

**Professor:** Dr. Scott A. Kimball  
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Office hours: M,W,F 11:30-2:30, or by appointment

**Lecture:** M,W,F 2:30-3:20PM  
Mulvane Science 124

### Course Description:

Students who have completed BI 151, BI 152, and BI 251 with a minimum grade of “C” and are interested in pursuing a major in Biology will enroll in this course in the spring of their sophomore experience. Students will design an original research project with the help of the faculty.

*Prerequisites: BI 151, 152, and 251, all with grade of “C” or higher, and sophomore status.*

### Required Texts:

- Ruxton, G.D. and N. Colegrave. 2011. *Experimental Design for the Life Sciences*. 3<sup>rd</sup> Ed., Oxford University Press, New York, NY. ISBN: 9780199569120.
- McMillan, V.E. 2012. *Writing Papers in the Biological Sciences*. 5<sup>th</sup> Ed., Bedford/St. Martin's, Boston, MA. ISBN: 9780312649715.

### Course Objectives:

Students completing this course should be able to:

- recognize and access different types of literature resources.
- construct a hypothesis and accompanying testable prediction(s).
- choose an appropriate experimental design to test a specific prediction.
- write a grant proposal, including a justification and description of the proposed experiment, an itemized budget, and a timeline to execute the experiment.

### Grading:

The final grade is calculated on a percentage basis:

In-class Assignments = 15%

Assignments will be given periodically in class that will help you to progress through the reading material and build toward your research proposal.

Attendance and Participation = 5%

Class participation is expected and only possible by attending every class.

Contributions to class discussions, group activities, and asking/answering questions during class will ensure full credit, but more importantly, participation will provide you the best opportunity to succeed in this and future courses.

Department Seminar Series Participation = 5%

Throughout the semester the Department of Biology and Chemistry will host a series of seminars presented by invited external speakers covering a broad variety of biological topics. You are required to attend three of these seminars and engage with the speaker in question/answer sessions to earn full participation credit. The seminar series is scheduled for Wednesday afternoons at 3:30 PM. Specific details will be announced in class. (see tentative schedule below)

### Research Proposal = 70%

The major assignment for this course is to write a proposal for a research project that will be carried out in BI 498 during your junior year at Baker University. **YOU MUST EARN AT LEAST A 70% ON YOUR RESEARCH PROPOSAL TO PROCEED TO THE EXECUTION OF YOUR RESEARCH PROJECT IN BI498.**

The proposal will include a budget to request funds from departmental research funds, so the project must be well-designed before funds can be approved.

The proposal should include the following components as described in Ch. 10 of the McMillan text:

1. Title: must be scientifically informative, specific, and concise
2. Introduction: general background information on the biology of the subject and rationale for the research followed by a hypothesis and prediction(s) (at least 5 primary sources)
3. Methods: detailed experimental design and materials and methodology used to carry out the experiment (additional primary sources)
4. Possible Results: explain what result would be supportive of your hypothesis and what result(s) would cause you to reject your hypothesis. Also explain the statistical method you will use to determine whether or not the data you collect will allow you to reject the null hypothesis.
5. Budget: limit \$300
6. Literature Cited: Biology Department/CSE format (see handout)

The research proposal will be worth a total of 100 points, as follows:

March 31	Project Hypothesis Due ( <b>5 points</b> )
April 14	First Draft Due ( <b>10 points</b> )
April 21	Second Draft Due to Mentor and Dr. Kimball ( <b>15 points</b> )
May 12	Final Draft Due to Mentor and Dr. Kimball ( <b>70 points</b> )

### Research Proposal Presentation = 5%

The proposal for your research project will be presented in an 8-10 minute PowerPoint presentation to your classmates. The presentation should highlight the major parts of your project proposal and should leave the audience with a good sense of the scope of your project, the scientific premise of the work to be done, and the merits of the design you intend to use to carry out the work.

### Grade Scale:

A	90-100%		
B	80-86%	B+	87-89%
C	70-76%	C+	77-79%
D	60-69%		
F	0-59%		

**Attendance/Make-up Policy:**

Attendance is mandatory and expected, but certain circumstances may require an isolated absence. It is the student's responsibility to notify the professor as soon as possible of the expected absence (absolutely no later than one day following the absence, in the case of an emergency) and to make necessary arrangements for class materials.

*Note to Athletes:* Athletes who expect to miss an assignment due to sanctioned activities must notify the instructor as soon as possible and in all cases before the week of the expected absence. In these cases, assignments may be administered in alternative formats or at earlier dates, depending on specific circumstances and at the discretion of the professor.

**Students with Disabilities:**

Baker University is committed to providing "reasonable accommodations" in keeping with Section 504 of the Rehabilitation Act and the Americans with Disability Act of 1992. Access Services coordinates accommodations and services for all eligible students with disabilities. If you have a disability and wish to request accommodations and have not contacted Access Services, please do so as soon as possible. Access Services is located on the Baldwin City campus in the Office of Student Academic Success (in Collins Library (lower level); 785-594-8352; [sas@bakeru.edu](mailto:sas@bakeru.edu)). Information about Access Services can also be found at [www.bakeru.edu/sas](http://www.bakeru.edu/sas). If accommodations have been approved by Access Services, please communicate with your professor(s) regarding your accommodations to coordinate services.

**Academic Honesty:**

Students are expected to take responsibility for their own work and provide appropriate credit to the authors of works used by the student to complete course work. Please review the student handbook for a full description of the University's policy on academic misconduct.

*From the Student Handbook:* Baker University expects students and professors to have solely completed or prepared the work or research that bears their name, and to acknowledge the materials and sources of others.

Students

1. Have the responsibility to do their own academic work.
2. Must acknowledge sources of their materials and material that is the work of others.
3. Have the responsibility to inquire of the professor when they are uncertain as to what constitutes proper acknowledgment.
4. Have the responsibility to inquire of the professor as to what materials and aids are permitted in testing and research work.
5. Have an obligation to know their rights and responsibilities as delineated in the Baker University Student Handbook.
6. Have the responsibility to know the University's position with respect to academic misconduct as set forth in [the student handbook].

**Honors Contracts:**

Any student with a cumulative grade point average of 3.50 that is interested in taking this course for honors designation should talk to me about the details involved and fill in the necessary form, obtain the required signatures and meet with the honors program director to review the contract before turning in the form to the Records Office. The last day to submit a proposal for an Honors Contract is the last day to add a course for the semester.

**Credit Hour Definition and Associated Course Expectations:** Consistent with best practices in higher education, Baker University subscribes to the federal definition of the “credit hour” endorsed by the Higher Learning Commission. Driven by intended learning outcomes and verified by evidence of student achievement, the “credit hour” is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom (or direct faculty) instruction and a minimum of two hours of out-of-class student work per week for the duration of the course enrollment period. A 3-credit-hour course, for example, requires approximately 45 classroom contact hours, roughly 90 out-of-class work hours and approximately 135 total instructional hours over the course of a 15-week semester. Students are expected to spend roughly 90 hours (6 hours per week) on out-of-class assignments which include: a) assigned text readings, b) reading-related exercises and associated Moodle forum postings, c) unit evaluation and final exam preparation, d) outside lab-related assignments, e) statistical and other homework problems, and f) literature review research and manuscript preparation.

## Class Schedule (subject to change):

Dates	Subject	Text Chapter
<b>Week 1</b> Jan 25/27	Introduction <i>no meeting Friday</i>	Ruxton & Colgrave, Ch. 1
<b>Week 2</b> Jan 30/Feb 1/3	Hypothesis Development <i>no meeting Friday</i>	Ruxton & Colgrave, Ch. 2
<b>Week 3</b> Feb 6/8/10	Variation and Replication Dr. Kimball's Research Presentation	Ruxton & Colgrave, Ch. 3
<b>Week 4</b> Feb 13/15/17	Randomization and Sample Size Faculty Research Presentation	Ruxton & Colgrave, Ch. 3
<b>Week 5</b> Feb 20/22/24	Experimental Design: Controls and Randomized Design Faculty Research Presentation	Ruxton & Colgrave, Ch. 4
<b>Week 6</b> Feb 27/Mar 1/3	Faculty Research Presentation Faculty Research Presentation Experimental Design: Factorial and Other Designs	Ruxton & Colgrave, Ch. 4
<b>Week 7</b> Mar 6/8/10	Faculty Research Presentation Biological Literature; Citation Format	McMillan, Ch. 1 & 6
<b>Week 8</b> Mar 13/15/17	<i>Spring Break ---- HIPHIPHOORAY!!!!</i>	
<b>Week 9</b> Mar 20/22/24	Overview of the Proposal <b>Annotated Bibliography Due Mar 24</b> (10 points)	
<b>Week 10</b> Mar 27/29/31	<b>No Class – Meet with Mentor</b> this week <b>Hypothesis Due</b> in Dr. Kimball's email <b>March 31</b>	McMillan, Ch. 2 & 3
<b>Week 11</b> Apr 3/5/7	Data Analysis in the Biological Sciences; Assessment <i>Good Friday (no class April 7) --- YEEHAW!!!!</i>	McMillan, Ch. 2 & 3
<b>Week 12</b> Apr 10/12/14	Writing in the Biological Sciences <b>First Draft Due Apr 14</b> – Print and bring to class for peer review	McMillan, Ch. 4
<b>Week 13</b> Apr 17/19/21	Drafting and Revising <i>Dialogos Scholars Symposium (no class April 19) --- WOWZER!!!</i> <b>Second Draft Due Apr 21</b> (to Mentor and Dr. Kimball)	McMillan, Ch. 7
<b>Week 14</b> Apr 24/26/28	Drafting and Revising Meet with <b>Mentor</b> this week	McMillan, Ch. 7
<b>Week 15</b> May 1/3/5	Oral Presentation in Science Meet with <b>Mentor</b> this week	McMillan, Ch. 10
<b>Week 15</b> May 8/10/12	Course Evaluations <b>Final Drafts Due May 12</b> (to Mentor and Dr. Kimball)	McMillan, Ch. 10
<b>FINALS WEEK</b> May 18	<b>Thursday, 8:30-11:30 PM</b> Oral Presentations of Project Proposals	