

**Faculty of Science Course Syllabus**  
**Department of Biology**  
*BIOL 3042/MARI 3042*  
*Molecular Ecology*  
*Fall 2016*

**Instructor(s):** Daniel Ruzzante      [daniel.ruzzante@dal.ca](mailto:daniel.ruzzante@dal.ca)      LSC 4045  
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**Lectures:**      *10:05-11:25 Tue/Thu*      *Location* LSC-COMMON AREA C334

**Laboratories:** 0

**Tutorials:** 0

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*Submit course syllabus to your Depart office for posting on the Dept website prior to the start of term*  
*Submit requests for final exam exemptions to the Dean's office at least 2 weeks prior to the start of term*

### **Course Description**

We survey techniques of molecular genetic analysis and consider how they can be used to identify species, populations, sexes, individuals and family relationships, and study population attributes such as historical dispersal, contemporary connectivity, mating behaviour and effective population size. Evaluation is based on assignments, a test and a final exam.

### **Course Prerequisites**

A grade of B- or better in each of [BIOL 2030.03](#) (or [GENE 2000.03](#)), [BIOL 2040.03](#), and [BIOL 2060.03](#).

### **Course Objectives/Learning Outcomes**

Understand main concepts in population genetics (Hardy-Weinberg Equilibrium, genetic drift, effective population size, inbreeding depression)

Familiarity with molecular markers and methods used in population genetics, molecular ecology, phylogeography, landscape genomics.

Familiarity with applications of molecular ecology, such as wildlife forensics, conservation biology and invasive species.

### **Course Materials**

- *No required text*

## Course Assessment

Component	Weight (% of final grade)	Date
<i>Quizzes (10)</i>	10%	<i>every other lecture for most of semester</i>
<i>Test (midterm)</i>	15%	<b>October 18, 2016</b>
<i>Final exam</i>		<i>(Scheduled by Registrar)</i>
<b>Assignments</b>		
1. <i>Microsatellite primer design – 5%</i>		<i>due Sept. 29</i>
2. <i>Basic population genetics – 5%</i>		<i>due Oct. 13</i>
3. <i>Effective population size – 10%</i>		<i>due Nov. 3</i>
4. <i>Model-based clustering – 10%</i>		<i>due Nov. 22</i>
5. <i>DNA sequence analysis – 10%</i>		<i>due Dec. 1</i>

## Other course requirements

N/A

## Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

## Course Policies

**Late assignments are penalized at a rate of 10% per day.  
Missed exams will require a doctor's note.**

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## Course Content

- What is Molecular Ecology, reasons for studying genetic variation
- Genetic markers : allozymes; begin lab methods - PCR
- Neutral Evolution: HWE, drift, effective pop size
- Lab methods: quantitative & reverse transcription PCR, DNA sequencing
- Genetic markers: microsatellites
- Population subdivision, F-statistics & gene flow
- Population subdivision: Model based clustering

- Inbreeding, inbreeding depression, purging
- Inbreeding, population fragmentation, demography
- Local Adaptation Qst/Fst
- genetic markers: mtDNA, phylogenetic analysis
- Barcoding and study of biodiversity
- Phylogeography: bridge between phylogenetics and population genetics
- Landscape genetics, case studies
- Forensics and management
- Case studies
- Next Generation DNA sequencing, metagenomics
- The evolution of molecular ecology methods: from allozymes to SNPs & RAD
- Invasive species
- Conservation Breeding and restoration

### **Prerequisites**

A grade of B- or better in each of BIOL 2030.03 (or GENE 2000.03), BIOL 2040.03, and BIOL 2060.03.

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### **ACCOMMODATION POLICY FOR STUDENTS**

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

[http://www.dal.ca/dept/university\\_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html](http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html)

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the **Request for Accommodation** form are available at [www.dal.ca/access](http://www.dal.ca/access).

### **ACADEMIC INTEGRITY**

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's **Policy on Intellectual Honesty** and **Faculty Discipline Procedures** is available here:

[http://www.dal.ca/dept/university\\_secretariat/academic-integrity/academic-policies.html](http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html)

## **STUDENT CODE OF CONDUCT**

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

“The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.”

The full text of the code can be found here:

[http://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

**SERVICES AVAILABLE TO STUDENTS**

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

<b>Service</b>	<b>Support Provided</b>	<b>Location</b>	<b>Contact</b>
<b>General Academic Advising</b>	Help with <ul style="list-style-type: none"> <li>- understanding degree requirements and academic regulations</li> <li>- choosing your major</li> <li>- achieving your educational or career goals</li> <li>- dealing with academic or other difficulties</li> </ul>	<b>Killam Library Ground floor</b> Rm G28  <b>Bissett Centre for Academic Success</b>	In person: Killam Library Rm G28  By appointment: <ul style="list-style-type: none"> <li>- e-mail: <a href="mailto:advising@dal.ca">advising@dal.ca</a></li> <li>- Phone: (902) 494-3077</li> <li>- Book online through MyDal</li> </ul>
<b>Dalhousie Libraries</b>	Help to find books and articles for assignments  Help with citing sources in the text of your paper and preparation of bibliography	<b>Killam Library Ground floor</b>  Librarian offices	In person: Service Point (Ground floor)  By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: <a href="http://dal.beta.libguides.com/sb.php?subject_id=34328">http://dal.beta.libguides.com/sb.php?subject_id=34328</a>
<b>Studying for Success (SFS)</b>	Help to develop essential study skills through small group workshops or one-on-one coaching sessions  Match to a tutor for help in course-specific content (for a reasonable fee)	<b>Killam Library 3<sup>rd</sup> floor</b>  Coordinator Rm 3104  Study Coaches Rm 3103	To make an appointment: <ul style="list-style-type: none"> <li>- Visit main office (Killam Library main floor, Rm G28)</li> <li>- Call (902) 494-3077</li> <li>- email Coordinator at: <a href="mailto:sfs@dal.ca">sfs@dal.ca</a> or</li> <li>- Simply drop in to see us during posted office hours</li> </ul> <b>All information can be found on our website: <a href="http://www.dal.ca/sfs">www.dal.ca/sfs</a></b>
<b>Writing Centre</b>	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) <ul style="list-style-type: none"> <li>- Learn to integrate source material into your own work appropriately</li> <li>- Learn about disciplinary writing from a peer or staff member in your field</li> </ul>	<b>Killam Library Ground floor</b> Learning Commons & Rm G25	To make an appointment: <ul style="list-style-type: none"> <li>- Visit the Centre (Rm G25) and book an appointment</li> <li>- Call (902) 494-1963</li> <li>- email <a href="mailto:writingcentre@dal.ca">writingcentre@dal.ca</a></li> <li>- Book online through MyDal</li> </ul> We are open six days a week  <b>See our website: <a href="http://writingcentre.dal.ca">writingcentre.dal.ca</a></b>