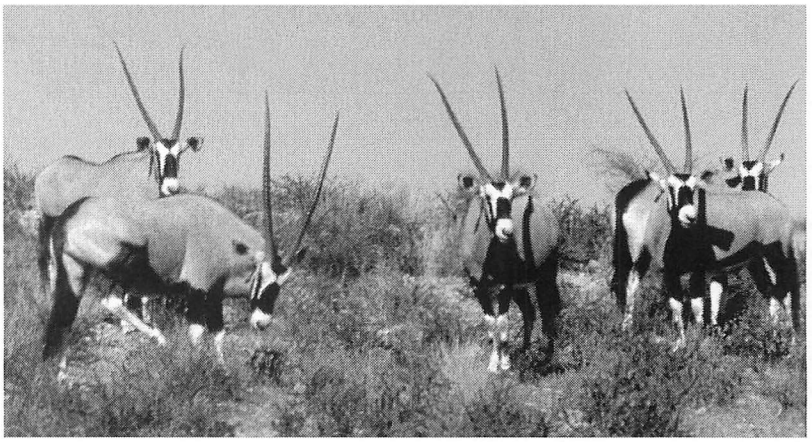
COURSE SUMMARY

EVOLUTIONARY CONCEPTS

(0-0;2-2)

Biology 3671 - 2017



Instructor:

Dr. Douglas Morris

Office: CB4017

Lab: CB3019

Text:

- Morris, D. W. and P. Lundberg. 2011. Pillars of Evolution. Oxford University Press, Oxford, UK.
- Morris, D. W. 2017. Biology 3671: Evolutionary concepts. Notes & Tutorials 2017.

Office Hours:

Wednesday & Friday 13:00-14:00 (11 January - 7 April 2017 only)

Other Times by Appointment

Lectures: Wednesday & Friday 11:30-12:50 Room SN 1015.

Tutorials: As assigned by the registrar:

ALL STUDENTS MUST REGISTER FOR AND ATTEND TUTORIALS

BIOL 3671T W1 Friday: 08:30-10:20 CB 3010A; GA TBA

BIOL 3671T W2 Tuesday: 08:30-10:20 CB 3010A; GA TBA

BIOL 3671T W3 Monday: 08:30-14:10 CB 3010A; GA TBA

BIOL 3671T W4 Monday: 12:30-14:20 CB 3010A; GA TBA

ELECTRONIC DEVICES IN LECTURES AND TUTORIAL. Students are not allowed to take photographs, send or receive phone or text messages, use E-mail or social networks, download files, stream content, or surf the internet. Audio and video recording during lectures and tutorials is strictly prohibited unless permission is granted on an individual basis by the course instructor. All electronic devices other than notepads or laptops used to take notes, and calculators required for assignments and tutorials, must be left out of the room or turned off and located out of sight. No electronic devices other than calculators are allowed during quizzes. Students anticipating or sending urgent messages are expected to remain outside of the classroom.

BEHAVIOUR DURING LECTURES AND TUTORIALS. Students must respect the rights of others by conducting themselves at all times in a professional, polite, and civil manner. Students who disrupt others during lecture or tutorial will receive a grade deduction.

There may be one or more guest lectures during the course. GUEST LECTURES ARE AN INTEGRAL COURSE COMPONENT AND STUDENTS WILL BE EXAMINED ACCORDINGLY.

Contents:

Introduction:

This course is designed for the student who wants to understand evolutionary concepts and their application to important questions in biology. The course emphasizes the lock-step connection between evolutionary biology and ecology. Course instruction will include a mixture of lectures, general discussions, tutorials, and investigative assignments. Lectures will emphasize conceptual, empirical, and experimental approaches to the study of evolution. Students are expected to complete supplementary readings and assignments, and to participate fully in tutorials. Lectures and tutorials are integrated to provide a single cohesive body of instruction.

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Course Objectives:

1. To help students "think like evolutionary biologists".

2. To introduce students to a broad array of relevant and contemporary issues in the study of evolution.

3. To expose students to the set of essential concepts, theories, and models required to be "literate" in the study of evolution.

4. To inspire students to question and discuss current concepts in evolutionary biology.

5. To assist students in developing the skills, discipline, and study habits necessary for self-instruction in this and other areas of biology.

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Evaluation:

Weekly in-class quizzes - 60%. Tutorial assignments, participation, discussion, and reports - 25%. Final term report 15%.

Performance will be evaluated regularly. The evaluation will be based on the student's grasp of important issues, logical reasoning, non-trivial criticisms of the material, and the ability to solve evolutionary problems. Students are encouraged to share their ideas and their questions.

Written or oral reports may be assigned at intervals during the course. Evaluation of these reports will be based on the student's ability to synthesize a field of enquiry, to apply that synthesis to a particular problem, or to develop significant new insights into evolutionary issues. The reports should not, in general, be restatements of review papers. Rather they will require the student to apply what is known (and what is unknown) to an unresolved question. Evaluation will be devoted equally to clarity of presentation, rigour of treatment, and suitability of the report to the assignment.

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Report Format:

Read each assignment carefully and include only relevant material. Unless otherwise indicated, maximum length of reports including tables, figures, and references will be six typed pages (double-spaced, 2.5 cm margins, minimum height of lower-case letters 2 mm).

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Report Due Date:

All regular reports will be due either at the end of the tutorial, or as announced in lecture. Late submission will be penalized at the rate of 10 % per calendar day unless prior permission is received. The due date for the final report is 12:50 7 April 2017. *Reports submitted after 7 April 2017 will not be accepted for grading.*

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Report Style:

Be concise. Use the active voice. Organize your thoughts before you begin writing. Omit needless or redundant words. Express your thoughts as clearly as possible even if it means re-writing the report. Write in your own words. Use quotations sparingly, and only when you cannot express the idea clearly yourself. Never borrow a phrase without quotations. Never repeat observations, interpretations, or ideas without proper citation. Never cite a reference that you have not read.

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FINAL TERM REPORT = TAKE-HOME ASSIGNMENT

Students will be given components of the final take-home report throughout the term. Students are encouraged to answer each component in a timely fashion. Submit the entire assignment as a single submission on or before the 7 April 2017 due date. Where possible, type the answer to each question or assignment (double-spaced, 2.5 cm margins, minimum height of lower-case letters 2 mm). The due date for the final report is 12:50 7 April 2017. *Reports submitted after 7 April 2017 will not be accepted for grading.*

Please note: The take-home term report is a term project and not a final examination. Students will be ineligible to write a special examination as outlined in general regulation VII in the Lakehead University Calendar.

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TUTORIALS:

Students are required to participate in weekly tutorials. Groups of students will identify a theme in evolutionary biology for presentation to the class as a whole. Each group will be responsible for developing the theme, identifying key concepts, and creating a 10-minute presentation to be delivered during a symposium on the last day of lectures (7 April 2017). Students will confirm their understanding of the theme by outlining a research proposal aimed at improving our understanding of the theme.

Evaluation will be based on your group presentation, your GA's assessment of contributions and tasks, and through regular peer grades and self assessments.

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Tentative Timetable 2017

Jan. 11 & Jan. 13 Topic 1: The Evolutionary Paradigm

Jan. 18 & Jan. 20 Topic 2: Mechanics I: Chance vs Systematic Change

Jan. 25 & Jan. 27 Topic 3: Mechanics II: Beyond Mendelian Genetics

Feb. 1 & Feb. 3 Topic 4: Function I: Beyond Mechanics

Feb. 8 & Feb. 10 Topic 5: Function II: Mappings

Feb. 15 & Feb. 17 Topic 6: Structure I: Evolutionary Games

Feb. 20 - Feb. 24 Family Day and Study Week - No Classes

Mar. 1 & Mar. 3 Topic 7: Structure II: The Structure Matrix

Mar. 8: Review and scheduled quiz.

Mar. 10 Topic 8: Scale I: Grain and Habitat Selection

Mar. 15 & Mar. 17 Topic 9: Scale II: Softness of Selection

Mar. 22 & Mar. 24 Topic 10: Dynamics 1: Evolutionarily Stable Strategies

Mar. 29 & Mar. 31 Topic 11: Dynamics II: Adaptive Dynamics

Apr. 5 Topic 12: Adaptation

Apr. 7 Class symposium: "Evolutionary Insights"

Apr. 7 Final Report Due: 15% of grade

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How to Study Evolution:

An understanding of evolutionary concepts is essential for all biologists. Some students have difficulty making the transition from rote learning to conceptual thinking. Others are confused on the difference between a clear understanding of concepts, often aided by mathematics, and arm-waving generalities. A vague understanding of evolution will lead, at best, to an even more vague understanding of biology. How, then, can students maximize their ability to learn evolutionary concepts?

Here are a few suggestions.

- **Form, or join, a study group.**

- **Supplement your lecture notes by annotating the figures and equations in your text.**
- **Redraw graphs, rewrite equations, and explain them to your study group.**
- **Review your lecture notes before you attend the next lecture.**
- **Make sure that you understand the mathematics, rather than memorizing equations or graphs.**
- **When confused, get help immediately from your study group, demonstrator or instructor.**
- **Ask yourself, and your study group, questions about the material rather than relying on quizzes to do that for you.**
- **Be an active participant in tutorial and classroom discussions.**
- **Try to imagine specific examples for each concept that you explore.**
- **Ask yourself at frequent intervals "how could I improve on or test this idea"?**
- **Never commit the "fallacy of complexity" by criticizing a model as too simple of a caricature of nature unless you have a clear and parsimonious alternative.**

- **Read Darwin's "On The Origin of Species by Means of Natural Selection" available on the web at http://darwin-online.org.uk/content/frameset?itemID=F373&viewtype=text&pageseq=1**

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