



Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

More information is located on page 2.

Action Requested:

Create new course Delete existing course

Modify existing course (check all that apply)

Title Credits Repeat Status Grade Type

Prereq/coreq Schedule Type Restrictions

Course Level:

Undergraduate

Graduate

College/School: Department:

Submitted by: Ext: Email:

Subject Code: Number: Effective Term: Fall Spring Summer Year:

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Title: Current

Banner (30 characters max including spaces)

New

Credits: (check one) Fixed Variable or

Repeat Status: (check one) Not Repeatable (NR) Repeatable within degree (RD) Repeatable within term (RT) Total repeatable credits allowed:

Grade Mode: (check one) Regular (A, B, C, etc.) Satisfactory/No Credit Special (A, B, C, etc. +IP)

Schedule Type Code(s): (check all that apply) Lecture (LEC) Lab (LAB) Recitation (RCT) Internship (INT) Independent Study (IND) Seminar (SEM) Studio (STU)

Prerequisite(s): Corequisite(s):

Special Instructions: (restrictions for major, college, or degree; cross-listed courses; hard-coding; etc.)

Catalog Copy for NEW Courses Only (Consult University Catalog for models)

Description (No more than 60 words, use verb phrases and present tense)	Notes (List additional information for the course)
An introduction to the research and evolutionary theory of sex and reproduction. Course covers topics from the evolution of sex and gender to the evolution of complex reproductive strategies involving behaviors such as mate recognition, courtship displays, territoriality, polygamy, and offspring care. Lectures focus primarily on multicellular animals, but also include discussions of unicellular prokaryotes and eukaryotes as well as plants.	
Indicate number of contact hours: Hours of Lecture or Seminar per week: <input type="text" value="3"/> Hours of Lab or Studio: <input type="text" value="0"/>	
When Offered: (check all that apply) <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Summer <input type="checkbox"/> Spring	

Approval Signatures

Department Approval _____ Date _____ College/School Approval _____ Date _____

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Courses Only

Graduate Council Member _____ Provost Office _____ Graduate Council Approval Date _____

Course Proposal Submitted to the COS Curriculum Committee

Course Number and Title: BIOL 457 Reproductive Strategies (3:3:0)

Prerequisites: Biology 307 or 308 and 60 hours

Catalog Description:

An introduction to the research and evolutionary theory of sex and reproduction. Course covers topics from the evolution of sex and gender to the evolution of complex reproductive strategies involving behaviors such as mate recognition, courtship displays, territoriality, polygamy, and offspring care. Lectures focus primarily on multi-cellular animals, but also include discussions of unicellular prokaryotes and eukaryotes as well as plants.

Course Justification:

The class was previously taught as a Special Topics course in Spring 2009 and had both substantial enrollment and positive course evaluation demonstrating student interest. Additionally, the high number of students currently pursuing B.S. degrees in Biology at GMU and the institution of new undergraduate majors within the ESP department necessitate the addition of upper-level electives addressing evolutionary, organismal, and environmental topics.

Relationship to similar courses in other departments:

No other similar courses in Biology or other departments

Audience and enrollment:

Biology majors with junior standing or above

List of potential instructors:

Dr. Rebecca Forkner

Anticipated frequency:

Fall of Every other year.

Additional Resources necessary:

None

Syllabus: Attached

BIOL 457
Reproductive Strategies

Instructor: Rebecca Forkner
Office: David King Hall 3019
Phone: (703) 993-4683
Email: rforkner@gmu.edu
Office hours: M 2-4 p.m.

Class Meetings: Mon & Wed 12:00 – 1: 15 p.m., Krug 242

Text: Thornhill, R. and J. Alcock. 2000 (reprinting). The Evolution of Insect Mating Systems. AuthorHouse Press.
Judson, O. 2002. Dr. Tatiana's sex advice to all creation: The definitive guide to the evolutionary biology of sex. Metropolitan Books, New York.

Course objectives: The purpose of this class is to introduce you to research and theory within the field of evolutionary reproductive biology.

Student Learning Outcomes: Upon completion of this course, students should be able to;

- 1) Explain the concepts of natural and sexual selection, particularly the four tenets of Darwinian selection. This includes being able to explain how multiple reproductive strategies can be maintained within the same species (i.e., evolutionarily stable strategies).
- 2) Explain how to test hypotheses regarding the evolution of different traits or behaviors. This includes being able to explain experimental and comparative methods and their limitations.
- 3) Discuss the costs and benefits of different modes of reproduction, including sexual and asexual reproduction. This includes being able to evaluate the costs of various parts of a complete reproductive strategy, such as investments in both mate attraction and offspring care.
- 4) Demonstrate an understanding of the different selection pressures on males and females and how these translate to differences in mating and reproductive strategies, including mate location, choice, and acquisition, territoriality, sperm competition, nuptial gifts, female receptivity, sex ratio variation, and parental care. This includes being able to discuss differences in selection pressure among species as well as between sexes.
- 5) Define "gender" and explain the genetic determinants of gender in different vertebrate and invertebrate species.
- 6) Demonstrate an understanding of the concepts of male-female conflict and parent-offspring conflict.
- 7) Demonstrate an understanding of kin selection theory and its relevance to the evolution of different reproductive strategies on both genetic and behavioral levels as well as being able to explain the circumstances under which altruism, specifically forgoing reproduction, can evolve.

Class Meeting Schedule:

Date	Topics Covered	Readings	Assignment
Aug 30	Concepts of evolution & fitness	Gould & Lewontin (1979) Neufeld & Palmer (2008)	
Sep 1	In class discussion	Thornhill & Alcock – Ch. 1	
Sep 8	Modes of Reproduction	Thornhill & Alcock – Ch. 2 Judson – Ch. 13	
Sep 13	Sex determination	Judson – Ch. 12, Graves 2000 Graves et al 2002	
Sep 15	In class discussion		Paper Topic Due
Sep 20	Library Research Exercise		
Sep 22	EXAM I		
Sep 27	Cost of Reproduction	Judson – Ch. 1 & 2	
Sep 29	Sexual Selection Theory	Thornhill & Alcock – Ch. 3	
Oct 4	In class discussion		
Oct 6	Timing of Mating	Thornhill & Alcock – Ch. 4, Miller et al 2007	Proposal for Paper Topic Due
Oct 12	Copulation	Thornhill & Alcock – Ch. 5 Judson – Ch. 9	
Oct 13	In class discussion		
Oct 18	EXAM II		
Oct 20	Attracting Females	Thornhill & Alcock – Ch. 6 Judson – Ch. 4 & 5	
Oct 25	Defending mating sites	Thornhill & Alcock – Ch. 7 Judson – Ch. 6 & 7	
Oct 27	In class discussion		Peer Groups Assigned
Nov 1	Male Mating Systems	Thornhill & Alcock – Ch. 8 & 9	Paper Draft Due
Nov 3	In class discussion		
Nov 8	Protecting mates & fighting for eggs	Thornhill & Alcock – Ch. 10 & 11 Judson – Ch. 10	
Nov 10	In class discussion		
Nov 15	EXAM III		
Nov 17	Choosing Males	Thornhill & Alcock – Ch. 12, 13 Judson – Ch. 3	Peer Reviews Due
Nov 22	Female Mating Systems	Thornhill & Alcock – Ch. 14 Judson – Ch. 8	
Nov 29	In class discussion		
Dec 1	Raising Young	Judson – Ch. 11	Final Paper Due
Dec 6	In class discussion		
	FINAL EXAM		

Course Website:

A Blackboard/WebCT page is available for this course. To access it, please visit <https://courses.gmu.edu>. Your login information is your GMU email address and password. This web page contains required readings, as well as announcements, assignments, handouts, discussion questions, and additional material. **Students are responsible for all material posted to the class webpage.**

Reading Assignments and Discussions:

Readings for each lecture and class discussion are listed above. These required readings include sections of your textbook, as well as journal and popular press articles. Journal articles have been chosen not only to correspond to classroom lectures but to reinforce or elucidate concepts by allowing you to read original research or arguments. Links to sites where you may download Adobe .pdf files of required articles will be available on the class webpage. Should you encounter problems with internet access, a hard copy of each article will be available on 2 hour reserve at the JC Library Reserve Desk. As you read assigned articles, focus on the overall message rather than on specifics of methods or data analysis. Comprehension is emphasized over memorization of the experimental details. The course is structured such that the instructors will cover critical concepts during Thursdays' lectures and students will critique lecture and reading materials during an in-class discussion on Tuesdays. For this class to be effective, **YOU MUST DO THE READINGS AND COME TO CLASS PREPARED TO DISCUSS THE TOPIC.**

Exams:

This course will cover complex and challenging evolutionary concepts. Test questions will be derived from the material covered in the lectures, textbooks, and assigned readings. **All questions regarding grades must be directed to the instructor within one week after grades are posted – after this period, no grade will be changed.**

Grading Criteria:

Exams 4 @	125 pts	500 pts
Discussion Questions & participation		150 pts
Paper Proposal		50 pts
First Draft of Paper		50 pts
Peer Reviews		100 pts
Final Paper		150 pts
Total		1000 pts

90 ≤ A ≤ 100%

80 ≤ B < 90%

70 ≤ C < 80%

60 ≤ D < 70%

F ≤ 59%

Students with Disabilities:

A qualified student with a disability may not be excluded from University activities, services, or academic programs. To request accommodations for a disability, please contact the Office of Disability Services (ODS) at (703) 993-4306. If you have already registered with ODS and have academic accommodations that you need to use in this class, please see me during office hours or make an appointment as soon as possible so that we can work together to best implement your accommodations.

It should go without saying that ANY student who feels that he or she is struggling with the course should see the instructors as soon as possible for extra assistance in comprehending material. Students are encouraged to use all methods available to them (office hours, lectures, online discussion boards, email, phone, etc.) to ask questions and seek help throughout the semester.

Honesty and Technology Policies:

Please turn off all cell phones, beepers, ipods or .mp3 players, PDAs, or other electronic devices during class. **The Biology Program does not tolerate academic dishonesty of any kind. Students are directed to read the University's policies regarding academic honesty given in the University Catalog: (<http://www.gmu.edu/catalog/apolicies/#Anchor12>).** Below you will find definitions of common honor code violations.

Honor Code Violations

Any student behavior that indicates a lack of academic honesty and integrity is considered a violation. Examples of Honor Code violations include, but are not limited to:

- Cheating—Using or attempting to use unauthorized materials, information, study aids, or the ideas or work of another in order to gain an unfair advantage.
- Fabrication—Submission of contrived or altered information.
- Unauthorized collaboration—Collaboration not explicitly allowed by the instructor.
- Multiple submission—Presentation of a paper or other work for credit in two distinct courses without prior approval by both instructors.
- Sabotage—Destroying or damaging another student's work, or otherwise preventing such work from receiving fair graded assessment.
- Plagiarism—Unacknowledged or falsely acknowledged presentation of another person's ideas, expressions, or original research as one's own work. Plagiarism includes failure to provide proper references for someone else's work and failure to use quotation marks when copying someone else's work.
- Facilitation of academic dishonesty—Knowingly helping or attempting to help another student violate any provision of the code.
- Tampering with academic records—Misrepresenting, tampering with, or attempting to tamper with any portion of a student's academic record.
- False testimony—Knowingly presenting false accusation or testimony before the honor board or its representatives.
- Improper disclosure—Failure of an honor board member or participant in an honor board hearing to maintain strict confidentiality concerning the identity of students accused of honor code violations.

BIOL 457 Reproductive Strategies INDIVIDUAL RESEARCH PAPER

Each student must prepare a research paper investigating a specific topic related to non-human animal reproduction. The purpose of this paper is to promote in depth exploration of a topic not covered in class.

There are several graded components to this project. You should keep ALL of the work you do toward this project in a portfolio for submission at the end of the course. Components include: 1) The proposal, 2) First Draft of the Paper submitted to the Writing Center, 3) Second Draft of the Paper submitted for Peer Review, 4) Comments received in Peer Review process, and 5) Final manuscript. Please see your syllabus for the points associated with each component. Instructions for submission of components to Blackboard will be provided in class. **NO LATE SUBMISSIONS WILL BE ACCEPTED.**

The objective of your paper is to explain the concepts behind a new discovery within the field of reproductive strategies. Your paper will be formatted in the same manner as a letter from your Judson textbook. That is, you will pretend that you are the organism you are researching and will write a letter to Dr. Tatiana seeking help with your "issue." In turn, you will pretend that you are Dr. Tatiana and write a response in which you address the problem the organism is having at the same time that you explain in detail the biological and evolutionary aspects of the reproductive strategy in question.

Choosing Your Topic

Potential topics are listed below. Some of these will be covered briefly in your class lectures. However, we would like you to write about NEW research in the field. Therefore, when choosing your topic, you should skim your textbooks to determine to what degree the organism or topic you've chosen has already been covered, and search for new developments within that field. Potential topics should be uploaded to Blackboard for approval. The deadline for submission of a topic is SEPT 15th.

Proposal

Your proposal should be a 2-3 page outline with an **annotated bibliography** of 6 – 10 primary sources (not including your textbooks if you cite those). An annotated bibliography is not simply a list of articles, but includes a few statements summarizing the article, as well as statements assess or evaluate the research and state how the article contributes to or fits into your paper topic. Below is an example of how to format your bibliography:

Summers, K. and B. Crespi (2008) The androgen receptor and prostate cancer: a role for sexual selection and sexual conflict. *Medical Hypotheses*. 70: 435-443.

The authors argue that prostate cancer arises as a result of sexual conflict in which females select for males with increased expression of proteins, proteases or hormones, associated with production of seminal fluid. To support their hypothesis, they did a literature review to look for genes responsible for production of seminal fluid that were also correlated with increased cancer risk or expression. This article is interesting because it hypothesizes that breast and prostate cancer are the result of sexual selection. Relevant evolutionary topics that I could discuss by focusing on this subject would include male-female conflict and antagonistic co-evolution.

Web references may not be used. While you may read websites to help you understand your topic, sources in your bibliography should be primary journal articles or textbooks. Your proposal does not need to include the actual letter to Dr. Tatiana, but should include a simple statement of the reproductive strategy. However, letters should be included in the draft of your paper for peer review. Proposals should be uploaded to Blackboard following in class instructions. The deadline for submission of your proposal is **OCT 6th**.

Peer Review

In order to help you write your letter and response, you will submit a draft to your classmates for Peer Review. Your paper draft should be uploaded to Blackboard following directions given in class. The deadline for submission of your draft for Peer Review is **Nov 1st**.

Once you have submitted your draft for review, your instructors will assign you to a group of 3-4 people, and you will be asked to download, read and comment on the drafts submitted by the other members of your group. Your peer review of your classmates' papers should address all of the questions listed below under "Guidelines". In particular, you should assist your classmates in improving the grammar, clarity, and brevity of their writing. Additionally, since your assignment is not formatted in a traditional term-paper form, but rather as a letter to Dr. Tatiana, you are to help evaluate and improve the humor of your peers' writings if necessary. Your comments on your classmates' papers should be courteous and constructive. Instructions for using the "track changes" function in Word to edit grammar and add comments will be provided. The deadline for completing your Peer Reviews is **NOV 17th**.

Paper

The guidelines listed below (after Potential Topics) will help you structure your proposal and final paper. You will use these guidelines as criteria for evaluating papers assigned to you in the Peer Review process. Excluding references, the body of the paper should be 6-8 pages in length (Arial 12, double spaced, 1 inch margins). **All drafts, including your proposal and peer review submission should be in Word .doc format (97-2003 compatible, .doc not .docx extensions)**

After you have a comprehensive, approved proposal with identified references, you should start to write your paper. Steps in this process include:

- Write a **complete paper** that is correctly structured and spell checked.
- If time permits, review your paper with the Writing Center and make revisions.
- Submit your complete paper draft to Blackboard for Peer Review.
- You will be assigned to a small peer review group. This means that in addition to having your paper reviewed by 3 to 4 classmates
- Each class member will review the drafts of all members of their assigned group.
- Make revisions to your paper based on the peer-reviews.
- Submit final paper to faculty for review.

Your final paper must be prepared according to APA guidelines. In addition to in-text citations, a full Literature Cited list must be included. Final submissions should include your original proposal, the draft you presented to the Writing Center with

comments, the draft submitted for peer review, all peer review comments received, and your final draft. All items should be submitted in a manila folder (i.e. do not submit your paper in elaborate binders or plastic folders). The deadline for submission of your final paper is DEC 1st.

Potential Topics:

Nuptial Gifts in Insects and Spiders
Sperm Competition in Insects and Spiders
Sperm Competition in Mammals
Sex Role Reversal
Temperature dependent sex determination
Homosexuality in non-human animals
Lekking in Birds
Lekking in Insects
Gender Determination in Social Insects
Cytoplasmic Sex Ratio Distorters
Sexually Transmitted Diseases in Insects
Seismic Courtship in Spiders
Secondary sex organs in insects
Male accessory glands
Mouthbrooding
Viviparity driven conflict hypothesis
Female mimicry in males
Male mimicry in females
Sperm parasitism
Reproductive strategies in slave-making ants
Filial cannibalism
Ingestion of seminal products
Harassment-associated mortality
Cryptic female choice
Seasonal changes in mate choice
Gynandromorphs in Hymenoptera or Diptera
Gynandromorphs in Crustaceans
Paternity assurance mechanisms
Mate takeover
Gamete trading in snails
Mate-marking
Size-assortative mating
Anti-harassment aposematism
Signa in Lepidoptera
Group mating in Norway rats
Conspicuous oestrous in primates
Vocal self-stimulation in birds
Chemically mediated mate choice
Copycat mating
Mating in Strepsiptera

FORMAT for the Paper

LETTER:

Is the letter in the correct format?

(e.g. *Dear Dr. Tatiana*)

Does the letter explain the problem succinctly (i.e. no more than 5-6 sentences)?

Is the letter appropriately humorous?

(e.g. *Judson pg 46, "I'm consumed with existential angst." Or pg. 170, "Will you go to hell for screwing your sisters? Don't worry about that."*)

Does the letter identify the type or species of animal considered?

RESPONSE:

Does your response identify and describe both the organism and its relevant reproductive behavior and/or morphology?

(e.g. *Judson pg. 69, "First you're not a real bedbug but a pirate bug, a close cousin."*)

Under what general aspect of reproductive strategies does this behavior or morphology fall?

(e.g. *Judson pg. 33, "The problem is, she's got a genuine, clinical sex mania. Such manias are of two types. In type I..."*)

Do you adequately explain the evolutionary basis of the issue (including historical research, views, or important researchers in the field)?

(e.g. *Judson pg. 55, "The second theory that aims to explain why female chimpanzees are so promiscuous is the obfuscation theory."*)

ADDITIONAL EXAMPLES AND ELABORATION OF CONCEPTS:

Is the importance of the topic restated and elaborated using additional examples from the behavior or morphology of other animals?

(e.g. *Judson pg. 113, "My second example of the evolution of counter measures comes from the marine flat worm..."*)

Can you explain, if appropriate, how this new issue or strategy changes our previous understanding of reproductive biology?

(e.g. *Judson pg. 154, "In the days before DNA..."*)

What conclusion is reached about the evolutionary rationale for this behavior?

(e.g. *Judson pg. 66, "He who fights and runs away lives to mate another day."*)

Are the conclusions logical and backed up with evidence presented in the paper?

Are paragraphs structured adequately with topic sentences and understandable flow?

Are you convinced that the topic is important, relevant to course material and current?

REFERENCES:

Is the paper well referenced, with all ideas and information gathered from others credited?

Are the references in an appropriate, consistent format?

Are the references primary sources?

Are all references cited in the text in the Bibliography?

Are all the references listed in the Bibliography cited in the text?

Proposed Due Dates: Students will not receive any points for the assignment if the due dates are missed.

Sept 15, 2010: Paper topic – Submit topics to Blackboard as .doc (Word 97-2003 compatible document, not .docx format) by 12:00 p.m.

Oct 6, 2010: Proposal of Approved Topic with annotated Bibliography - Submit proposals to Blackboard as .doc (Word 97-2003 compatible document, not .docx format) by 12:00 p.m.

Nov 1, 2010: First Draft of Paper. Submit as .doc (Word 97-2003 compatible document, not .docx format) to Blackboard by 5:00 p.m.

Nov 17, 2010: Peer Reviews of all Group Members' papers. Submit to Blackboard to appropriate Peer Review Group Folder by 5:00 p.m.

Dec 1, 2010: Final Paper. Submit hardcopy with all components in class.