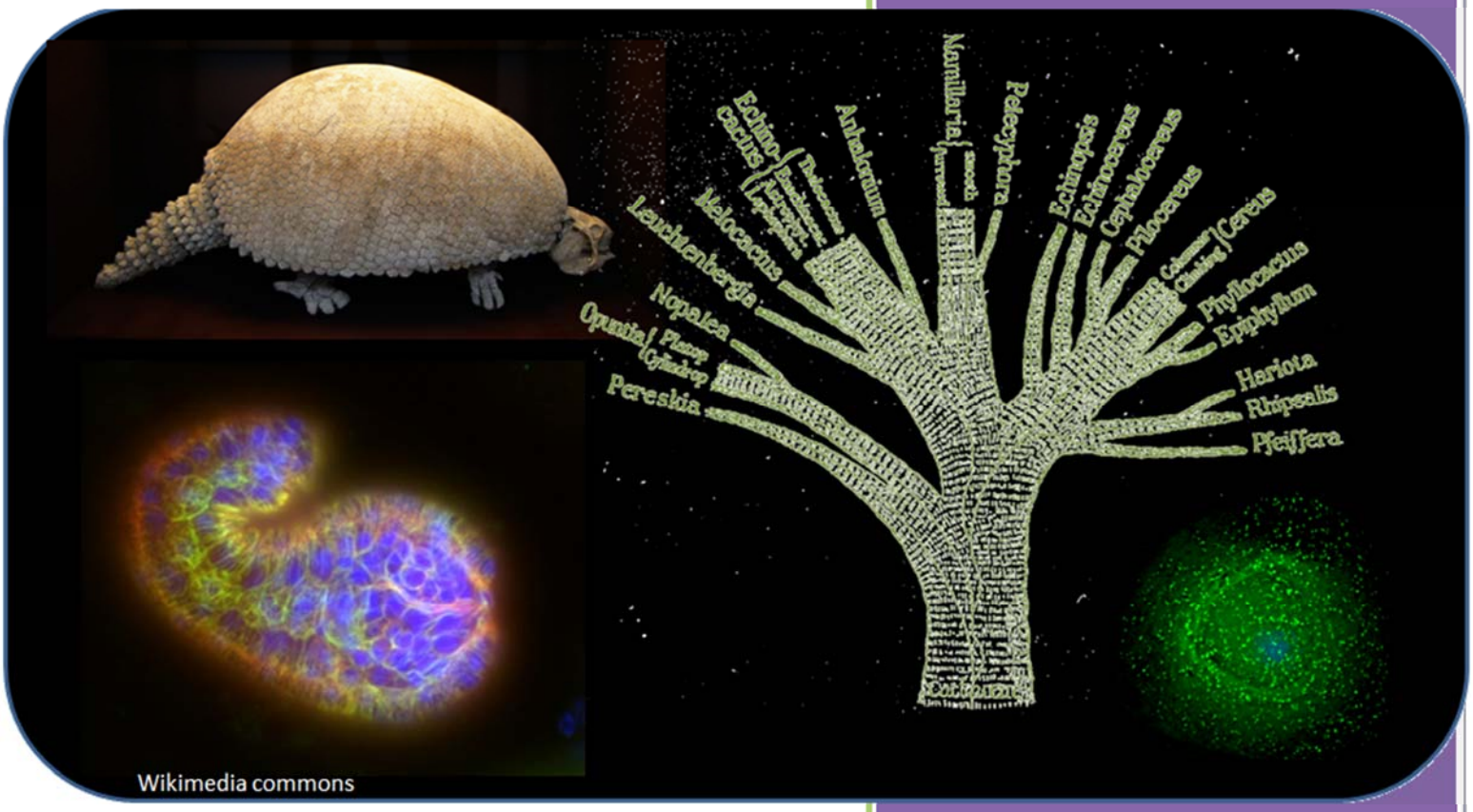
Winter 2018 Syllabus

BIO B51: Evolutionary Biology



Professor M. Andrade

UTSC

Course Overview

Evolutionary Biology is the study of the diversity, relationships, and change over time in organisms at all scales of organization (from populations to higher taxonomic groups). The theory and principals of evolutionary biology give critical insight into a wide range of fields, including conservation, medicine, pathogenesis, community ecology, and development.

This lecture-based course will give you a firm grounding in modern Evolutionary Biology. Course material reinforces the logic and methods that underlie this field, illustrates these with key historical and modern research studies, and makes clear the importance of links to other areas of Life Sciences. This course assumes an introductory-level knowledge of Evolution.

Learning Outcomes

At the conclusion of this course, you will:

1. understand the basic principles of Evolutionary Biology, and be able to outline links between mechanisms of evolutionary change and patterns of diversity within as well as across species.
2. appreciate and be able to suggest appropriate methodologies and approaches for testing predictions arising from hypotheses in different areas of Evolutionary Biology.
3. be able to explain how Evolutionary Biology links to all other fields of Biology.

SUBJECT-SPECIFIC KNOWLEDGE

4. be able to make logical inferences from a variety of different types of data, and evaluate how well or poorly a given dataset supports an argument or assertion
5. be able to identify, read and evaluate scientific research papers from the primary literature
6. understand how to motivate, support and engage in productive collaborative work

GENERALIZABLE COMPETENCIES

Course Personnel: Contact

Professor: Maydianne Andrade
biob51@utsc.utoronto.ca
Office hours held in **AC254** (library study room)
- Wednesdays 2pm to 4pm

TA support:
Poster Assignment TA: Ahmed Elbassiouny
Office hours: TBA
Term test & quiz TA: Monica Mowery
Office hours: TBA
Email & Marking TA: Catherine Scott
Marking TA: Nishant Singh

Course Coordinator: Jennifer Campbell
jacampbell@utsc.utoronto.ca
Office: SW421D

Office hours:
Monday 10:00 a.m. – 11:00 a.m.
Tuesday 2:00 p.m. – 3:00 p.m.
Wednesday 2:00 p.m. – 3:00 p.m.
Thursday 10:00 a.m. to 11:00 a.m.

Course Materials

All course information, the course schedule & syllabus is on the Blackboard homepage.

Lectures: **AC223**

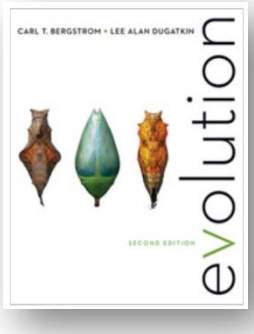
- **Tuesdays 10am – 11am** (WebOption post: Wednesdays)
- **Thursdays 10am – 11am** (WebOption post: Fridays)

***Tutorials*:* AC223**

- **Thursdays 5pm – 7pm**
- **Dates: Jan. 18, Jan 25, Feb 8, Mar 8, Mar 22, Mar 29, April 5**
- ***you MUST be able to attend tutorials***

Always consider the **GOLDEN RULE OF BIG CLASSES:**
If *everyone* needs to know something, it will be on the course homepage! **Look there FIRST!**

Required text:
CT Bergstrom & LA Dugatkin Evolution 2nd edition. WW Norton. ISBN: 978-0-393-61440-4



Readings in support of lecture material are on the course schedule. You should ensure that you UNDERSTAND everything you read, KNOW the theory and examples outlined in lecture and videos and ensure you can follow the additional examples given in the textbook.

Lecture slides will be posted on the course homepage as pdf files by the night prior to the lecture to allow you to fill in details or refer to figures/tables/references.

Taking your own notes is ESSENTIAL to success in this course.

All lectures will be available as online WebOption webcasts, linked to the blackboard homepage. The lectures are the intellectual property of Prof. Andrade, and are intended to be watched online only. The lectures are posted 24 hours after the lecture is recorded. ***WebOption lectures will be available throughout the term; they will not be removed until after the final exam.***

Note that BIOB51 personnel do not administer the WebOption webcasts, and do NOT have copies of the digital files of lectures. Any questions about the WebOption should be directed to the contacts listed on the WebOption homepage (http://lecturecast.utsc.utoronto.ca/).

I need help!
Who do I contact?

1. The Blackboard homepage should be your first stop for ALL questions.

2. Course Content questions

e.g., "I need help with: lecture content, practice problems, video content, understanding the readings."

Ask Prof Andrade

- office hours
- discussion board
- email (biob51@utsc.utoronto.ca)

3. Course Administration questions

e.g., I missed/will miss the term test, I have a medical note, I want to register an AccessAbility accommodation, I missed an assignment deadline

Ask the Course Coordinator: Jennifer Campbell
jacampbell@utsc.utoronto.ca

Attendance at lectures is optional, but knowing the material AS PRESENTED IN LECTURES (NOT just the text on the slides) is MANDATORY for success in this course.

This can be done through in-person attendance OR watching lectures online.

Only **you** can determine the best way to succeed.

If you use WebOption exclusively, SCHEDULE a time to watch the lectures each week and D*O NOT PROCRASTINATE!*

Announcements: It is YOUR responsibility to be aware of announcements made in class in a timely way. Major announcements will be posted on Blackboard, and reminders will be on the first slide presented in class. **Be sure to CHECK the homepage AND your University of Toronto email account each week to read the announcements.**

Aids to Understanding: Quizzes & Practice problems

A. Examinable Videos & Quizzes.

Videos that complement and expand on the lecture material will be made available on the Blackboard homepage (see 'Content' link). ***These contain examinable material.***

You will watch two types of examinable videos:

1. **Evolution! Documentaries**. (2). These are full-length films --'oldies but goodies'-- which are excellent reviews of some particular area of Evolutionary biology. The examples used are classics.
2. **Lock it in! Evolution-Shorts.** (2) These brief films expand on research in one particular system that is relevant to lecture material and emphasize why the example is important to Evolutionary Biology. These are intended to 'Lock in' your understanding of lecture material.

Quizzes. There will be a blackboard quiz associated with each of these videos, which will contribute to your final grade (see 'Evaluation') and highlight the examinable material from each video. Each quiz must be completed as outlined on the schedule, ***usually*** ~1 week after it is assigned (see schedule for specific dates). An answer key for each quiz will be posted after it is due and can be used as a study guide for the video materials.

B. Practice Problems

Three problem sets will be posted on Blackboard during the term. Two of these must be submitted through blackboard and will contribute to your final grade (see 'Evaluation'). These problem sets are study tools that test your understanding prior to the term tests & the final exam. They are due by the date/time listed on the schedule. Answers will be posted after the practice problems are due.

Tip for success in this course:

Take the practice problems seriously. Do ALL of them. This is like getting marks for studying!

Quiz & Problem set marking: **Quizzes and practice problem sets will be graded as pass/fail only.**

A **pass (and full marks)** requires that you submit a **reasonable attempt** at answering **every question** (whether it is correct or not) by the due date/time. You may complete quizzes and practice problem sets in multiple sessions. If you do this, be sure to save your answers after each session ('save answer' as you complete each one and/or 'save all answers' when you are finished with a work session). When you are done, you must click 'save and submit'

(ONLY when you are ready to submit and then 'ok' to confirm your submission). Assignments are due by 11pm on the posted due date.

Quiz & Problem set Group Work/Collaborators: Working with others in a study group can be an effective way of exploring your understanding of material. If your preferred learning style involves discussing questions or a video with classmates, that is fine. Note the following mandatory rules however: (1) you must declare the full names of your collaborators on the assignment (the last option on each assignment provides this opportunity); (2) while you may discuss questions/problems, **you MAY NOT write the answers collaboratively**. Written answers to questions and the actual calculations **must** be done independently. Collaboratively written answers are a form of plagiarism, and a violation of the academic code (see below).

Other Aids to Understanding

C. Prof Andrade's Office hours (drop-in, AC254) Wednesdays, 2pm to 4pm

Feel free to use my office hours as a study group. This is a great chance to get help, discuss the material, or just think about questions other students are asking. Course content questions may also be submitted to the discussion board or by email (biob51@utsc.utoronto.ca).

Tip for success in this course:

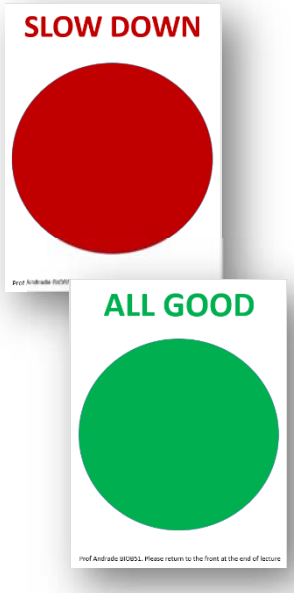
Make time for office hours or post to the discussion board if you need help!

D. Discussion board

This is an excellent way to connect with your classmates and me, seek input on your understanding of class material, or consider connections between material brought up in class or the textbooks and current events or material in other classes**. There are two discussion boards, one for student communication with each other (I will not comment on discussions on this board), and one which directs comments/questions to me (although students are also welcome to comment on this board as well).** As always, inclusive and civil discussion conforming to the Academic code of conduct is expected. Disagreements and challenging opinions are welcome, but personal attacks or disparagement of others are not acceptable.

E. Textbook materials

Purchase of the textbook includes an e-book which is linked to the BB page. Study tools provided by the textbook are also available on Blackboard. These include chapter quizzes, flash cards, and animations. Chapter quizzes are not collected for marks, but you are free to use them to test your understanding.



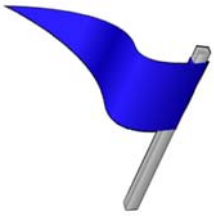
F. Supporting your mastery of academic English

The academic English used in science texts (and by Professors) tends to be concise with complex grammar that can make it challenging to interpret. Academic English is new to most students in University. If you want help mastering scientific texts, consider taking the free, 20-minute, confidential, **Academic English Health Check (AEHC)** (sign up here) and use the free support available at the English Language Development Centre to support your learning.

I tend to speak relatively quickly, but in the past, students have been reluctant to let me know when I should slow down. To reduce the stress associated with real-time feedback, I will implement a 'traffic light' system in which randomly chosen students will be asked to give feedback by holding up Red or Green 'traffic lights' when I request a 'lecture speed check'. Learn more about this in class. WebOption videos also provide the opportunity to replay unclear sections of lectures, and questions on the Discussion Board will allow interactive answers to your questions which can be reviewed at your own pace.

G. Flagging disagreements

No textbook is perfect. I chose a book that has a good balance of well-presented content, good online learning tools, and a reasonable price. But in some cases, I disagree with the definitions or explanations provided by your textbook. I will make it clear where I disagree with the textbook, and you are responsible for the material as I teach it. This will be flagged in lecture, in notes posted in the e-book, and as a pdf printout of e-book notes that indicate relevant sections.



I require that you understand and learn my approach to course topics/definitions; this is what you should know for the term test and exam in this course.

As always, you are welcome to come to office hours to discuss/debate any of these points.

Evaluation

Item	Value
Quizzes (5): • 'Lock it in' Evo-shorts 1 & 2 • Evolution! Documentaries 1 & 2	 1% (0.5% each) 2% (1.0% each)
Practice Problem sets 1 & 3 (Practice problem set 2 = not for marks)	4% (2% each)
Integrative Biology Poster Assignment	10%
Term test (Tentative date: Feb 16)	33%
Final exam (comprehensive)	50%

H. Integrative Biology Poster Assignment

In this assignment, you will develop your scientific communication skills by working with a group of peers (collaborators) to create an informative scientific poster which you will present to your peers, professors, and TA's in a poster session modelled on those held at most major scientific conferences. A major goal of this assignment is to recognize and highlight the links between different fields of study in the Biological Sciences. Your poster will explore a topic or question in biology for which insight can be gained by considering empirical research from at least 2 different fields of study (represented by the three winter-term B-level core courses in the Department of Biological Sciences at UTSC). More information will be provided on Blackboard (see 'Integrative Biology Research Poster Project' blackboard link) and in tutorial sessions.

I. Term test & Final Exam:

Format. The **term test** will include one to three written-answer questions and 40 – 60 multiple choice and/or matching questions (specific break-down will be confirmed prior to the test). Topics covered are specified on the lecture schedule, and materials for which you are responsible include lecture material and online video content. The registrar will schedule the date for the test, likely in the week prior to or after reading week, after which the material covered will be announced. The term test will be ~1.5 – 2 hours in duration (to be confirmed prior to the test).

The **final exam** will consist of approximately 75– 95 multiple choice and/or matching questions (specific break-down will be confirmed prior to the exam), will be 3 hours in duration, and is scheduled by the registrar during the final exam period. The final is comprehensive and will cover material from the entire course, although material that has already been examined in the term tests will be covered in less detail. Roughly 2/3 of the final will be like a second term test on material not previously tested and 1/3 will be an inclusive exam with questions that span the entire course (see the course schedule for more details).

Content. **The term tests and final exam will focus on material covered in lecture, assigned videos, and material from the text to which I have specifically directed you during the lecture.** Questions will focus on your understanding of theory, hypothesis testing and mechanisms, evidence in support of these, as well as testing your ability to make inferences from novel examples or data. Straight recall of examples and vocabulary will also be required. The best way to study for these tests/exams is to (1) do the quizzes and practice problems, and be sure you understand the answers and (2) read and think about the examples in the text and in lectures--what do those examples demonstrate and why? To what area of theory do they apply? (3) test your understanding with the online chapter tests.

Tip for success in this course:

KNOW the lecture & video material & UNDERSTAND the readings.

*For exams, **concentrate on learning material presented in lectures & videos,** know how predictions arise from theory, how data are used to test those predictions, and think about how to apply concepts to new data. Use your textbook readings to support these learning objectives.*

***Details* of textbook material will NOT be examinable unless I cover it in lecture, OR specifically direct you to it during lecture.** However, I recommend that you do all the readings if you want to do well in this course.

Course Policies & Administration

AccessAbility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach the AccessAbility Services as soon as possible. AccessAbility Services staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course. Once your needs are assessed, ensure you notify Jennifer Campbell of the AccessAbility-determined accommodations that will ensure you are able to reach your academic goals in this course.

Academic honesty & plagiarism

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility, and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently.

According to Section B of the University of Toronto's Code of Behaviour on Academic Matters, which all students are expected to know and respect, it is an offence:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism;
- it is also an offence to use unauthorized study aids, such as test banks purchased online.

There are other offences covered under the Code, but these are by far the most common ones that apply in this course. Please respect these rules and the values which they protect.

Missed deadlines for quizzes and practice problem sets

There will be NO EXTENSIONS and NO MAKE-UPs for video quizzes or practice problem sets. Failure to submit as specified, on time and complete, will result in a '0' for that component. The ONLY exceptions are for students who add the course after an assignment was due, or who have a documented health issue. If this is the case, you must contact Jennifer Campbell IMMEDIATELY after adding the course or falling ill.

Missed Term Test

Students who will be unable to attend the term test for religious reasons must notify the course coordinator (Jennifer Campbell) as soon as possible after the conflict is recognized. Students who are unable to attend the term test due to illness must notify Jennifer Campbell within 3 working days of the test and arrange to present a completed UTSC medical certificate (available via the registrar's website) which confirms their illness at the time of the exam. Medical certificates will be verified.

There will be a SINGLE make-up for the term test for students with a documented excuse, confirmed as valid by Jennifer Campbell. Alternative arrangements are NOT possible. The date of the make-up test will be announced on Blackboard, and it is the SOLE RESPONSIBILITY of the affected student to ensure they know the date of the make-up test. Students who miss a term test with no acceptable, documented excuse will receive zero for that test. Students who miss a term test and the make-up and have documented, confirmed excuses for both will have their final scores adjusted so that the marks for the missed test is shifted to the final exam.

Students who **miss the final exam** must petition the Registrar to write a deferred exam

Tentative Schedule. See Blackboard for updates
***Attendance at Poster tutorials is mandatory. Check the Poster schedule on Blackboard for updates.**

Week	Date	Lecture #	Topic	Readings (Bergstrom/Dugatkin)	Available online	Due today
1	Tues Jan 9	1	Course introduction	Read the syllabus	**Evo-short 1 online:** Natural Selection & the Rock Pocket Mouse Quiz due Tues Jan 16, 11pm	
	Thurs Jan 11	2	*Recap*: Natural Selection	Chapter 1 (pp. 3 – 12); Chapter 2 (p. 42-48; 53 -55); Chapter 3 (pp. 65-79)		
2	Tues Jan 16	3	*Recap*: Natural Selection & Evidence for Evolution	Chapter 1 (p. 16-26);	**Evo-short 2 online:** Lizards in an evolutionary tree due Tues Jan 30, 11pm	**DUE: Quiz for 'Evo-short 1'** 'Save and submit' before 11pm
	Thurs Jan 18	4	*Recap:* Evidence for Evolution & Evolutionary Analysis	Chapter 3 (p. 80 – 84; p. 89 - 106); Chapter 19 (p. 677-680)		
		****Poster Tutorial 1 (5pm to 7pm): Introduction, Logistics & Expectations***				
3	Tues Jan 23	5	Evolutionary Analysis: Experiment, Observation, Phylogeny & the Comparative method	Chapter 4 (p. 124-139); Chapter 5 (p. 176-181) *Animation: Reading Phylogenetic trees (Textbook materials, Chapter 4)*		
	Thurs Jan 25	6				
		Poster Tutorial 2 (5pm to 7pm): Group Dynamics, Group Meet & Greet				***Personality test (bring printout)***
	Friday Jan 26	***Poster Project: Mini-deadline 1***				***Quiz: Scientific sources video***
4	Tues Jan 30	7	Mutation & Variation	Chapter 3 (p. 69,70; p. 85 – 87) Chapter 6 (p. 195-210)	**Documentary 1 online** Evolution: Great Transformations Quiz due Tues Feb 6, 11pm	**DUE: Quiz for Evo-short 2** 'Save and submit' before 11pm
	Thurs Feb 1	8				

Week	Date	Lecture #	Topic	Readings (Bergstrom/Dugatkin)	Available online	Due today
5	Tues Feb 6	9	Mechanisms of Evolution 1: Hardy-Weinberg, Mutation & Selection	Chapter 7 *Animation: Population Genetics (Textbook materials, Chap.7)*	**Problem set 1 online** Due Tues Feb 13	**DUE: Quiz for Documentary 1** 'Save and submit' before 11pm
	Thurs Feb 8	10				
		Poster Tutorial 3: Group work session				
	Friday Feb. 9	***Poster Project: Mini-deadline 2***				***Research Topic registration***
6	Tues Feb 13	11	Mechanisms 2: Patterns of Selection	Chapter 7	**Practice problem set 2 Online, Study tool: not for marks**	**DUE: Problem set 1** 'Save and submit' before 11pm
	Thurs Feb 15	12			**Documentary 2 online** *'Evolutionary Arms Race'* **Quiz Due Thurs Mar 8**	
	Friday Feb 16	***Poster Project: Mini-deadline 3***				***Quiz: Poster Design Video***
Term test Date to be announced by registrar: Likely just before or after Reading week: Material covered will be announced once date is assigned						
	Feb 17 - 23	**Reading week**				
7	Tues Feb 27	13	Mechanisms 3: Migration, Drift & Non-random mating	Chapter 8 (p.257-270; p.278 – 287) *Animation: Genetic Drift (Textbook materials, Chap.8)*		
	Thurs Mar 1	14	Mechanisms 4: Case Studies			
8	Tues Mar 6	15	The Arms Race: Viruses & Pathogens	Understanding Evolution: Arms Race (U Berkeley public resource) Causes & Consequences of HIV Evolution (*Nature* review, 2004)		
	Thurs Mar 8	16				**DUE: Quiz for Documentary 2** 'Save and submit' before 11pm
		Poster Tutorial 4: Group Work Session				
9	Tues Mar 13	17	Quantitative genetics: Continuous traits & Heritability	Chapter 9 (p. 309- 320; p. 345-357)		
	Thurs Mar 15	18				
		Poster Project: mini-deadline 4				***Draft poster due on Blackboard***

Week	Date	Lecture #	Topic	Readings (Bergstrom/Dugatkin)	Available online	Due today
10	Tues Mar 20	19	Selection & speciation	Chapter 14 (p. 487-520)		
	Thurs Mar 22	20		--	**Practice problem set 3 Online Due: Tues April 3**	
		Poster Tutorial 5: Peer review session				
		Poster Project: mini-deadline 5				
11	Tues Mar 27	21	Darwin's Dilemma 1: Sexual selection	Chapter 16 (pp 587-603)		
	Thurs Mar 29	22				
		Poster Tutorial 6: Group Work Session				
12	Tues April 3	23	Darwin's Dilemma 2: Social Behaviour & Altruism	Chapter 17 (607-622)		**DUE: Practice Problem set 3** 'Save and Submit' before 11pm
	Thurs April 5	24				
	Thurs April 5	**The BIG DAY! Research Poster Session (5pm)**				**Due: Workload assessments**
	April 7 - 10	**Study Break**				
Exam Period April 11 - 26	FINAL EXAM (all material, including videos) Bring a non-programmable calculator. Date/time TBA by Registrar ~2/3 of exam: All material not covered in the term test ~1/3 of exam: cumulative, questions that integrate information across all course material					