DEGREE/PROGRAM CHANGE FORM C Form Number: C1220

Form Number: CI

Fields marked with * are required

Name of Initiator: Felisa Smith Email: * fasmith@unm.edu Date: * 02-27-13 Phone Number: * 505 277-6725 Initiator's Title* Professor: AS Biology General Administra Associated Forms exist?* No Faculty Contact* Felisa Smith Administrative Contact* Felisa Smith Department* Biology Admin Email* fasmith@unm.edu Admin Phone* 277.6725 Branch Main Proposed effective term: Year | 2014 Semester | Spring **Course Information** Select Appropriate Program Undergraduate Degree Program Name of New or Existing Program * BS & BA Biology- Ecology and Evolutionary Biology Concentration ▼ Degree Type BS Select Category | Concentration Select Action | New

Exact Title and Requirements as they should appear in the catalog. If there is a change, upload current and proposed requirements.

See current catalog for format within the respective college (upload a doc/pdf file)

Ecology Concentration Assessment Plan.pdf EEOB Proposed Concentration 2013 v8.doc

Does this change affect other departmental program/branch campuses? If yes, indicate below.

Reason(s) for Request * (enter text below or upload a doc/pdf file)

Biology is a broad field. Currently, many of our students graduate without a clear program of study and may lack crucial courses that would allow them to pursue graduate training. By providing concentrations within our BS degree, we can steer students towards courses of study that are directly applicable to specific careers or graduate training in particular areas. The concentration in 'Ecology, Evolution, and Organismal Biology' (EEOB) will provide students with a solid training in the tools and techniques used for the study of living things and their environment, as well as exposure to interdisciplinary approaches, a grounding in at least one taxonomic group and training at multiple levels of the biological hierarchy. This concentration would be particularly appropriate for students seeking additional graduate training in this area at UNM or elsewhere and for students seeking employment with federal, state, and municipal environmental agencies, non-governmental organizations, or environmental consulting firms. Given the seriousness of the many pressing environmental issues facing society, providing formal training in EEOB will enhance the opportunities and jobs available for our undergraduates.

Upload a document that inlcudes justification for the program, impact on long-range planning, detailed budget analysis and faculty workload implications.*

Ecology Concentration Assessment Plan.pdf
Justification for Ecology.pdf
EEOB Justification & UNM responses.pdf

4/17/14

Climate change and other pressing environmental problems have led to the increased importance of a solid understanding of Ecology, Evolution, and Organismal Biology (EEOB). Students pursuing this option may receive either the Bachelor of Science or Bachelor of Arts degree in Biology with a concentration in EEOB. The concentration provides a depth of understanding at multiple hierarchies of biological organization and exposes students to the techniques, methodologies and approaches used by these sub-disciplines. Students will develop expertise with the biology of a group of organisms, familiarity with methodologies used in studying them, expertise with the systematics of classification, and significant hands-on experience in the field or research laboratory. A concentration in EEOB is designed to provide a comprehensive background for students planning to pursue graduate school or seek a career in a governmental agency.

Majors in biology seeking a Bachelor of Science degree with a concentration in EEOB must satisfy the requirements given in sections 1, 2, 3 and 6. Majors in biology seeking a Bachelor of Arts degree must satisfy the requirements in sections 4, 5, and 6.

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Text for catalog (see page 6-9 for text with rationale for each component added):

Ecology, Evolution, and Organismal Biology (EEOB) concentration within existing Biology Major (BS or BA)

1.	Successful com	pletion of the f	four-course introduc	tory sequence	(16 credits).	
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BIOL 201L Molecular and Cell Biology	(4)	Fall , Spring
BIOL 202L Genetics	(4)	Fall, Spring
 BIOL 203 & 203L Ecology and Evolution 	(4)	Fall, Spring
 BIOL 204 & 204L Plant and Animal Form and Function 	(4)	Fall, Spring

2. Successful completion of upper division courses in *both* Ecology and Evolution (6-7 credits, depending on whether lab is also taken).

•	BIOL 310L Principles of Ecology	(3)	Spring
•	BIOL 300 Evolution	(3)	

3. Successful completion of at least 1 taxonomic based course from the following (3-4 credits).

 BIOL 484/584 Biology of the Fungi 		(3)
 BIOL 450 General Virology 	(3)	Spring
 BIOL 463L Flora of New Mexico 	(4)	
 BIOL 482L Parasitology 	(4)	Spring
 BIOL 485L Entomology 	(4)	Spring
 BIOL 486L Ornithology 	(4)	Fall, alternative years
 BIOL 487L Ichthyology 	(4)	Fall
 BIOL 488L Herpetology 	(4)	Spring
BIOL 489L Mammalogy	(4)	Fall, alternate years

4. Successful completion of at least 1 synthetic/comparative taxonomic based course and lab from the following (4 credits).

 BIOL 36oL General Botany 	(4)	Fall
 BIOL 371L Invertebrate Biology 	(4)	Fall
BIOL 351L General Microbiology	(4)	Fall, Spring
 BIOL 386L General Vertebrate Zoology 	(4)	Fall, Spring

5. Successful completion of at least 1 statistics course from the following (3 credits).

•	STAT 145 Introduction to Statistics		(3)	Fall, Spring
•	STAT 345 Elements of Mathematical Statistic	s and		
	Probability Theory		(3)	Fall, Spring
•	STAT 427 Advanced Data Analysis I	(3)	Fall	
•	PSY 200 Statistical Principles		(3)	
•	Or other course with prior approval from EEO	B faculty ad	visory comi	mittee

6. Successful completion of at least 1 course from each of the following clusters:

- A) Individual (Genes/Physiology)
- B) Population (Behavior/Population biology)
- C) Community/Ecosystems

for a total of 3 courses (9-12 credits). Graduate courses, indicated by an *, need instructor approval for undergraduate enrollment. Courses within each cluster are listed below.

A) Individua	l (Genes/Phy:	siology) C	luster
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al Genetics	(3)	Fall	
ogy		(4)	Spring
		(4)	Spring
netics	(3)	Sprin	g
ology		(3)	Spring
cal Ecology	(3)	Fall	
ЭУ		(4)	Spring
approval from EEC	OB faculty	(3)	
	ogy netics ology cal Ecology gy	ogy netics (3) blogy cal Ecology (3)	ogy (4) (4) netics (3) Sprin ology (3) cal Ecology (3) Fall gy (4)

B) Population (Behavior/Population Biology) Cluster

at UNM or at another accredited institution

• BIOL 409 Conservation Genetics (3)	
• BIOL 409 Sexual Systems in Animals: diversity and evolution	(3)
• BIOL 455 Ethology: Animal Behavior (3)	
• ANTH 360 Human Behavioral Ecology(3)	
• ANTH 363. Primate Social Behavior(3)	
• ANTH 491 Population Genetics(3)	
BIOL 491 Population Genetics	(3)
 Or other course with prior approval from EEOB faculty advisory committee 	(3)

C) Community/Ecosystem Cluster

•	BIOL 409 Topics: Ecology of Plant Microbe Symbios	sis (3)		
•	BIOL 451 Microbial Ecology		(3)	Fall
•	BIOL 495 Limnology		(3)	Spring
•	BIOL 475 Plant Community Ecology	(3)	Sprin	g
•	BIOL 514* Ecosystem Studies		(3)	Fall
•	BIOL 511* Macroecology	(3)	Sprin	g, alternate years
•	BIOL 405 Ecosystem Dynamics		(3)	Spring
•	BIOL 419 Topics: Global Change Biology	(3)	Fall	
•	BIOL 535/EPS 535* Freshwater Ecosystems		(3)	Spring
•	Or other course with prior approval from EEOB facu	lty	(3)	
	advisory committee			

7. Demonstration of significant hands-on experience in the field or research laboratory (o-4 credits). This can be achieved by one of the following:

• BIOL 400 Senior Honors Thesis (must be accepted into program)	(varies)	
BIOL 408L Bosque Internship	(4)	Fall, Spring, Summer
BIOL 409 Ornithological Field Expedition	(3)	varies
BIOL 461L Introduction to Tropical Biology	(4)	Spring
BIOL 463L Flora of New Mexico	(4)	
BIOL 496L Limnology Lab	(1)	
BIOL 499 Undergraduate Problems	(1-4)	
• PSY. 450 Gorilla Observation	(3)	Fall, Spring, Summer
 Successful completion of an approved field course offered 		

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- Participation in a NSF REU program at UNM or elsewhere
- Other field experience with prior approval from EEOB faculty advisory committee

8. Successful completion of at least 1 interdisciplinary synthetic course (3-4 credits). Graduate courses, indicated by an *, need instructor approval for undergraduate enrollment.

•	BIOL 324L Natural History of the Southwest	(4)	Fall
•	BIOL 379 Conservation Biology	(3)	Spring
•	BIOL 419 Topics in Interdisciplinary Science		
	(e.g., Global Change Biology, Evolutionary Immunology,		
	Communicating Science to the Public, Intermediate Mathematical Biology, Physiological Ecology, Paleo and Historic Ecology, etc.)	(2)	varies
_		(3)	
•	BIOL 445 Biology of Toxins	(3)	Spring
•	BIOL 470 Biology: Discovery and Innovation	(3)	Spring
•	BIOL 490 Biology of Infectious Organisms	(3)	Spring, alternate years
•	BIOL 492 Introduction to Mathematical Biology	(3)	Fall
•	BIOL 494 Biogeography	(3)	Spring, alternate years
•	BIOL 495 Limnology	(3)	Spring
•	BIOL 535/EPS 535* Freshwater Ecosystems	(3)	
•	BIOL 518* Evolutionary and Ecological Genomics	(3)	
•	BIOC 423 Introduction to Biochemistry	(3)	
•	EPS 352 Global Climate Change	(3)	
•	EPS 439 Paleoclimatology	(3)	
•	BIOL 558/EPS 558* Geomicrobiology	(3)	
•	ANTH 350 Human Biology	(3)	Spring
•	ANTH 357 Human Origins	(3)	
•	Or other course with prior approval from EEOB faculty advisory committee	⁻ (3)	

g. Successful completion of at least one semester of the 'BrownBag' seminar (1-2 credits).

• BIOL 402 Brown Bag	(1)	Fail, Spring
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10. Successful completion of additional Biology courses so the total number of biology hours is greater or equal to 48.

- 11. Successful completion of supporting courses in Math, Physics and Chemistry (24-27 hours).
 - Math: MATH 180 & 181 OR MATH 162 & 163
 - Physics: PHYC 151 & 152 **OR** PHYC 160 & 161
 - Chemistry: Either (CHEM 121 & CHEM 123L and CHEM 122 & CHEM 124L) or (CHEM 131L and CHEM 132L)
 - PLUS one semester of organic chemistry (CHEM **301 and CHEM 303L) or (CHEM 212 and CHEM 124L)

Notes:

- BIOL 110, 112L, 123, 124L, 136 and 239L do not count toward a biology major credit.
- A course fulfilling one requirement cannot be used towards another (e.g., no double-dipping); BIOL 419 is considered a different course if it has a different instructor/title.
- Please verify that coursework meets with the requirements for a BS in Biology. Specifically, coursework must include three 400-level courses from different categories, as identified in the catalog (cell/molecular, interdisciplinary, ecology/evolution, organismal).
- Note that all courses in Biology and supporting areas must be completed with a grade of C or better.
- Note: transfer students must complete at least 19 credits of biology coursework at UNM.

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Proposed concentration WITH rationale for each component.

Title: **Ecology, Evolution, and Organismal Biology** (EEOB) concentration within our *existing* Biology Major (BS or BA)

Requirements and rationale for each are given below.

1. Successful completion of the four-course introductory sequence. Provides the foundation for further study in biology (16 credits).

BIOL 201L Molecular and Cell Biology	(4)	Fall, Spring
BIOL 202L Genetics	(4)	Fall, Spring
BIOL 203 & 203L Ecology and Evolution	(4)	Fall, Spring
BIOL 204 & 204L Plant and Animal Form and Function	(4)	Fall, Spring

2. Successful completion of upper division courses in *both* Ecology and Evolution. Provides a solid foundation and sufficient breadth in the field for further study of EEOB (6-7 credits, depending on whether lab is also taken).

•	BIOL 310L Principles of Ecology	(3)	Spring
•	BIOL 300 Evolution	(3)	

3. Successful completion of at least 1 taxonomic based course from among the following. Provides depth of knowledge and expertise with the biology of a group of organisms, familiarity with methodologies used in studying them and expertise with the systematics of classification (3-4 credits).

 BIOL 484/584 Biology of the Fungi 		(3)
 BIOL 450 General Virology 	(3)	Spring
 BIOL 463L Flora of New Mexico 	(4)	
 BIOL 482L Parasitology 	(4)	Spring
 BIOL 485L Entomology 	(4)	Spring
 BIOL 486L Ornithology 	(4)	Fall, alternative years
 BIOL 487L Ichthyology 	(4)	Fall
 BIOL 488L Herpetology 	(4)	Spring
 BIOL 489L Mammalogy 	(4)	Fall, alternate years

4. Successful completion of at least 1 synthetic/comparative taxonomic based course and lab from among the following. Provides a comparative perspective on a group of organisms (4 credits).

 BIOL 36oL General Botany 	(4)	Fall
BIOL 371L Invertebrate Biology	(4)	Fall
 BIOL 351L General Microbiology 	(4)	Fall, Spring
 BIOL 386L General Vertebrate Zoology 	(4)	Fall, Spring

5. Successful completion of at least 1 statistics course. Provides an introduction to the quantitative methods commonly used in EEOB research and tools for evaluating the scientific literature (3 credits).

•	STAT 145 Introduction to Statistics		(3)	Fall, Spring
•	STAT 345 Elements of Mathematical Statistic	cs and		
	Probability Theory		(3)	Fall, Spring
•	STAT 427 Advanced Data Analysis I	(3)	Fall	

- PSY 200 Statistical Principles (3)
- Or other course with prior approval from EEOB faculty advisory committee
- 6. Successful completion of at least 1 course from each of the following clusters:
 - A) Individual (Genes/Physiology)
 - B) Population (Behavior/Population biology)
 - C) Community/Ecosystems

for a total of 3 courses (9-12 credits). Graduate courses, indicated by an *, need instructor approval for undergraduate enrollment. Courses within each cluster are listed below. Provides a depth of understanding at multiple hierarchies of biological organization and exposes students to the techniques, methodologies and approaches used by these sub-disciplines (3 courses total; 9-12 credits). Graduate courses, indicated by an *, need instructor approval for undergraduate enrollment.

A) Individual (Genes/Physiology) Cluster

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•	BIOL 401 Topics: Microbial Genetics	(3)	Fall	
•	BIOL 435L Animal Physiology		(4)	Spring
•	BIOL 436L Phylogenetics		(4)	Spring
•	BIOL 437 Evolutionary Genetics	(3)	Spring	l
•	BIOL 460 Microbial Physiology		(3)	Spring
•	BIOL 471 Plant Physiological Ecology	(3)	Fall	
•	BIOL 478L Plant Physiology	-	_(4)	Spring
•	Or other course with prior approval from EEOB faculty	′	(3)	
	advisory committee			

B) Population (Behavior/Population Biology) Cluster

•	BIOL 409 Conservation Genetics	(3)		
•	BIOL 409 Sexual Systems in Animals: diversity and	evolution	(3)	
•	BIOL 455 Ethology: Animal Behavior	(3)		
•	ANTH 360 Human Behavioral Ecology	(3)		
•	ANTH 363. Primate Social Behavior	(3)		
•	ANTH 491 Population Genetics	(3)		
•	BIOL 491 Population Genetics			(3)
•	Or other course with prior approval from EEOB fac	ulty		(3)
	advisory committee			

C) Community/Ecosystem Cluster

BIOL 409 Topics: Ecology of Plant Microbe Syn	nbiosis (3)		
BIOL 451 Microbial Ecology		(3)	Fall
 BIOL 495 Limnology 		(3)	Spring
 BIOL 475 Plant Community Ecology 	(3)	Sprir	ıg
 BIOL 514* Ecosystem Studies 		(3)	Fall
 BIOL 511* Macroecology 	(3)	Sprir	ıg, alternate years
 BIOL 405 Ecosystem Dynamics 		(3)	Spring
 BIOL 419 Topics: Global Change Biology 	(3)	Fall	
 BIOL 535/EPS 535* Freshwater Ecosystems 		(3)	Spring
 Or other course with prior approval from EEOB 	faculty	(3)	
advisory committee			

7. Demonstration of significant hands-on experience in the field or research laboratory (o-4 credits). This can be achieved by one of the following:

• BIOL 400 Senior Honors Thesis (must be accepted into program)	(varies)	
BIOL 408L Bosque Internship	(4)	Fall, Spring, Summer
BIOL 409 Ornithological Field Expedition	(3)	varies
BIOL 461L Introduction to Tropical Biology	(4)	Spring
BIOL 463L Flora of New Mexico	(4)	
BIOL 496L Limnology Lab	(1)	
BIOL 499 Undergraduate Problems	(1-4)	
PSY. 450 Gorilla Observation	(3)	Fall, Spring, Summer
 Successful completion of an approved field course offered 		
at UNM or at another accredited institution		
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- Participation in a NSF REU program at UNM or elsewhere
- Other field experience with prior approval from EEOB faculty advisory committee
- 8. Successful completion of at least 1 interdisciplinary synthetic course. Because many pressing biological questions lie at the edges of disciplines, this will provide students with training in how science is integrated across disciplinary boundaries, and how tools from one discipline can be applied to others (3-4 credits). Graduate courses, indicated by an *, need instructor approval for undergraduate enrollment.

•	BIOL 324L Natural History of the Southwest	(4)	Fall
•	BIOL 379 Conservation Biology	(3)	Spring
•	BIOL 419 Topics in Interdisciplinary Science (e.g., Global Change Biology, Evolutionary Immunology,		
	Communicating Science to the Public, Intermediate Mathematical		
	Biology, Physiological Ecology, Paleo and Historic Ecology, etc.)	(3)	varies
•	BIOL 445 Biology of Toxins	(3)	Spring
•	BIOL 470 Biology: Discovery and Innovation	(3)	Spring
•	BIOL 490 Biology of Infectious Organisms	(3)	Spring, alternate years
•	BIOL 492 Introduction to Mathematical Biology	(3)	Fall
•	BIOL 494 Biogeography	(3)	Spring, alternate years
•	BIOL 495 Limnology	(3)	Spring
•	BIOL 535/EPS 535* Freshwater Ecosystems	(3)	
•	BIOL 518* Evolutionary and Ecological Genomics	(3)	
•	BIOC 423 Introduction to Biochemistry	(3)	
•	EPS 352 Global Climate Change	(3)	
•	EPS 439 Paleoclimatology	(3)	
•	BIOL 558/EPS 558* Geomicrobiology	(3)	
•	ANTH 350 Human Biology	(3)	Spring
•	ANTH 357 Human Origins	(3)	
•	Or other course with prior approval from EEOB faculty advisory committee	⁻ (3)	

9. Successful completion of at least one semester of the 'BrownBag' seminar. Provides exposure to state of the art research and training in critical evaluation (1-2 credits).

BIOL 402 Brown Bag	(1)	Fall, Spring
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10. Successful completion of additional Biology courses so the total number of biology hours is greater or equal to 48.

- 11. Successful completion of supporting courses in Math, Physics and Chemistry (24–27 hours).
 - Math: MATH 180 & 181 OR MATH 162 & 163

- Physics: PHYC 151 & 152 **OR** PHYC 160 & 161
- Chemistry: Either (CHEM 121 & CHEM 123L and CHEM 122 & CHEM 124L) or (CHEM 131L and CHEM132L)
- PLUS one semester of organic chemistry (CHEM 301 and CHEM 303L) or (CHEM 212 and CHEM 124L)

Notes:

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- Please verify that your coursework meets with the requirements for a BS in Biology. Specifically, coursework must include three 400-level courses from different categories, as identified in the catalog (cell/molecular, interdisciplinary, ecology/evolution, organismal).
- Note that all courses in Biology and supporting areas must be completed with a grade of C or better.
- Note: transfer students must complete at least 19 credits of biology coursework at UNM.

Justification for Ecology, Evolution and Organismal Biology (EEOB) concentration

Biology is a broad and diverse field. Currently, many of our students graduate without a clear program of study and may lack crucial courses that would allow them to pursue graduate training. By providing 'concentrations' within our BS degree, we can steer students towards courses of study that are directly applicable to specific careers or graduate training in particular areas. The concentration in 'Ecology, Evolution, and Organismal Biology' (EEOB) will provide students with a solid training in the tools and techniques used for the study of living things and their environment, as well as exposure to interdisciplinary approaches, a grounding in at least one taxonomic group and training at multiple levels of the biological hierarchy. This concentration would be particularly appropriate for students seeking additional graduate training in this area at UNM or elsewhere and for students seeking employment with federal, state, and municipal environmental agencies, non-governmental organizations, or environmental consulting firms. Given the seriousness of the many pressing environmental issues facing society providing formal training in EEOB will enhance the opportunities and jobs available for our undergraduates.

Impact on Long-range planning

None. We would hope that other concentrations will be developed in the future to direct students into other areas of biology that are growing, but that is beyond the scope of the current proposal.

Detailed Budget Analysis

There are no costs associated with this concentration. All the courses currently exist. We are simply suggesting the track a student would navigate through our offerings if they wanted to develop a robust degree in EEOB.

Faculty Workload Implications

None. A departmental committee will need to be established to oversee the concentration and provide advice for students. However, service on a committee is an expected part of the faculty workload so this will not add unduly to faculty responsibilities.

Justification for Ecology, Evolution and Organismal Biology (EEOB) concentration

Biology is a broad and diverse field. Currently, many of our students graduate without a clear program of study and may lack crucial courses that would allow them to pursue graduate training. By providing concentrations' within our BS degree, we can steer students towards courses of study that are directly applicable to specific careers or graduate training in particular areas. The concentration in 'Ecology, Evolution, and Organismal Biology' (EEOB) will provide students with a solid training in the tools and techniques used for the study of living things and their environment, as well as exposure to interdisciplinary approaches, a grounding in at least one taxonomic group and training at multiple levels of the biological hierarchy. This concentration would be particularly appropriate for students seeking additional graduate training in this area at UNM or elsewhere and for students seeking employment with federal, state, and municipal environmental agencies, non-governmental organizations, or environmental consulting firms. Given the seriousness of the many pressing environmental issues facing society providing formal training in EEOB will enhance the opportunities and jobs available for our undergraduates.

Impact on Long-range planning

None. We hope that this will be the first in a series of concentrations within the Biology degree, so that students can tailor their classes to more adequately prepare them for their long-term goals.

Detailed Budget Analysis

There are no costs associated with this concentration. All the courses currently exist. We are simply suggesting the track a student would navigate through our offerings if they wanted to develop a robust degree in EEOB.

Faculty Workload Implications

Modest.

This proposal requires that all students take the lecture section of Ecology (Biology 310). Depending on how many students elect to pursue the concentration, we may need to increase capacity in this course to prevent a bottleneck. The cap was previously set at 25 and the course was taught every other year. However, a new faculty in our department (Jennifer Rudgers) has taken over the course. The Ecology 310 lecture will now be offered every spring semester and is currently open to 50 students; Professor Rudgers has indicated that she is willing to increase capacity to 100 students, if needed. Moreover, she has submitted a Form C to separate the lecture (Biol 310) from the lab (Biol 310L). The lab will remain capped at 24, which is the maximum number that can be accommodated in vans; the lab is field-based. Please note that the lab is *not* required for the EEOB Concentration, and so will not be a bottleneck for students.

In addition, a departmental committee will need to be established to oversee the concentration and provide advice for students. However, service on a committee is an expected part of the faculty workload so this will not add unduly to faculty responsibilities.

Program Assessment

Assessment will occur within the context of the overall biology degree; these comprehensive plans are still being developed within the department. To specifically assess the effectiveness of the EEOB concentration itself, we will target the one course common to all students: Biology 310. The final exam in this course will include a set of 10 standardized questions that evaluate students' understanding of the fundamental principles of ecology. These questions will be on the final exam every semester and will be scored separately to provide a long-term record of student performance within the EEOB concentration. The 10 assessment questions will be developed collaboratively by Professor Rudgers and the departmental EEOB oversight committee.