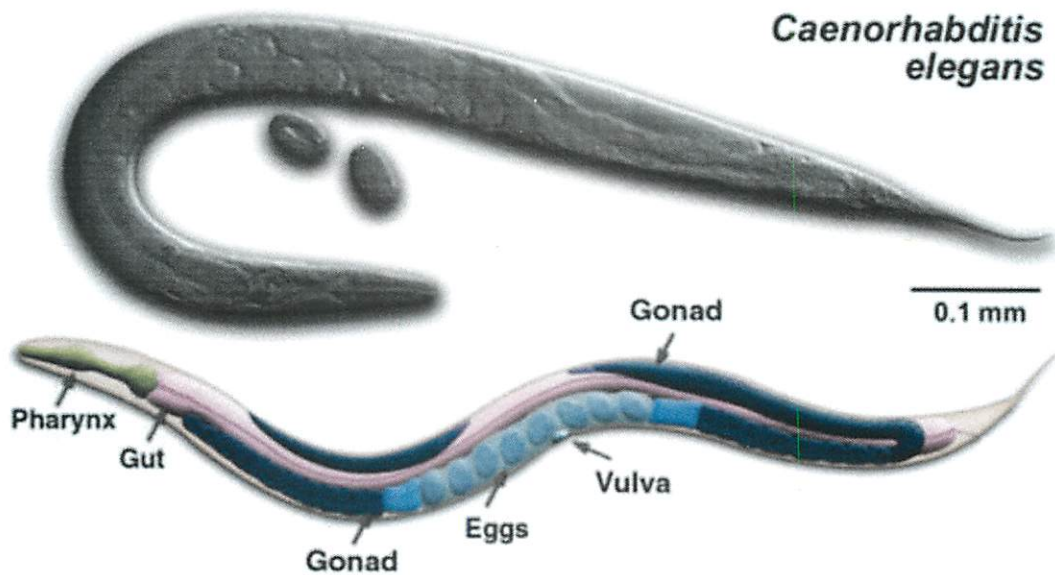
	Date	9/19/2012
Signature, Chair, Program/Department of:	Biology & Wildlife	
	Date	10/2/2012
Signature, Chair, College/School Curriculum Council for:	CNSM	
	Date	10/3/12
Signature, Dean, College/School of:	CNSM	

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

<input type="text"/>	Date	<input type="text"/>
Signature, Chair, Senate Core Review Committee		

Metabolism and Biochemistry UAF BIOL 4XX (4); CRN ??????

Course Syllabus



Studies of the cells and genes of the nematode *Caenorhabditis elegans* have become a cornerstone of current biology. Using this simple and malleable animal model, students will conduct their own biological investigations and, through this research learning, will gain an understanding of intermediary metabolism. Topics include major pathways of carbon, nitrogen, and lipid metabolism, structure and function of proteins, biological regulation and signaling, and longevity and aging.

1. Course Information:

Metabolism and Biochemistry, BIOL 4XX (4)
Meeting Times: Tues 9:45 – 11:15 am, Life Sciences
Wed 2:15 – 5:00 pm
Prerequisites: BIOL 3XX; CHEM 105X; 106X.

2. Instructing Staff:

Barbara E Taylor, Ph.D., Associate Professor of Biology (Neurophysiology)
Office: Arctic Health Research Building Room 241A
Research Lab: Arctic Health Research Building Room 253
Phone: 474-2487 (office)
E-mail: betaylor@alaska.edu*
Office hours: Tuesday 2-4pm or by appointment

Teaching Assistant, graduate student in biology
Office: Arctic Health Research Building Room 258
Phone:
E-mail: astudent@alaska.edu
Office hours: TBA

3. Course Readings/Materials:

ResourceText: *Lehninger Principles of Biochemistry, Fifth Edition*, David L. Nelson, Michael M. Cox, W. H. Freeman, 2008, ISBN 978-0-7067-7108-1.

A reserve copy is available in the BioSciences Library.

ResourceText: *Functional Metabolism: Regulation and Adaptation*, Kenneth B. Story, Editor, Wiley, 2004, ISBN: 978-0-471-41090-4

A reserve copy is available in the BioSciences Library.

Resource Website: *WormBook: the online review of C elegans biology*

<http://www.wormbook.org/>

Blackboard Page: Students are expected to check the course webpage on **Blackboard** on a regular basis.

Login at <http://classes.uaf.edu/webapps/login>

Contact us by email if you are unable to access this site.

Email Notifications: On occasion, students will be contacted via email. We will assume that each student will check their university-assigned email address (username@alaska.edu) on a regular basis.

4. Course Description:

Welcome to Undergraduate Research in Metabolism and Biochemistry. The UAF Catalogue describes the topic of this course as follows: Studies of the cells, genomics and proteomics of the nematode *Caenorhabditis elegans* have become a cornerstone of current biology. Using this simple and malleable animal model, students will conduct their own biological investigations and, through this research learning, will gain an understanding of intermediary metabolism. Topics include major pathways of carbon, nitrogen, and lipid metabolism, structure and function of proteins, biological regulation and signaling, and longevity and aging.

The goal of this course is to provide an understanding of metabolism by studying its major pathways, regulation, and molecular components. **This course is designed as a research encounter with metabolism and biochemistry for students that have taken introductory biology and chemistry courses. It will cover the fundamental facts and principles of metabolism and biochemistry, and it will give students an opportunity to investigate metabolism in a simple and genetically tractable animal model, the nematode *Caenorhabditis elegans*.**

Biochemistry is the chemistry of living things. All living things have in common that they are adapted to survive, grow, and reproduce. To do this they must produce a variety of biomolecules using resources they acquire from their environment. In this course we will strive for an understanding of how living organisms convert resources they acquire from their environment into more of themselves.

Course Organization: The course will lead the student in a consideration of the foundations of metabolism and biochemistry, which integrate with the distinguishing features of living organisms. Living organisms have in common six distinguishing features

1. their chemical complexity and microscopic organization;
2. their systems for extracting and transforming energy;
3. the defined functions of their components and the regulated interactions among their components;
4. their mechanisms for sensing and responding to the environment;
5. their capacity for self-replication and self-assembly;
6. their capacity to change over time.

These common features will be explored through the cellular, physical, chemical, genetic and evolutionary foundations of metabolism and biochemistry as they occur in our model organism, *C elegans*. There are **3 central concepts** each divided into topics (readings will be posted on Blackboard). We will spend up to one class period on each topic. The first three weeks in lectures (1 per week = 3) and laboratories (1 per week = 3), however, will introduce student to the basic biology and culture techniques for *C elegans* with the intention that by the third week of classes students will have selected a research project and begun culturing worms for that project. Questions and discussion throughout the course are encouraged and this syllabus should be considered flexible. We will **begin with a general introduction** to the chemistry of biological molecules and then consider the central concepts in more detail. The central concepts associated with this course are:

1. structure and catalysis;
2. bioenergetics and metabolism;
3. information pathways.

5. Course Goals:

The overall goal of this course is for the student to gain a fundamental working knowledge of metabolism and to appreciate the impact of this field on other areas of biology. Specific areas of student development include achieving an understanding of:

1. the relationship between the structure and function of biological molecules;
2. the balance of anabolism and catabolism in an organism's overall metabolism;
3. the intermolecular interactions between macromolecules and their ligands;
4. the dynamics and regulation of metabolic pathways.

These specific areas will be addressed with references to and examples from the research project being conducted by students enrolled in the course.

Expectations: Over the semester certain information will need to be understood in order to reach the goals set above. A list of this information includes:

1. general recognition and understanding of biological molecules;
2. basic elements of protein structure;

3. basic understanding of reactions in glycolysis, glycogen metabolism, citric acid cycle, beta-oxidation, and the electron transport chain;
4. methods of metabolic regulation.

These information topics will be addressed with references to and examples from the research project being conducted by students enrolled in the course.

6. Instructional Methods:

1. **Lecture and Discussion.** Lectures and discussions will focus on the basic concepts of metabolism, which will be addressed with references to and examples from the research project being conducted by students enrolled in the course. An important source for this information is written material. *Lehninger Principles of Biochemistry, Fifth Edition* (David L. Nelson, Michael M. Cox, W. H. Freeman, NY) and *Functional Metabolism: Regulation and Adaptation* (Kenneth B. Story, Editor, Wiley) are optional textbooks. Assigned readings from these texts along with material from the online resource WormBook (www.wormbook.org) will be made accessible via the course Blackboard page. Primary research literature and review articles will also be made available on Blackboard to support the topics covered in the lectures as well as the student research projects.

You are expected to complete the assigned readings, to attend the lectures, and take part in class exercises. The readings and the lectures together define the **material covered in the exams**.

2. **Term Assignment – The Research Project.** Students will work individually or in teams of two on a research project of their own choosing and design. These research projects will meet the biology program requirements for a capstone project; these requirements are listed at the end of this syllabus. Research topics can be inspired by any sub-discipline of biology, but each project must be approved by the course instructors, who will ensure the feasibility of each project. Research topics and experimental designs are due by the end of the third scheduled laboratory period. For the remainder of the semester, students will work on their research projects during the scheduled laboratory periods as well as during times they schedule themselves. During the scheduled laboratory periods for the last 10 weeks of the semester, students will be graded on assignments/activities designed to aid students in conducting their research projects. The following is a list of these assignments/activities:

Oct. 10	written summary of worm culture techniques
Oct. 17	written summary of experimental design
Oct. 24	demonstration of data collection
Oct. 31	written description of background and potential significance of the research project
Nov. 7	peer feedback on research reports
Nov. 14	full outline of research report
Nov. 21	data blitz – presentation of data collected to date
Nov. 28	draft of results section of research report
Dec. 5	complete draft of research report
Dec. 12	peer feedback on research reports

In keeping with its writing-intensive designator, Undergraduate Research in Metabolism and Biochemistry requires students to engage in numerous writing activities throughout the semesters. The instructors (professor and TA) will regularly evaluate students' writing and inform students of their progress. The major written project (research project) that is part of the course is supervised in stages over the last ten weeks of the semester as seen in the schedule above. In addition, each student will have at least one personal conference with the instructors, which will be devoted to the student's writing, and draft components of the research report will receive evaluation from the instructors and other students in the course. Also, note that written materials comprise a majority of the graded work in the course. This "written material" consists of exams with short answers, components of the research report that are submitted during the semester, and the complete research report submitted at the end of the semester. The rubric that the instructors will use to grade the term assignment (= research or capstone project) is included as the last page of this syllabus.

Blackboard Page. Several learning resources will be available on the course Blackboard Page:

- a. A copy of the lecture slides will be posted just prior to class.
 - b. A manual for *C elegans* culture in the UAF laboratory will be posted.
 - c. Answers to the exam questions will be posted on Blackboard after the exams have been completed and graded.
 - d. The course Blackboard Page will contain links to other instructional and informative pages on biochemistry. Some of these will include practice quizzes and short movie clips, which are especially good learning aids.
 - e. A copy of this syllabus and the course calendar will be posted separately on Blackboard.
3. **Exams.** There will one midterm exam during the semester. It will test your knowledge of the lecture subjects to the depth covered in the readings. You must complete the readings to be fully prepared for the midterm exam. The midterm exam will consist of multiple choice and short answer questions and will count toward 10% of the final grade. Do not miss the scheduled exam time! If you miss the exam, your ONLY opportunity for a make-up exam will be the first lecture period following the exam.
4. **Final Exam.** The final exam will be held **Saturday, December 15 from 10:00 AM – noon**. The final exam will be a cumulative test of your knowledge of metabolism to the depth covered in the readings. The exam will consist of multiple choice and short answer questions. It will count toward 15% of the final grade.

7. Course Policies

As a UAF student, you are subject to the Student Code of Conduct. In accordance with Board of Regents' Policy 09.02.01, UAF will maintain an academic environment in which the freedom to teach, conduct research, learn, and administer the university is protected. Students will enjoy maximum benefit from this environment by accepting responsibilities commensurate with their role in the academic community. The principles of the Code are designed to facilitate communication, foster academic integrity, and defend freedoms of inquiry, discussion, and expression among members of the university community. You should become familiar with campus policies and regulations as published in the student handbook.

UAF requires students to conduct themselves honestly and responsibly, and to respect the rights of others. Conduct that unreasonably interferes with the learning environment or that violates the rights of others is prohibited. Students and student organizations will be responsible for ensuring that they and their guests comply with the Code while on property owned or controlled by the university or at activities authorized by the university.

Disciplinary action may be initiated by the university and disciplinary sanctions imposed against any student or student organization found responsible for committing, attempting to commit, or intentionally assisting in the commission of any of the following prohibited forms of conduct:

- A. cheating, plagiarism, or other forms of academic dishonesty;
- B. forgery, falsification, alteration, or misuse of documents, funds, or property;
- C. damage or destruction of property;
- D. theft of property or services;
- E. harassment;
- F. endangerment, assault, or infliction of physical harm;
- G. disruptive or obstructive actions;
- H. misuse of firearms, explosives, weapons, dangerous devices, or dangerous chemicals;
- I. failure to comply with university directives;
- J. misuse of alcohol or other intoxicants or drugs;
- K. violation of published university policies, regulations, rules, or procedures; or
- L. any other actions that result in unreasonable interference with the learning environment or the rights of others.

This list is not intended to define prohibited conduct in exhaustive terms, but rather to set forth examples to serve as guidelines for acceptable and unacceptable behavior.

Honesty is a primary responsibility of you and every other UAF student. The following are common guidelines regarding academic integrity:

1. Students will not collaborate on any quizzes or 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 exams.
2. Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (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.

Alleged violations of the Code of Conduct will be reviewed in accordance with procedures specified in regent's policy, university regulations and UAF rules and procedures. For additional information and details about the Student Code of Conduct, contact the Dean of Student Services or web www.alaska.edu/bor/ or refer to the student handbook that is printed in the back of the class schedule for each semester. Students are encouraged to review the entire code.

A Few Words on Plagiarism: In general, **DO NOT present someone else's ideas or data as your own: you are expected and required to give credit where credit is due.** Plagiarism is a violation of the law and may lead to serious repercussions! Please follow the following guidelines: for any written assignments, if you use someone else's ideas, data, or other information, write it in your own words and include the reference in parentheses directly following that information. Avoid copying someone else's text. If, however, you feel you have to include an exact copy of that text, put it in quotation marks followed by the reference in parentheses. Of course, include all cited references in the Literature Cited section. During oral presentations, please acknowledge the sources by mentioning their name(s) and year of publication or by printing them on overheads, slides, or handouts. Also be aware that you need to cite earlier work by yourself. Any substantial use of any written or other materials that was used for another course or that was generated in any other circumstances will not be accepted for credit in this course. Only minor contributions from earlier work with appropriate citation(s) will be accepted.

8. Evaluation

The final grade will be based on the average of all assignment marks according to the following fixed scale:

	Required Component	% value of final grade
1.	Lecture Exam (1)	10%
2.	Laboratory Research (weekly assignments and activities)	30% (3% each assignment/activity; assignments/activities are done one per week for the last 10 weeks)
3.	Term Assignment	45%
4.	Final Exam	15%
Total		100%

The class will be graded on a straight percentage basis: 90-100% is an A, 80-89.9% is a B, 70-79.9% is a C, 60-69.9% is a D, and < 60% is an F. We will not grade on a curve. This means that, in principle, it will be possible for everyone to get an A in this course.

Missed exams and presentations:

Times for exams and presentations are designated well in advance. Completion of these tasks at the designated time will be the responsibility of the student. Accommodations will only be made for legitimate and documented contingencies.

9. Disabilities Services

At UAF, the Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (fydso@uaf.edu, 474-5655) to provide reasonable accommodation to students with disabilities.

10. Course Calendar (subject to change)

Principles of Metabolism and Biochemistry

Biology 303 Fall 2012

Section I. *C elegans* a model for biological research

1. Sept. 5 Class introduction
2. Sept. 12 *C elegans* biology
3. Sept. 19 Trends in *C elegans* research

Ecology of *Caenorhabditis* species, Kiontke et al 14pp
Intermediary metabolism, Braeckman et al 24pp

Three recent reviews will be selected and pdfs posted on Blackboard

Lehninger Principles of Biochemistry p71-147

Lehninger Principles of Biochemistry p235-263; 343-362

Section II. Molecular properties of biomolecules

4. Sept. 26 Amino acids, protein structure
5. Oct. 3 Carbohydrates and lipids
6. Oct. 10 Biosignaling

RTKRas/MAP kinase signaling - Meera V. Sundaram
WormBook pdf

Heterotrimeric G proteins in *C. elegans* - Carol Bastiani and Jane Mendel
WormBook pdf

7. Oct. 17 Bioregulation

Section III. Intermediary Metabolism

8. Oct. 24 **Exam**
9. Oct. 31 Glycolysis and gluconeogenesis
10. Nov. 7 Citric acid cycle
11. Nov. 14 Fatty acid oxidation and synthesis
12. Nov. 21 Amino acid oxidation and synthesis
13. Nov. 28 Oxidative phosphorylation

Exam includes all topics previously covered

Lehninger Principles of Biochemistry p527-558

Lehninger Principles of Biochemistry p615-637

Lehninger Principles of Biochemistry p647-668; 805-845

Lehninger Principles of Biochemistry p673-700; 851-894

Lehninger Principles of Biochemistry p707-762

Section III. Metabolic Integration

14. Dec. 5 Energy metabolism in health and disease

Functional Metabolism p243-262;

Disease models and drug discovery - Andres V. Maricq and Steven McIntire, eds. WormBook pdf

C elegans and volatile anesthetics - P.G. Morgan, E.-B. Kayser and M.M. Sedensky WormBook pdf

Anthelmintic drugs - Lindy Holden-Dye and Robert J. Walker WormBook pdf

Obesity and the Regulation of Fat Metabolism - Kaveh Ashrafi WormBook pdf

Walker WormBook pdf

Obesity and the Regulation of Fat Metabolism - Kaveh Ashrafi WormBook pdf

Walker WormBook pdf

Functional Metabolism p319-369

15. Dec. 12 Oxygen in biology and metabolism

Dec. 15 8:00AM - 10:00AM

COMPREHENSIVE

FINAL EXAM

Capstone Project in Biological Sciences

The intent of the Biological Sciences capstone project is to integrate a range of knowledge and skills learned in previous courses, including scientific knowledge, quantitative literacy, and communication skills, and to apply these products of the university education to a creative activity. For a biologist, a fundamental expression of applied knowledge, creativity, and critical reasoning is to engage in scientific inquiry.

The capstone project in Biological Sciences consists of mentored research project on a biological topic that is completed in the junior or senior year. The capstone project must be designed or chosen by the student in consultation with a faculty mentor. The faculty mentor must approve the project before work begins. The project must include both evaluation of data and communication of the study intent, methods, results, interpretation, and conclusion in the form of a written paper. The capstone project requirement may be met in two ways, detailed below.

First, the student may pass, with C grade or better, a designated capstone course in Biological Sciences or Wildlife Biology and Conservation. Capstone courses are offered across a range of sub-disciplines within biology. A list of capstone courses in Biological Sciences can be found in the UAF catalog. All capstone courses include the expectation that the student will complete a biological research project. Typically, the capstone course instructor will introduce one or several model study systems and methodologies that will form the basis for the student's project. The course instructor will assist the student to design a study and analyze the results. The student will communicate the results of the project in a written report. Some capstone courses may require that students communicate their research findings in additional ways, such as in an oral report or poster presentation

Second, the student may satisfy the capstone requirement by conducting a research project with a faculty mentor, typically a member of the UAF Biology & Wildlife faculty. A student may receive course credits for the research project by enrolling in independent study (BIOL 397 or 497) or undergraduate biology research (BIOL 488 or URSA 488); however, course credits are not necessary for completion of the capstone project requirements. A more informal arrangement, in which the student performs and communicates a project under the supervision of a member of the Biology & Wildlife faculty may satisfy the capstone requirements as well. In either case, to satisfy the capstone requirement using a research project conducted outside a designated capstone course, the student must file a petition with the Biology & Wildlife department chair. The petition must include a memo by the student's faculty mentor confirming that the work was completed and a copy of the mentor's written assessment of the final paper, showing that the work was of satisfactory quality.

All capstone projects will be assessed using a common set of expectations. The rubric used by mentors to grade capstone projects may be viewed here [<link>](#).

Rubric for Undergraduate Research in Metabolism and Biochemistry Capstone Project

Final Evaluation of Capstone Project by Course Instructors (=Research Supervisor)

<i>To be completed by student</i>	
Student's name _____	Date _____
Capstone Project Title _____	
Research Supervisor _____	

To be completed by Research Supervisor

	Yes (excellent)	Somewhat (adequate)	No (inadequate)
1. Does the capstone paper represent the student's own scientific research?			
2. Does the capstone paper make a compelling argument for the significance of the student's research within the context of the current literature?			
3. Does the capstone paper clearly articulate the student's research goals?			
4. Are the methods appropriate given the student's research agenda?			
5. Is the data analysis appropriate and accurate?			
6. Does the thesis skillfully interpret the results?			
7. Are the tables and figures clear, effective and informative?			
8. Is there a compelling discussion of the implications of findings?			
9. Is the literature review appropriate and complete?			
10. Are the citations presented consistently and professionally throughout the text and in the list of works cited?			
11. Is the writing appropriate for the target audience?			
12. Is the paper clearly communicated and free of language errors?			