



## **Book (compulsory):**

**Reece et al. (2017). Campbell Biology. (2<sup>nd</sup> Canadian edition). Pearson.** Several format available starting at 122\$. **Although we will be giving you instructions to access “Mastering Biology,” the web component of the textbook, this is a facultative resource for BIO1130.** It might help you in your preparation for the exam. I will not refer to it during the lectures.

It is an excellent book (that you will also use in BIO1140). It covers basics of all subjects although I will not use it much for the first three chapters of BIO1530. The illustrations are excellent. In addition, I will often use my own photos and images + videos from the public domain to illustrate some concepts. Complementary material (museum specimens) will be used for certain subjects.

Although we will be giving you **instructions to access “Mastering Biology,” the web component of the textbook, this is a facultative resource for BIO1130.** It might help you in your preparation for the exam. I will not refer to it during the course or my lectures.

My lectures are illustrated with PowerPoint slides. These presentations will be made available at least 24 hours in advance of class on the Virtual Campus (Brightspace). They will also be available as PDF files. It is always preferable to print or download the files before class. **Exams are based on what I teach in class and this goes beyond the PowerPoint slide content.** Consequently you need to take notes.

Audio podcasts (i.e., only sound, no slides) of each lecture will be made available. This is a tool to help you in your studying process. **Important:** students that miss class because podcasts are available, do not do well in exams. **Attend lectures to ensure your success in this course! This is why you are at university!**

There will be active discussion groups (topic discussions + Q&A) on the Virtual Campus during the term. Read them and participate. Some elements of the discussions will be material to study for exams. More on this during the term.

## **Course Overview:**

The course contains many notions and concepts. My main objective is to ignite in you a curiosity for scientific questions and for the evolutionary reality of life on our planet.

We will discuss the scientific method, the theory of evolution, ecological and conservation biology and the history of life on Earth. These themes will be addressed from multiple angles. Thus, we will discuss the perception of science in society. We will examine the scientific contribution of Charles Darwin and other scientists. We will examine the pattern and process of evolution. We will study how species are formed, how they adapt to their environment and how they go extinct. We will also look at the evolution of our own species. Finally, we will examine the history of life on Earth by describing the main evolutionary events of this wonderful saga. All these concepts will be illustrated with numerous examples.

## Outcomes:

At the end of this course, my hope is that you will have learned and understood the following concepts:

- 1) The scientific method and concepts such as: induction, deduction, hypothesis, prediction and testing.
- 2) The distinction between science and non-science and the concept of realism, methodological materialism, rationality, etc.
- 3) Notions of the history of evolutionary thinking, from the early Greeks (Anaximander, etc.) to more recent times; Lamarck, Darwin, etc.
- 4) Perception of evolution and evolutionary processes: Buffon, Cuvier, Lamarck and Darwin and the Modern Synthesis, including the important contribution of 18<sup>th</sup> and 19<sup>th</sup> century geologists.
- 5) Knowledge of pre-mendelian and Mendelian genetics, laws of heredity and modern additions to these theories: incomplete dominance, epistasis, polygenism, norms of reaction, etc.
- 6) Fundamentals on microevolution: understanding of the Hardy-Weinberg equilibrium (numerical examples with explications in podcasts) and factors that can change it (mutation, assortative mating, migration, natural selection, genetic drift, etc.)
- 7) An understanding of the natural mechanisms that maintain and favour genetic diversity.
- 8) An understanding of the models of speciation and other macroevolutionary concepts such as punctuated equilibrium and phyletic gradualism.
- 9) Concepts associated with phylogenetic research and classification of living beings
- 10) A basic understanding of the origin of the universe, the solar system and our planet.
- 11) A good understanding of the theories and experiments associated with the study of the origin of life and the origin of the first prokaryotic and eukaryotic cells.
- 12) A good understanding of the evolution of life and of the evolution of major morphological innovations in the main groups of living beings.
- 13) General notions of ecology and an understanding of biotic and abiotic factors that govern the distribution of individuals and of species in aquatic and terrestrial environment.
- 14) Notions in population ecology: population growth, fertility, survival curve, notions of biological cycles, island biogeography, etc.
- 15) Fundamentals of community ecology: e.g. keystone species.
- 16) Fundamentals of conservation biology: extinction vortex, effective population size, minimum viable population size, etc.

## Evaluation:

Because this first-year biology course is attended by more than a thousand students, it is impossible to give midterms during the regular schedule. Midterms will be on a Saturday for all students. **Please ensure your availability on these days.** It is your responsibility to attend. Regulations associated with absence to midterms are detailed in the virtual campus (Brightspace). More information on content, time and location will be given a week before the exam during the term. Exams structure include about 50 % of multiple choice questions and 50% of short and long answer questions.

There will be two midterms and a final exam. All sections of BIO1130 must attend their own midterms.

Midterm exam 1: **Saturday morning, September 29<sup>th</sup>**: 15 or 20%\*

Midterm exam 2: **Saturday afternoon, November 3<sup>th</sup>**: 20 or 25%\*

Final exam: December 2018 (date to be determined): 40%

Laboratories\*\*: 20%

\* The combination of midterms (15%-25% or 20%-20%) that gives the highest grade will be kept. The material tested in exams is partially cumulative, even for the final. More information on exams content during the term.

\*\* Dr. Fabien Avaron (lab coordinator) will explain lab content and schedule during the first lecture of the term. **There is no laboratory during the first week of class.**

## Chapters

Chapter 1. Science: definition, methodology and perception

Chapter 2. Evolutionary thinking before Darwin

Chapter 3. Charles Darwin and the theory of evolution

Chapter 4. Genetics, Neo-Darwinism and Modern Synthesis

Chapter 5. The evolution of populations

Chapter 6. Adaptation

Chapter 7. Geographic variation and speciation

Chapter 8. Phylogenetics

Chapter 9. Biosphere and ecology

Chapter 10. Ecology of populations

Chapter 11. Conservation Biology

Chapter 12. The origin of life

Chapter 13. Bacteria and Archaea

Chapter 14. Protists

Chapter 15. The Cambrian explosion

Chapter 16. The conquest of the terrestrial environment: evolution of plants

Chapter 17. Evolution of animals: general concepts

Chapter 18. Evolution of animals: from echinoderms to chordates