BIOL 421
Conservation Genetics

Fall Term (2013-14)

CALENDAR DESCRIPTION

This course will explore genetic aspects of conservation, addressing questions such as: How is genetic variation lost? Can loss of genetic variation result in extinction? How much genetic variation is 'enough' for population viability? Can loss of genetic variation be prevented? How do we define management units for conservation? And is hybridization a problem or a benefit for conservation?

LEARNING HOURS 120 (24L;24T;72P). PREREQUISITE BIOL 243/3.0 or PSYC 202/3.0 or STAT 263/3.0 or STAT 269/3.0. COREQUISITE BIOL 302/3.0 or BIOL 303/3.0. EQUIVALENCY *BIOL 310/3.0.*

SCHEDULE

Lectures: Tuesday 15:30-16:30, Thursday 14:30-15:30. BIOSCI 1102.
Tut: Tuesday 11:30-14:30. BIOSCI 1341 or NICOL 321.

Instructor	**Dr. V. Friesen**
Instructor Contact	vlf@queensu.ca Phone: 613-533-6156
Office Hours	By chance or appointment
TA:	Anna Tigano/Rebecca Taylor
TA Contact Information	613-533-6000 x 75539
Office Hours	By chance or appointment

Learning Objectives

The goals of Biol421 are to familiarize students with 1) general genetic principles fundamental to the conservation of biodiversity, 2) current research and controversies in conservation genetics, 3) practical skills in the analysis and interpretation of conservation genetic data, and 4) the interface between conservation genetics, economics, policy and ethics. Students will also develop skills in oral presentation/discussion, scientific writing, critical thinking, data management, and computer analysis.

As the field of conservation biology grows, several specialized subdisciplines are forming. Conservation genetics is a relatively new field of research at the interface of conservation biology, and ecological and evolutionary genetics. The expansion of this field of research, and its importance in conservation, are evidenced by the recent initiation of a scientific journal ('Conservation Genetics'), the hiring of research chairs in conservation genetics at many universities and government offices worldwide, and the solicitation of conservation geneticists on decision bodies such as the Committee on the Status of Endangered Wildlife in Canada. The course is intended to familiarize students with both the fundamentals of conservation genetics, and state-of-the-art research in the field. This course will address questions such as How is genetic variation lost? Can loss of genetic variation result in extinction? How much genetic variation is 'enough' for population viability? Can loss of genetic variation be prevented? How do we define management units for conservation? And is hybridization a problem or a benefit for conservation?

Learning Hours

Teaching method		*Average hours per week*	*Number of weeks*	*Total hours*
In-class hours	Lecture	2	12	24
	Seminar			
	Laboratory			
	Tutorial	3	12	36
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity			
	Off-campus activity			
	Private study			60
Total hours on task				120

Course Outline

The lecture component of the course will comprise three parts: The first approx. 4 weeks will entail GUTS ('getting up to speed'), a review of general concepts of molecular, Mendelian, population and evolutionary genetics that are germane to conservation: mutation; the Hardy Weinberg theorem and its assumptions; genetic drift; genetically effective population size; natural selection; gene flow and population differentiation; and quantitative genetics. The middle approx. 6 weeks of lectures will focus on genetic concerns in the conservation of biodiversity, especially the application of basic theory to declining populations: inbreeding depression; the relationship between neutral genetic variation and fitness; genetic variability and population viability; effects of population fragmentation on gene flow; defining and prioritizing population units for conservation; conservation implications of hybridization; the genetic considerations of captive breeding. The final approx. 2 weeks will provide examples of how genetic tools can aid non-genetic problems in conservation: e.g., disease; adaptation to anthropogenic changes; alien invasions and climate change. Students also will be exposed to current research in conservation genetics through guest lectures.

Tutorials will involve exercises to help students master the fundamentals of conservation genetics through a combination of practical exercises, discussions and student seminars.

The lecture and tutorial schedule are provided on the course website.

Textbooks/Readings

Allendorf et al., 2013, Conservation and the Genetics of Populations, 2nd ed. Blackwell.

Grading Scheme

Component	**Weight (%)**	**Date**
Take-home quiz	5%	Week 2
Midterm test	15%	Week 5
Final exam	40%	Exam period
Tutorial exercises	40%	Weeks 1-12

Grading Method

• All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale.

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

Academic Integrity and Queen's Code of Conduct

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 - http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations, on the Arts and Science website (see http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity), and at Biology's website (http://www.queensu.ca/biology/undergrad/integrity.html) and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulations on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Accommodation Policy, Exam Conflicts, and Other Conflicts

Students who feel they need accommodations for disabilities or extenuating circumstances, or have a conflict between exams or other commitments should consult the Biology Department's website for details about how to proceed (http://www.queensu.ca/biology/undergrad/integrity.html). In general, the earlier a course coordinator is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when it is possible to do so.

Students may apply to write a make-up or deferred exam if they have an exam conflict as defined in the Academic Regulations of the Faculty (See Arts and Science Calendar Regulation 8 - http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations). In this case, the

student should report to the Exams Office first to verify that there is a genuine exam conflict. Biology professors will not consider your situation to be a conflict unless it meets the criteria set out by the Faculty of Arts and Sciences.

Students may request a make-up or deferred exam if they have an exam conflict with off-campus travel associated with a field course (e.g BIOL-307/3.0 or 407/3.0) that is held during the fall or winter terms.

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Accommodation of Disabilities

Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: http://www.queensu.ca/hcds/ds/