Introduction to Graduate Studies  
BIOL 820  
Spring, 2013  

Instructor  
Thomas L. Freeman, Ph.D.  
Office: 241 BHS  
Email: freemantl@unk.edu  
Phone: (308)865-8595 (email contact is strongly preferred)  
Website: http://www.lopers.net/faculty/unknet/freemantl/  

Course Description (catalog)  
An introduction to graduate research methods and biological techniques for the professional teacher and biologist. Emphasis on literature of science, design of a problem, methods and techniques of biological investigation and scientific writing. The student will submit a research proposal as one requirement of the course. No grade of incomplete will be given. The student is encouraged to take this course during his/her first nine hours of graduate work in biology.  

Learning Objectives  
1. Students will understand the requirements for their degree program and complete plausible plans for completion of the degree requirements.  
2. The use of appropriate formatting, style and language in professional electronic communications will be emphasized and practiced. Essential aspects for successfully utilizing Blackboard will be introduced.  
3. Students will develop a scientific question and develop testable hypotheses to answer a specific aspect of the question.  
4. Skills related to use of the UNK Library for research will be developed.  
5. Students will gain an appreciation for the design and testing of a scientific hypothesis with an emphasis on the interdependence of data collection to statistical methods.  
6. Students will practice the skill of reading the scientific literature.  
7. An appreciation for the role of the IACUC and IRB in research projects will be gained. Students will complete an IACUC or IRB protocol.  
8. Sources of funding for student-based research will be reviewed. Students will complete an application for funding (departmental, RSC, etc.).  
9. Students will practice the art of writing scientific papers and will demonstrate skills by completion of a scientific review paper. Students will learn proper citation methods and be instructed on strategies to avoid plagiarism.  

Course Materials  
Computer and Software: Access to a computer, modern browser and Internet connection are required for the course. A word processor compatible with the instructor's software is needed for preparation of written assignments. Formatting problems should be expected when the instructor's comments are incorporated into draft versions. Details for submitting draft and final versions will be provided with each written assignment. Statistical analysis of data sets utilizing spreadsheets will be
required (Open Office Calc, Excel, Calc, Quattro, etc.), and the presentation will require some form of slide-show package (MS Excel, Impress, etc.). Some assignments will require submitting documents as PDFs for verifying that the formatting was well done.

**Digital Imaging Device:** Some method of producing digital images may be required for incorporating digital images into assignments. Good solutions include a flatbed scanner, digital camera, etc. Suggest that students not buy anything if possible as a photo from a cell phone will often produce satisfactory results.

**Web Resources:** Blackboard, an online course management system, is used for this course. Students will be responsible for becoming proficient at using the system. Instructions can be found online by searching the eCampus section of the University of Nebraska at Kearney web site. Students will be expected to check the Blackboard site often for announcements and assignments. In addition, students are required to use and check the email account assigned to them by the university.

**Lecture AVIs and Provided Study Notes:** Lectures are supplied as HTML5 video that will likely only be compatible with a recent FireFox web browser. Support for mobile devices will be hit or miss, but students will be able to download the video if streaming does not work as anticipated. Note that much of the provided material is copyrighted by the authors. *Students should refrain from distributing the resources to others without proper permission from the copyright owner(s).* All links and access to course materials will expire shortly after the last day of class.

**Grading**

**Quizzes:** Quizzes cover ANY of the material contained in a given module (video, notes, handouts, readings, mini-assignments, assignments, discussion, etc.) and must be completed by the due date posted on Blackboard. Each quiz has a time limit.

**Mini-assignments:** Several small assignments are done throughout the semester to re-enforce introduced concepts and provide an opportunity to practice skills. Instructions and due dates are posted on Blackboard.

**Assignments:** Students will complete several assignments. The topics will be assigned by the instructor. Typically, assignments are more detailed and rigorous than mini-assignments. Instructions and due dates are posted on Blackboard.

**On-line Exams:** Multiple time-limited online exams will be given. Students will only be able to take each exam once. Exams are "closed book", so students are not allowed to consult any outside source during the exam.

**Discussion Groups:** Students will be divided into groups for discussion on topics introduced during the course. Full credit will require meaningful contribution to the discussion as demonstrated by a minimum of 2 thoughtful postings per forum (generic "I agree with ..." are not viewed as thoughtful). Severe point deductions are assessed for any breach in earnest and intelligent discourse (i.e. cordial comment and discussion that is well intentioned and supported by rational thought).

**Final Exam:** Students will be provided access to the final exam approximately one week before the due date. The final exam is comprehensive and late exams will not be accepted. The final exam *may* include closed or open book portions as dictated in the instructions.
Tentative Point Distribution: Anticipated assignments with distribution of points for the course. Changes may be made as the discretion of the instructor.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>13 @ 10 pts</td>
<td>130</td>
</tr>
<tr>
<td>Mini-assignments</td>
<td>15 @ 10 pts</td>
<td>150</td>
</tr>
<tr>
<td>Assignments</td>
<td></td>
<td>255</td>
</tr>
<tr>
<td>A1: bibliography</td>
<td>40 pts</td>
<td></td>
</tr>
<tr>
<td>A2: review paper</td>
<td>60 pts</td>
<td></td>
</tr>
<tr>
<td>A3: hypotheses</td>
<td>40 pts</td>
<td></td>
</tr>
<tr>
<td>A4: IRB or IACUC</td>
<td>35 pts</td>
<td></td>
</tr>
<tr>
<td>A5: student</td>
<td>30 pts</td>
<td></td>
</tr>
<tr>
<td>A6: generic</td>
<td>50 pts</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td>13 @ 5 pts</td>
<td>65</td>
</tr>
<tr>
<td>Exams</td>
<td>2 @ 100 pts</td>
<td>200</td>
</tr>
<tr>
<td>Final Exam</td>
<td>1 @ 200 pts</td>
<td>200</td>
</tr>
<tr>
<td>total</td>
<td></td>
<td>1000 pts</td>
</tr>
</tbody>
</table>

The final grade will be determined based on the number of earned points. In the event that assignments are changed, the scores will be normalized to 1000 pts (points earned / total possible x 1000). Grades will be assigned as follows:

A+ (1000-990), A (989-960), A- (959-930), B+ (929-900), B (899-870), B- (869-840), C+ (839-810), C (809-780), C- (779-750), D+ (749-720), D (719-690), D- (689-660), F (Below 659)

Course Information and Policies

Expectations: Because students admitted to the graduate program in biology have significant exposure to biology, related disciplines (math, chemistry, physics, etc.) and general education coursework (English, writing, grammar, geography, history, etc.), it is anticipated that previously developed skills and knowledge will be utilized extensively throughout the course and reflected in the student's academic performance. Students are required to maintain a professional and cordial mannerism when communicating with the instructor and other students.

Because the course is offered in both regular and summer semesters, students will need to pay close attention to the pace of the course. On average, students will complete one module per week during 16 week semesters and two modules per week during 8 week (summer) semesters. While plenty of lead time will be provided for major assignments and exams, it is the student's responsibility to schedule time for completion of each assignment. I make every attempt to post materials early to provide as much flexibility to students as possible; however, note that grading of assigned items typically does not occur until after the due date.

Due Dates: Due dates will be clearly identified on Blackboard and strictly enforced. Students are strongly encouraged to complete assignments several hours before due. There will be no opportunity to make up missed quizzes, assignments or exams, and a score of zero will be assessed. Assignments submitted by email after the assignment link has expired in Blackboard will not be accepted. The final exam must be submitted by the due date or a grade of zero will be given. In the rare instances that material is accepted late at the instructor's discretion, students will be assessed a late penalty (minimum of 10% for each day late).
Note on Technology: While not common, problems with technology do happen. This can be caused by instructor error, server crashes, weather-related power outages or problems with Internet connections. Verified problems with course technology will be dealt with fairly. If you find that the Blackboard service is not responding or behaving improperly, notify the instructor immediately. If the problem is reasonably beyond the student's control, an opportunity to reclaim missed points may be provided (see due dates above as they relate to completing tests and assignments on time). While instructors generally attempt to be helpful with the resolution of computer related problems, the operation of each student's personal computer is the sole responsibility of the student (i.e. virus protection, operating system maintenance, software installation, etc.), and user-specific issues are normally resolved through interaction with the UNK helpdesk.

Other Policies of Interest

Exams and Quizzes: All online evaluations are closed book. It is expected that students will not utilize notes, textbooks, the Internet, or any other source of information during an assessment. Note that use of the Internet during a quiz or exam has been the most commonly detected source of academic dishonesty by students.

Plagiarism and Academic Dishonesty: Presenting someone else's work as your own is a serious academic offense. Any material containing plagiarism or reflecting academic dishonesty will receive a grade of zero and result in placing a record of the offense in the department's file. A second offense will result in assignment of an "F" for the course. All instances of plagiarism or academic dishonesty carry the risk of referral to the graduate committee, review of the student's file, and potentially expulsion from the program.

Withdraw and Incomplete Grades: Students should consult the academic calendar for the last day to withdraw from a course which will result in a grade of "W". Instructors are not permitted to withdraw a student; therefore, any student not continuing the class that fails to withdraw will receive a grade of "F". If unusual circumstances prevent completion of a course (such as major hospitalization, overseas deployment, etc.), students may request a grade of incomplete. At the sole discretion of the instructor, an "I" may be assigned for the course, and the student will be permitted a maximum of one year to complete the coursework.

Students with Disabilities: Students with disabilities are encouraged to contact me for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students with documented disabilities. To receive accommodation services, students must be registered with UNK Disabilities Services Coordinator, David Brandt, in the Academic Success Office, 163 Memorial Student Affairs Building, 308-865-8214 or by email brandtdl@ unk.edu.
**Tentative Schedule**
The sequence of lessons, notes and reading assignments are listed. Sequence, topic, assignments and any dates are tentative and subject to change by the instructor. Details for each assignment will be posted on Blackboard including due dates.

<table>
<thead>
<tr>
<th>Module Date</th>
<th>Topic / Activities / Notes</th>
<th>Assignments (due dates posted on Blackboard)</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1 1/7/2013</strong></td>
<td>Introduction and syllabus</td>
<td>Quiz 1 mA1: short paragraph on why you are engaged in graduate study</td>
<td>Syllabus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mA2: properly formatted and worded email</td>
<td>UNK Blackboard Web Site</td>
</tr>
<tr>
<td></td>
<td>Why graduate school?</td>
<td></td>
<td>Loper-Mail</td>
</tr>
<tr>
<td></td>
<td>Essential elements of Blackboard Etiquette in the digital world (email and discussion boards)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Why graduate school?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quiz 1</td>
<td></td>
</tr>
<tr>
<td><strong>Module 2 1/14/2013</strong></td>
<td>Types of research -- lab, field, &quot;blended&quot;, theoretical</td>
<td>Quiz 2 mA3: short paragraph on the area most interesting to the student</td>
<td>Resources posted to Blackboard</td>
</tr>
<tr>
<td></td>
<td>Faculty at UNK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scope of scientific projects at UNK -- thesis vs. Bio831, acceptable projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>What area of science appeals most to you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module 3 1/21/2013</strong></td>
<td>Requirements for graduation</td>
<td>Quiz 3 mA4: hypothetical program of study</td>
<td>Department of Biology Graduate Student Handbook</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mA5: preliminary scientific question, null and alternative hypotheses</td>
<td>Graduate Catalog</td>
</tr>
<tr>
<td></td>
<td>What is science? How is science done? Good scientific question and hypothesis development (Dr. Freeman's philosophy on the doing of science)</td>
<td></td>
<td>Heath Chapter 1 and 2</td>
</tr>
<tr>
<td></td>
<td>Post scientific question for comment by students.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module 4 1/28/2013</strong></td>
<td>Getting scientific information, The library at UNK, How to access and use resources at the library -- online journals, interlibrary loan, etc.</td>
<td>Quiz 4 mA6: reference list (min. 50)</td>
<td>McMillan Chapter 1</td>
</tr>
<tr>
<td></td>
<td>Reading papers (couple of example papers -- review vs. primary literature Writing in science</td>
<td></td>
<td>Papers posted on Blackboard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>McMillan Introduction and Chapter 4</td>
</tr>
</tbody>
</table>
| Module 5 2/4/2013 | Writing review papers  
Proper citation of sources  
Academic honesty and plagiarism  
Answering Essay Questions | Quiz 5  
A1: annotated bibliography (best 15+)  
A2: Review Paper | McMillan Chapters 5,6 and 7  
Graduate Handbooks  
McMillan, pp. 212-214 (or 188-190 depending on edition) |
| --- | --- | --- | --- |
| Module 6 2/11/2013 | Fundamentals of good experimental design, qualitative vs. quantitative data, data collection and records, critical evaluation  
Hypothetical experimental design presented for students to evaluate and comment. | Quiz 6  
mA7: data sheets and data management plan  
mA8: critical evaluation of scientific question and hypotheses with preliminary experimental design | Heath Chapter 3 and 4  
McMillan Chapter 2  
Heath Chapter 9, 11 and 12 |
| Module 7 2/18/2013 | Descriptive statistics  
Use of spreadsheets and internet resources for statistical analysis  
Hypothesis testing, statistical methods for the biologist (t-test, ANOVA, Chi-square and linear regression), p-values  
Why does good experimental design consider statistical methods before beginning data collection? What data will students collect? | Quiz 7  
mA9: spreadsheet assignment | Spreadsheet software for personal computer  
general readings from Health Chapters 6-12 |
| Module 8 2/25/2013 | Continuation of hypothesis testing and statistical methods (exercises) | Quiz 8 | McMillan Chapter 3 |
Displaying data and statistical information
- Tables
- Graphs

What are appropriate uses for tables and graphs?

**Module 9**
3/4/2013

Critical evaluation of scientific question, hypotheses, experimental design and statistical tests

Discussion the assigned review paper with emphasis on the experimental design and results.

**Module 10**
3/11/2013

You must be kidding ... the realities of conducting scientific studies!
- The use of animals in research
- The use of human subjects in research
- Legal restrictions
- Other things to consider

What are some challenges associated with your proposed scientific question?

**Module 11**
3/25/2013

Other types of Scientific Writing, posters, presentations and grants

Grant Writing: overview of problem,
specific aims, experimental plan, budget, justification of research and budget, etc.  

What are the required resources for your proposed work, and how might those resources be acquired?

| Module 12 | 4/1/2013 | How am I going to pay for all this stuff?  
Funding a research project  
UNK sources of funds (RSC and departmental)  
Extramural funding sources (largely limited to professional scientists)  
Given what you have learned, would you keep your current project, or would you opt to look into something else? | Quiz 12  
mA14: draft generic grant application | Department of Biological Science funding forms  
RSC application |
|---|---|---|---|---|
| Module 13 | 4/8/2013 | Peer reviews of student grants | A5: Comments on assigned grant  
A6: generic grant application | Assigned grants |
| Module 14 | 4/15/2013 | Resume or curriculum vitae  
Cont. discussion of grants and finishing up semester  
What is your plan for the future and how does a masters in biology help? | Quiz 13  
mA15: resume or c.v. depending on purpose | McMillan Chapter 10 |
| 4/22/2013 | Grants Due  
Finals Week (4/29-5/2/2013) | | Final Exam |