General Education Review Committee
Agenda

April 10, 2009

Room Change: RH 207A

1:00 p.m. – 1:30 p.m.

I. Call to Order

Roll

( ) Erik Hirschman	Mat-Su/**UAB**	Social Sciences
( ) Mari Ippolito	CAS/**UAB**	
( ) Patricia Fagan	CAS	Humanities
( ) Robert Capuozzo	COE	
( ) Jack Pauli	CBPP	
( ) Jeane Breinig	CAS	Written Communication
( ) Len Smiley	CAS	Quantitative Skills
( ) Suzanne Forster	CAS/**UAB**	
( ) Robin Wahto	CTC/**UAB**	
( ) Walter Olivares	CAS	Fine Arts
( ) Bart Quimby	OAA	
( ) Catherine Sullivan	CHSW/**UAB**	
( ) Doug Parry/ Shawnalee Whitney	CAS	Oral Communication
( ) Jeff Miller	SOE	
( ) Karl Wing	USUAA	
( ) Hilary Davies	UAB Chair	

II. Approval of Agenda (pg. 1)

III. Approval of Summary (pg. 2)

IV. Report from Associate Vice Provost Bart Quimby

V. Chair's Report

VI. Course Action Requests

Add BIOL A489 Population Genetics and Evolutionary Processes (3 cr) (3+0) (pg. 3-8)

VII. Old Business

VIII. New Business

IX. Informational Items and Adjournment

General Education Review Committee
Summary

March 27, 2009
ADM 204
12:30 p.m. – 1:30 p.m.

I. Call to Order

Roll

(x) Erik Hirschman	Mat-Su/**UAB**	Social Sciences
(e) Mari Ippolito	CAS/**UAB**	
(x) Patricia Fagan	CAS	Humanities
(x) Robert Capuozzo	COE	
(x) Jack Pauli	CBPP	
(x) Jeane Breinig	CAS	Written Communication
(x) Len Smiley	CAS	Quantitative Skills
(x) Suzanne Forster	CAS/**UAB**	
(e) Robin Wahto	CTC/**UAB**	
(x) Walter Olivares	CAS	Fine Arts
(x) Bart Quimby	OAA	
(e) Catherine Sullivan	CHSW/**UAB**	
(x) Doug Parry/ Shawnalee Whitney	CAS	Oral Communication
( ) Jeff Miller	SOE	
( ) Karl Wing	USUAA	
(x) Hilary Davies	UAB Chair	

II. Approval of Agenda (pg. 1)
Approved

III. Approval of Summary (pg. 2)
Approved

IV. Report from Associate Vice Provost Bart Quimby

V. Chair's Report

VI. Course Action Requests

Chg CEL A450 Civic Engagement Capstone (3 cr) (2+2) (pg. 3-8)
Approved

Chg ACCT A452 Auditing (3 cr) (3+0) (pg. 9-14)
Approved

Chg JUST A251 Criminology (3 cr) (3+0) (pg. 15-19)
Approved

Add EDFN A304 Comparative Education (3 cr) (3+0) (pg. 20-26)
Approved

Chg BIOL A378 Marine Biology (3 cr) (3+0) (pg. 27-32)
Approved

VII. Old Business
VIII. New Business
IX. Informational Items and Adjournment

Curriculum Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course or Program of Study

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEU	5b. Contact Hours (Lecture + Lab)
BIOL	A489		3	(3+0)

6. Complete Course/Program Title
Population Genetics and Evolutionary Processes

Pop Genetics & Evol Processes
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action ☒ Course ☐ Program

☒ Add
☐ Change
(mark appropriate boxes)
☐ Delete

☐ Prefix
☐ Credits
☐ Title
☐ Grading Basis
☐ Course Description
☐ Test Score Prerequisites
☐ Other Restrictions
☐ Class ☐ Level
☐ College ☐ Major
☒ Other Capstone status.

☐ Course Number
☐ Contact Hours
☐ Repeat Status
☐ Cross-Listed/Stacked
☐ Course Prerequisites
☐ Co-requisites
☐ Registration Restrictions

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2009 To: /9999

12. ☐ Cross Listed with
☐ Stacked with
Cross-Listed Coordination Signature

13. List any programs or college requirements that require this course
BA-Biological Sciences, BS-Biological Sciences majors, Biology minors; BS-Natural Sciences majors; Environmental Science minors.

14. Coordinate with Affected Units: UAA Faculty ListServ, UAA Deans & Directors.
Department, School, or College
Initiator Signature Date

15. ☒ General Education Requirement
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

16. Course Description
A comprehensive examination of the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics.

17a. Course Prerequisite(s) (list prefix and number)	17b. Test Score(s)	17c. Co-requisite(s) (concurrent enrollment required)
BIOL A252 or BIOL A308.	n/a.	n/a.

17d. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

17e. Registration Restriction(s) (non-codable)
Senior standing; completion of all GER Tier 1 and 2 courses is required.

18. ☐ Mark if course has fees

19. Justification for Action
New UAA GER Integrative Capstone course. This is a key course in the Biological curriculum which has not been offered until now. The advanced approach to understanding evolutionary patterns and processes requires an integration of critical concepts of genetics, ecology, evolutionary biology, molecular biology, human biology and anthropology, statistics and applied mathematics. Students will emerge with an understanding of how population-level evolutionary processes, ecology, and the natural world are linked.

UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Implementation Date: Fall 2009.

II. Course Information:

A.	**College:**	College of Arts and Sciences.
B.	**Course Subject/Number:**	BIOL A489.
C.	**Course Title:**	Population Genetics and Evolutionary Processes.
D.	**Course Description:**	A comprehensive examination of the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics.
E.	**Credit Hours:**	3.0.
F.	**Contact Hours:**	3 + 0.
G.	**Grading Basis:**	A-F.
H.	**Status of Course Relative to Degree Program:**	BA-Biological Sciences, BS-Biological Sciences majors, Biology minors, BS-Natural Science majors; Environmental Science minors.
I.	**Course Fees (Yes/No):**	No.
J.	**Lab Fees (Yes/No):**	No.
K.	**Coordination:**	UAA Faculty ListServ, UAA Deans & Directors.
L.	**Prerequisites/Corequisite:**	Prerequisite: BIOL A252 or BIOL A308. Corequisite: N/A.
M.	**Registration Restrictions:**	Senior Standing; completion of all GER Tier 1 and 2 courses is required.
N.	**Course Attributes:**	UAA GER Integrative Capstone.

III. Course Activities:

This is primarily a lecture course meetings 3 hours per week for 15 weeks. Students are required to read, research and synthesize information from the primary literature and other sources to cover a topic of their choice related to quantitative understanding of microevolutionary processes. This research will be presented by students to the class.

IV. Evaluation:

Course grading is A-F. The evaluation methods, while at the discretion of the faculty member teaching the course, may include written lecture exams, reading and interpreting selected primary literature, and presentation of a paper in microevolution.

V. Course Level Justification:

Course Level Justification:
Students are required to learn and integrate information from a variety of scientific disciplines as it relates to applied genetics, advanced evolutionary analysis, and microevolutionary proesses; to read, understand, and apply ideas conveyed by primary scientific literature; to synthesize current biological knowledge and evolutionary theory; and

to apply course materials to current problems.

GER Integrative Capstone Justification: Justifications for designating BIOL A489 Population Genetics and Evolutionary Theory as a GER Integrative Capstone course include:

1. Knowledge Integration/Interrelationships and Synergy Among GER Disciplines: The overall theme of the course is understanding the relationship of evolutionary processes to other natural and social sciences. The course will focus on the interfaces among physical sciences (biochemistry, geological history, mathematics), biological sciences (biology, ecology, conservation, molecular biology, etc.), and the social sciences (particularly human biology, sociology, anthropology).

2. Effective Communication Skills: Course success demands effective communication through essay examinations, individual classroom presentations, brief reports (oral and written) on current controversies surrounding evolution and evolutionary processes, and a final research product.

3. Critical Thinking: Students will succeed when they are able to integrate information across disciplines, and critically evaluate the reliability of data and positions presented in lecture, texts, scientific, and popular viewpoints. Student ability to critically evaluate diverse material will be determined based on writing assignments, class presentations, and examinations.

4. Information Literacy: Students are expected to achieve and demonstrate computer and internet skills for acquiring information relevant to current topics in evolutionary biology. This will involve research in the primary scientific literature, and the collection of information from unpublished sources such as popular press and public statements. Students will be required to show that they can critically winnow facts and scientific content from diverse, non-scientific sources.

5. Quantitative Perspectives: A critical understanding of evolutionary processes is grounded in many quantitative disciplines, including statistical analysis, applied maths (algebra, calculus, probability and combinatorics, etc.), general and advanced genetics, molecular biology. In addition, students must be able to read and interpret scientific data in graphical and tabular form, and to generate appropriate graphical displays of their own results. Microevolutionary analysis is only possible using sophisticated computer-based analytical techniques including: Bayesian analysis, Monte Carlo simulation, maximum likelihood analysis, and discrete graph analysis. Exams will specifically test on these skills.

6. Evolving realities of the 21st century: The growing understanding that evolution is a dynamic and everpresent component of modern life, particularly in the context of climate change and anthropogenic change, touches many aspects of science, policy, and social attitudes. This course will help students understand the implication of evolutionary process in a changing environment, and provide them with effective means to communicate its importance and relevance for individuals and society.

VI. Course Outline:

1.0 Population structure
    1.1 Hardy-Weinberg equilibrium
    1.2 Systems of mating I
    1.3 Demographics
    1.4 Genetic drift
    1.5 Neutrality and molecular evolution
    1.6 Coalescence
    1.7 Gene flow & subdivision
    1.8 Founders and survivors
    1.9 mtDNA, Y.DNA: Separating history from gene flow
2.0 Genotype and phenotype
    2.1 Quantitative genetics: means
    2.2 Quantitative genetics: variances
    2.3 The unmeasured genotype approach
    2.4 The measured genotype approach
3.0 Selection
    3.1 Measures of fitness
    3.2 Constant fitness models
    3.3 Selection on quantitative traits & FFTNS
    3.4 Pleiotropy and developmental constraints
    3.5 The shifting balance theory
4.0 Units and targets of selection
    4.1 The unit of selection
    4.2 Meiotic and molecular drive
    4.3 Sexual, frequency & density dependent selection I
    4.4 Asexual selection, lateral gene transfer
5.0 Ecological genetics
    5.1 Environmental heterogeneity
    5.2 Niche and mimicry
    5.3 Coevolution and host-parasite systems
    5.4 Life history evolution
6.0 Human evolution and sociobiology
    6.1 Hominid evolution
    6.2 Altruism and group selection
    6.3 Cultural evolution

VII. Instructional Goals and Student Outcomes:

A. The instructor will:

- Provide a basic description of evolutionary theory and concepts.
- Build on the conceptual framework to describe how evolutionary process results in evolutionary pattern.
- Link current research on microevolutionary processes relate to observed responses to environmental and climate change.
- Emphasize the underlying quantitative processes that structure the living world, and enable students to undertake analyses and conceptualization of processes on their own.
- Provide detailed examples of modern evolutionary analysis and theory as mechanisms of biotic change and diversification.
- Relate all of the above to current issues in local and national debate on endangered

populations, relevance of evolution thought to modern life (evolutionary medicine, emerging disease and virulence, endangered species, etc.).

- Assist students to learn how to evaluate and integrate information from a variety of sources and perspectives.

B. Student Outcomes:

Students will be able to:	Assessment Method
Describe evolutionary process, microevolution mechanisms, macroevolutionary patterns, linking concepts of individual and population dynamics, biological processes, and applied genetics.	Exams and written assignments.
Integrate information from scientific articles with that provided in lecture and textbook assignments, and to use this information to evaluate the scientific accuracy of reports from the popular press or public science.	Exams, written assignments, in-class presentations.
Communicate principles of evolutionary biology and the role of evolution in modern life.	Written assignments, in-class presentations.

VIII. Suggested Text(s):

Freeman, S. & J. C. Herron. 2007. *Evolutionary Analysis*. 4th Ed. Benjamin Cummings.

Ridley, M. 2004. Evolution. 2nd Ed. Oxford University Press

Templeton, A. 2007. *Population Genetics and Microevolutionary Theory*. 2nd Ed. Wiley-Liss.

IX. Bibliography:

In addition to textbook assignments, an extensive list of current literature from scientific journals is utilized for this course and available on Blackboard. Contact Douglas Causey (afdc, or 6-1310) for more information.

Arnold, S. J., R. Burger, P. A. Hohenlohe, B. C. Ajie, and A. G. Jones. 2008. Understanding the evolution and stability of the G-matrix. *Evolution* 62:2451-2461.

Depew, D.J. & B.H. Weber. 1996. *Darwinism Evolving: Systems Dynamics and the Genealogy of Natural Selection.* The MIT Press.

Excoffier, L., P.E. Smouse, & J. M. Quattro. 1992. Analysis of molecular variance inferred from metric distances among DNA haplotypes: application to human mitochondrial DNA restriction data. *Genetics* 131:479-491.

Fu, R., A.E. Gelfand & K.E. Holsinger. 2002. Exact moment calculations for genetic models with migration, mutation, and drift. *Theoretical Population Biology* 63:231-243.

Harpending, H C., M. A. Batzer, M. Gurven, L. B. Jorde, A. R. Rogers & S. T. Sherry. 1998. Genetic traces of ancient demography. *Proceedings of the National Academy of Sciences USA* 95:1961-1967.

Jordan, S., C. Simon, D. Foote & R. A. Englund. 2005. Phylogeographic patterns of Hawaiian Megalagrion damselflies (Odonata: Coenagrionidae) correlate with Pleistocene island boundaries. *Molecular Ecology* 14:3457-3470.

Lubell, J. D., M. H. Brand, J. M. Lehrer & K. E. Holsinger. 2008. Detecting the influence of ornamental Berberis thunbergii var. atropurpurea in invasive populations of Berberis thunbergii (Berberidaceae) using AFLP. *American Journal of Botany* 95:700-705.

Pamilo, P. & M. Nei. 1988. Relationships between gene trees and species trees. *Molecular*

Biology & Evolution 5:568-583.
Templeton, A.R. 2004. Statistical phylogeography: methods of evaluating and minimizing inference errors. *Molecular Ecology* 13:789-809
Visscher, P. M., W. G. Hill & N. R. Wray. 2008. Heritability in the genomics era -- concepts and misconceptions. *Nature Reviews Genetics* 9:255-266
Weir, B.S. & C. C. Cockerham. 1984. Estimating F-statistics for the analysis of population structure. *Evolution* 38:1358-1370.