APPLICATION FOR NEW COURSE

1. Submitted by College of Agriculture ___________________________ Date 28 October 2004
Department/Division offering course Entomology ___________________________

2. Proposed designation and Bulletin description of this course

a. Prefix and Number ENT 550
b. Title* Spider Ecology and Behavior

*NOTE: If the title is longer than 24 characters (including spaces), write
A sensible title (not exceeding 24 characters) for use on transcripts Spider Ecology Behavior

c. Lecture/Discussion hours per week 3
d. Laboratory hours per week 0

e. Studio hours per week 0
f. Credits 3

g. Course description

Spiders are fascinating in their own right, and also are major predators in terrestrial food webs. This course examines the
ecology and behavior of spiders as model predators in systems ranging from undisturbed forests and meadows to
agroecosystems and the urban landscape. While focusing on spiders, the course also intertwines two general sub-themes:
(1) the advantages of employing diverse approaches (e.g. field and laboratory experiments, non-manipulative
observations, and meta-analyses) in ecological and behavioral research; and (2) the strengths, and limitations, of using
model organisms to develop and test theory.

h. Prerequisites (if any)

One year of undergraduate biology

i. May be repeated to a maximum of 0 (if applicable)

4. To be cross-listed as

Prefix and Number ___________________________ Signature, Chairman, cross-listing department ___________________________

5. Effective Date Fall 2005 (semester and year)

6. Course to be offered ☒ Fall ☐ Spring ☐ Summer

7. Will the course be offered each year?
(Explain if not annually) ☐ Yes ☒ No

Offering the course every other year will meet the anticipated demand, and will allow students who want the course to fit it into
their schedule before graduating.

8. Why is this course needed?

• Abundance and ubiquity of spiders in terrestrial ecosystems.
• Increasing scientific world literature on the ecology and behavior of spiders.
• The value of testing general theory by comparing predictions of theory with the traits of a group such as the spiders (Order
  Araneae), which is exceptionally diverse but whose members exhibit the same basic body plan and are all predaceous.
• Absence of a similar course in the graduate and undergraduate offerings of Entomology and other biological science
departments at the University of Kentucky.
• The broad appeal of such a course to graduate and advanced undergraduate students majoring in a range biological science
departments in Agriculture and Arts and Sciences.
• Enrichment of the Entomology offerings in ecology, behavior and applied entomology.
9. a. By whom will the course be taught?  Prof. David H. Wise

b. Are facilities for teaching the course now available?  
   If not, what plans have been made for providing them?

   ☒ Yes  ☐ No
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10. What enrollment may be reasonably anticipated?  
   15-25

11. Will this course serve students in the Department primarily?  
   ☑ Yes  ☐ No

   Will it be of service to a significant number of students outside the Department?  
   ☑ Yes  ☐ No

   If so, explain:

   The course will have a broad appeal to undergraduate and graduate students majoring in the biological sciences, particularly to students focusing on organism-level studies. It will be attractive to undergraduate biology majors who have not yet selected an area of specialization within biology, who will be interested in taking a course on a fascinating animal -- the spider -- to which almost everyone has either a strong negative or positive reaction. Because spiders are major predators in terrestrial systems, and because the course also deals with major conceptual issues in ecological and behavioral research, the course will also appeal to advanced undergraduates and graduate students majoring in several departments within the College of Arts and Sciences and the College of Agriculture who are studying ecology, behavior and applied topics such as biological control, resource management and conservation biology.

12. Will the course serve as a University Studies Program course?  
   ☐ Yes  ☑ No

   If yes, under what Area?  ____________________________

13. Check the category most applicable to this course
   ☐ traditional; offered in corresponding departments elsewhere;
   ☐ relatively new, now being widely established
   ☑ not yet to be found in many (or any) other universities

14. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky?  
   ☐ Yes  ☑ No

15. Is this course part of a proposed new program:  
   If yes, which?  ____________________________

   ☑ Yes  ☐ No

   Will adding this course change the degree requirements in one or more programs?*
   If yes, explain the change(s) below

16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.

17. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.  ☑ Check here if 100-200.

18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate students in assignments, grading criteria, and grading scales.  ☑ Check here if 400G-500.

19. Within the Department, who should be contacted for further information about the proposed course?

   Name  Prof. David H. Wise  ____________________________  Phone Extension  7-4693
*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.
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Signatures of Approval:

[Signatures]

Department Chair

Dean of the College

January 31, 2005

Date

1/31/05

Date

1/15/05

Date of Notice to the Faculty

*Undergraduate Council

*University Studies

*Graduate Council

*Academic Council for the Medical Center

*Senate Council (Chair)

*If applicable, as provided by the Rules of the University Senate

Date of Notice to University Senate

ACTION OTHER THAN APPROVAL

Rev 3/04
ENT 550: Spider Ecology and Behavior

Syllabus and Course Objectives

Instructor: Prof. David H. Wise, Dept. of Entomology

Required Text:

Wise, D. H. In prep. Weavers and Wanderers: Ecology and Behavior of Spiders. Cambridge University Press (Manuscript will be used until book is published)

Supplemental Texts (On Reserve):


Other Readings:

The majority of assigned readings, other than those from Weavers and Wanderers and the supplemental texts on reserve, will be research and review articles from the scientific literature.

Grading:

- Undergraduate and Graduate Students: Two hour exams and a final examination; all exams will be essay exams
- Graduate Students: In addition to the exams, a 10-page library research paper.
- Grading Scale:
  
  Undergrads:  
  A -- 85 -- 100  
  B -- 75 -- 84  
  C -- 60 -- 74  
  D -- 50 -- 59  
  E -- < 50

  Grad students:  
  A -- 90 -- 100  
  B -- 80 -- 89  
  C -- 70 -- 79  
  D -- 60 -- 69  
  E -- < 60
Overview of Course

The course focuses on the ecology and behavior of spiders as model terrestrial predators. Because spiders are ubiquitous and so abundant, and because they exhibit such a wide range of foraging adaptations, from the sit-and-wait tactics of web builders to active hunting by the wandering spiders, they make excellent models for developing and testing theories about the ecological roles played by generalist arthropod predators in terrestrial food webs. Throughout the course two general themes will be intertwined: (1) the use of diverse approaches (e.g. field experiments, laboratory microcosm experiments, non-manipulative observations and meta-analyses) in ecology; and (2) the advantages and limitations of using model organisms and model systems to develop and test ecological theory.

Course Learning Objectives

Upon completion of this course, the student will be able to:

- Identify the major traits of spiders that set them apart from most other predators, and also those that they have in common with most predators

- Critically evaluate the advantages and disadvantages of relying on model organisms to test general theories in ecology and behavior

- Analyze the strengths and limitations of the following different approaches to testing theory in ecology and behavior: field experiments, laboratory microcosm experiments, non-manipulative observations, meta-analyses and mathematical modeling

- Synthesize the major findings relevant to each of the Major Topics covered in the course

- Assess the design and interpretation of field experiments in ecology and behavior

- Propose potentially productive new avenues of research in each of the course’s Major Topics

Course Structure

The course will be divided into sections, each covering a single major topic. Each section will start with a treatment of how general theory characterizes the ecology and behavior of generalist predators with respect to that topic. The core of the section will be a critique and synthesis of empirical findings for spiders as they relate to predictions of theory. The section will conclude with a discussion of how well theory and empirical evidence agree, highlighting how predictions of theory are either confirmed or contradicted, and how theory relating to the topic could be revised or tested further.
The course will mix lecture with discussion. The instructor will lay the groundwork for each section of the course with a lecture based upon assigned readings from *Weavers and Wanderers: Ecology and Behavior of Spiders*. Each lecture will be followed by a critical discussion of assigned papers from the ecological and behavioral literature. Selected papers will illustrate major findings and particularly imaginative and innovative research, and will provide the starting point for in-depth discussions of critical features of experimental design, interpretation of results, and development of theory. Each section will end with a synthesis and discussion of future research directions.

**The Text, *Weavers and Wanderers: Ecology and Behavior of Spiders***

The topics to be covered in the course reflect the major themes of *Weavers and Wanderers: Ecology and Behavior of Spiders*. This monograph, currently being written, will synthesize the world literature on the ecological interactions and behavioral ecology of spiders. Coverage of each topic in the monograph will be in-depth, critical and linked directly to theory. Topics will range from foraging for prey and mates to the cascading indirect effects of spiders on rates of net primary production and rates of litter decomposition in complex food webs. The book will be a balanced critique of the evidence from the most substantial studies on each topic. Conclusions reached by investigators will be evaluated according to the adequacy of the research design and the validity of their interpretations. Since a major aim of the book is synthesis and the testing of theories about the ecology and behavior of generalist predators, the book will bring together the findings of a wide range of research projects in order to develop broadly supported generalizations.

**Major Topics Covered in the Course**

- Overview of basic spider biology, emphasizing morphology, physiology, behavior and the traits and evolutionary relationships of the major families of the Order Araneae
- Introduction to the strengths and weaknesses of relying on model organisms and model systems to develop and test ecological theory
- General consideration of the evolutionary origins and ecological consequences of the generalist foraging mode, i.e. predation on a broad spectrum of prey
- Examination of the diversity of foraging strategies and prey selection among spiders, the postulated model generalist predators
- Food limitation: effects of a relative shortage of calories and nutrients on spider growth, survival, reproduction and population dynamics. This section will include the controversial topic of spiders as “wasteful killers,” and the broader topic of “bottom-up limitation” of spiders in grazing food webs (webs based upon living net primary production) and detrital food webs (i.e. those based upon non-living organic matter)
- Cannibalism: prevalence, characteristics, selective advantages, and consequences for population regulation and food-web dynamics
- Sexual selection, with an emphasis on the how sexual cannibalism relates to sexual selection
theory
• Spider foraging behaviors, including their relationship to environmental parameters and evolved dispersal behaviors
• Territoriality in spiders: evolutionary origins and impacts on population densities and food-web dynamics
• Evolution of group living in spiders, from simple coloniality to complex cooperative behaviors, with an emphasis upon the selective advantages and limiting constraints of living in groups
• Competition between spider species: prevalence, mechanisms and consequences for population dynamics
• Selective advantages of intraguild predation i.e predation by generalist predators (spiders in particular) on other generalist predators that potentially compete for a limited supply of shared prey
• Cascading indirect effects of spiders on rates of net primary production in grazing food webs, and rates of decomposition of detritus in detrital webs
• Biological control of agricultural pests by spiders: theoretical considerations and empirical evidence for both their effectiveness and possible negative effects on pest control by other natural enemies
• Conservation of biodiversity: theoretical considerations; spider diversity and relative abundance as indicators of food-web structure and dynamic properties; diversity patterns of spiders in both non-managed habitats experiencing low human impact, and highly impacted rural, suburban and urban landscapes.
January 31, 2005

To: Marilyn Lyons
   Graduate Council

From: Dr. Mike Muller
   Associate Dean for Academic Programs

Re: Entomology 550.

Attached is a proposal for a new course, ENT 550, Spider Behavior and Ecology. This course has been approved by the College of Agriculture Undergraduate and Graduate Curriculum Committees. It has also been forwarded to Dr. Kraemer for Undergraduate Council approval.

Thank you.