



COURSE SYLLABUS

COURSE TITLE:	BIOL 121.3 The Diversity of Life		
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS START DATE:	Sept. 5 th , 2018	LAB START DATE:	Sept. 12 th , 2018
CLASS LOCATION:	Northlands College	LAB LOCATION:	Northlands College
CLASS TIME:	10:00 am to 11 am (MWF)	LAB TIME:	1pm to 4pm (Wednesday)

Course Description

Our world has at least 15 million species, all of which have adapted to particular environments and lifestyles and use energy to grow and reproduce. We examine these processes in representative organisms from all the major groups, and discuss factors influencing changes in biodiversity over time and space.

Prerequisite(s): Biology 30 or BIOL 107 or BIOL 108.

Note: Students with credit for BIOL 110 will not receive credit for BIOL 121.

Course Overview

This course is designed to introduce you to the vast and exciting field of biology with a focus on biological diversity, evolution, adaptations of organisms to specific environments, and the evolutionary and ecological factors influencing changes in biodiversity over time and space.

Learning Outcomes

By the completion of this course, students will be expected to:

1. have an understanding of biological principles (concepts), and that evolution is the unifying principle in biology
2. gain an appreciation for biology as an experimental science [hence, provide necessary background for advanced study of biology and other related disciplines], and realize that an understanding of biological principles requires knowledge of other fields of science e.g. chemistry, physics, geology, geography, mathematics, biochemistry and many disciplines within biology (e.g. evolution, ecology, genetics, physiology, structure and function, ethology, parasitology, molecular biology, etc.).
3. obtain knowledge of the diversity and complexity of life, which includes how organisms are adapted to their environment and the variation (e.g. morphological, genetic, physiological, behavioral) that exists among individuals of the same species and between individuals of related species
4. be able to think critically regarding scientific issues in our society and understand the importance of relationships between organisms and their environment, and how biodiversity is constantly changing over time

Specifically, students should know:

- the characteristics that unite all living organisms, and why viruses and prions are considered non-living entities
- the differences between unicellular/multicellular organisms and heterotrophs/autotrophs
- that different organisms reproduce in different ways; sometimes using more than one mode of reproduction; and the advantages/disadvantages of asexual/sexual reproduction
- that water represents the matrix or solvent of life
- the biological species concept and other ways to define species; the hierarchical system of nomenclature
- that there is difference between species and variation among individuals, for example, their morphology, genetics, ethology, ecology, physiological responses to the same environmental conditions, etc.
- that museums represent the catalogues of the diversity of life both in time and space
- the definition of biological diversity; and the problems with quantifying species diversity
- that species are not fixed in time; what Darwin saw and how he made conclusions about his observations that led to the theory of evolutionary change by means of natural selection; and the evidence to support this theory
- that some organisms are more suited (better adapted) to their environment, but that this is no guarantee of survival and opportunity to reproduce; the concept of reproductive fitness
- that variation is essential for natural selection to work; natural selection acts on individual organisms but evolutionary change takes place at the population level
- the differences between microevolution/macroevolution; the principles of homology, analogy and homoplasy; allopatric species, adaptive radiation, and that evolution is unidirectional
- the difference between natural selection/sexual selection; importance of the differences (diversity) between sexes
- the difference between biotic and abiotic factors; influence of abiotic factors on the reproductive fitness of organisms
- that there is considerable ecosystem diversity – and that environments and the organisms in them have changed over time
- what were the first organisms that lived on earth, the importance of O₂ in changing species diversity, why did multicellularity come about, the conquest of land and air (by multiple groups) and the challenges organisms faced and how they were overcome [examples of adaptation]
- when the ancestors of the representative organisms appeared on earth
- that species diversity has changed over time in response to major environmental changes; e.g. mass extinctions, climatic change [pre-human effects]
- what is symbiosis and the types of symbiotic relationship; coevolution [arms-race; predator-prey, parasite-host] and the role these play in changing biological diversity; the role of competition
- the interrelationships of organisms and biodiversity; concepts of niche, food webs/chains
- the relationship between species diversity and the theory of island biogeography
- the relationship between community structure (and trophic relationships) and species diversity in communities
- the effect of human (Anthropogenic) influences [fire, invasive species, habitat fragmentation, mining, etc.] on biodiversity over space and time [past, present, future]; including the Canadian prairies
- the concept of biological hotspots, and why the need to conserve biological diversity

Note: The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at: http://www.usask.ca/university_secretary/LearningCharter.pdf

More information on the Academic Courses Policy on course delivery, examinations and assessment of student learning can be found at:

http://www.usask.ca/university_secretary/council/academiccourses.php

Class Schedule

(Approximate number of 50 minute lectures indicated in brackets)

Dates	Major Lecture topics	LAB TOPIC (see lab manual for details)
1 Sept. 5,7	Course Introduction (1); Intro. to life (1):Characteristics of Life, levels of organization, water (polarity & its role in life, heat of capacity/vaporization and its role in life, solvent, cohesive and adhesive properties of water, pH buffers acids and bases) and energy (concept, laws, free energy, equilibrium, metabolism, catabolic/anabolic pathways, heterotrophs and autotrophs)	NO LAB
2 Sept. 10,12,14 and 17	Biology as a Science (1): pioneers and scholars in biology, inductive & deductive reasoning in study of science, scientific methods, hierarchy of life, Lab ROs; Introduction to biodiversity (3): unicellular organisms, prokaryote vs eukaryote, bacteria, viruses, viroids and prions, classification of organisms, domains of life;	LAB 1 - Introduction & Prokaryotes (Sept. 12)
3 Sept. 19, 21, and 24	Introduction to biodiversity (3): plantae, fungi, protists	LAB 2 – Protists (Sep. 19)
4 Sept. 26, 28 and Oct. 1	Introduction to biodiversity (3): Animalia, intra and inter specific variation	LAB 3 - Fungi Quiz on Labs 1, 2 10 marks (Sept. 26)
5 Oct. 3, 5 and 10	Evolution and Species Concept (3): micro/macro evolution, Hardy-Weinberg, Extinctions, term <i>species</i> , Modern Species Concepts i.e. Biological, Morphological, Ecological, others and their limitations.	LAB 4 - Plants I - Green algae, Mosses, Club mosses & Ferns (Oct. 3)
6 Oct. 12, 15	Abiotic & Biotic World (2): diff. between abiotic and biotic factors, influence of abiotic factors on the reproductive fitness of organisms	No LAB

7 Oct. 17, 19, 22	Changes in biodiversity through time (3): History of Earth, Geological time scale, theory of evolution of Darwin and origin of life to multicellular sexual organisms, evolution and evolutionary steps of life, allopatric speciation; adaptive radiation, living fossils	LAB 5 - Plants II - Conifers & Angiosperms Flower project (in lab assignment) 15 marks (Oct. 17)
8 Oct. 24, 26 and 29	Changes in biodiversity through time (3): evidence to support the theory of evolution Mid-term Exam	LAB 6 - Animals I - Sponges, Cnidarians, Flatworms & Nematodes Spot Test/Quiz – Labs 3,4,5 25 marks (Oct. 24)
9 Oct. 31, Nov. 2 and Nov. 5	Variations, biological adaptation, adaptation by natural selection, sexual selection, geographic isolation (3)	LAB 7 – Animals II - Segmented worms, Mollusks & Arthropods- In-lab assignment 10 marks (Oct. 31)
10 Nov. 7 and 9	Biotic Interactions (2): Behaviors, growth, competition and exploitation	LAB 8 - Echinoderms & Chordates Spot Test - Labs 6,7 10 marks (Nov. 7)
11 Nov. 19, 21 and 23	Biotic Interactions (3): Interactions between organisms and effects on biodiversity, mutualism, succession and island biogeography, unknown species, dominant species, and keystone species, introduced and invasive species and functional extinction	REVIEW LAB (Assignments total = 70 marks) (= 20% of mark)
12 Nov. 26, 30 and Dec. 3	Biodiversity hotspots and measurement of biodiversity (1); Human influences on biodiversity and ecosystem (1): exploitation, introduced species and pollution; Conservation of biodiversity (1)	Lab Exam (TBD)
13 Dec. 5 and 7	Course wrap-up, Review and final Exam	

Laboratory class information:

1. Labs begin on Sept 12th Students are expected to attend and be on time for all scheduled labs, review labs and final lab exams. The lab schedule is provided on the previous page of this document.
2. **The current edition of the Biology 121.3 lab manual is required for all labs** (this item can be purchased from the Bookstore in Marquis Hall). For your labs you may also need a 2H, 3H or 4H drawing pencil, loose-leaf or white (unlined) drawing paper, a calculator, an eraser and a metric ruler.

Course & Lab Instructor

Contact Information:

Dr. Indermohan S Rawal

E-mail: Rawal.inder@northlandscollege.sk.ca

Office Hours: 9 am – 4 pm; students can contact me every Thursday between 1 pm - 4 pm and can also contact me by email.

Required Resources

No required textbook. However, if you can obtain a full copy of Peter Russell's Biology it will be useful for other biology classes in the future. OpenStax has a free online textbook called Biology which may be useful.

2017-2018 Lab Manual for Biology 121.3. University of Saskatchewan, Biology Department.
Required.

Downloads

Please note that Powerpoint slides or lecture notes will be provided to you as a courtesy.

Grading Scheme

Midterm exam	15
Final exam	45
Lab Assignments & quizzes	20
Lab exam	20
Total	100%

Evaluation Components

Midterm Exam:

Value: 15% of final course grade

Date: *This midterm lecture exam will be held Oct. 24 – Oct. 29* (exact date TBD) at the lectures classroom

Length: 50 minutes

Format: 40 multiple-choice questions

Description: Included material will be announced in class. Calculators and all other electronic devices are not allowed.

Final Exam:

Value: 45% of final course grade

Date: Consult Final Exam Schedule

Length: 3 hours

Format: 100 multiple-choice questions

Description: The exam is comprehensive in that it will cover all lecture material. However, material delivered after the midterm exam will be emphasized. Calculators and all other electronic devices are not allowed.

Laboratory Assignments & Quizzes:

Value: 20% of final course grade

Date: see Laboratory Schedule

Format: Quizzes (written); spot tests; flower project

Description: The quizzes will be 15-20 minutes in duration and test material from the previous two or three lab exercises. The questions will generally require a short written answer. Spot tests involve images shown in PowerPoint and short questions about the specimen shown. No phones, laptops, tablets or other material allowed. Additional information about the lab quizzes can be found in your lab manual, and will be given in the weeks prior to the assignment.

Laboratory Exam:

Value: 20% of final course grade

Date: TBD

Length: 1.5 hours

Format: This will be a mixture of spot test, short written answers and possibly practical questions (slide prep, etc)

Description: The exam is comprehensive in that it will cover all laboratory classes. Calculators and all other electronic devices are not allowed.

University of Saskatchewan Grading System

Students in BIOL 121 are reminded that the University has established a grading system to be used in all of its courses. Information on literal descriptors for grading at the University of Saskatchewan (reproduced below) can be found at:

<http://students.usask.ca/current/academics/grades/grading-system.php>

Submitting assignments and Late Assignments

All exams, quizzes and assignments are to be completed during the assigned class time. Any assignments handed in late or remaining uncompleted will be assigned a mark of zero. Please see above for other rules and regulations around missed exams. Please refer to the current lab manual for other policies around missed lab assignments.

Criteria that must be met to Pass

A recorded grade for all assignments, quizzes and exams, with a total grade of 50%, is required to pass this course. INF (incomplete failure) can be applied to those students not attending the final lab exam and to those students not attending the lecture final exam.

Scheduling of Exams

Midterm, final and lab examinations must be written on the date scheduled, and at the location scheduled. See above schedule for the midterm exam date.

Final examinations may be scheduled at any time during the examination period (First week of Dec); students should therefore avoid scheduling travel plans, employment, or other commitments for this period. If a student is unable to write an exam through no fault of his or her own for medical or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Students absent for a midterm exam must advise their lecturer in person, by telephone or by e-mail and initiate arrangements for writing a Deferred Midterm Exam. Contact must be made within **three working days** of the missed exam and **supported by appropriate documentation**, in order to avoid being assigned a grade of zero for the exam. The same rules apply for a Deferred Final Exam, but applications are made to the Dean's Office of your college.

As a student, you must bring your current College or University of Saskatchewan student ID card to all exams and be prepared to present it for verification purposes.

It is forbidden for students to utilize, in any way during an exam, any electronic device (e.g. cell phone, smart phone, tablet, laptop, electronic dictionary or translator) other than a simple calculator (if required by the examiner) for solving mathematical problems.

Students are encouraged to review all examination policies and procedures:

<http://www.usask.ca/calendar/exams&grades/examregs/>

Consult page 2 of the 2016-2017 Lab Manual for the procedure to follow for a missed Lab Exam.

Student Feedback

Marks from machine-graded exams are usually available within one week. The multiple-choice questions will not be posted after the exam. Students will be encouraged to meet with the instructor to review their performance.

Attendance Expectations for Laboratory Classes

Students are expected to attend all scheduled lab periods. Students are advised to consult the lab manual for further information about BIOL 121 procedures to follow when they are too ill to attend the lab period (and/or lab exam) or are facing extenuating personal circumstances.

Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at:
http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

Important Note: Additional information about student misconduct specific to BIOL 121 can be found in the laboratory manual. BIOL 121 students are required to read and understand the information about misconduct that is presented in the laboratory manual.

Examinations with Access and Equity Services for Students (AES)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services for Students (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals. In order to access AES programs and supports, students must follow AES policy and procedures. For more information, check <http://www.students.usask.ca/disability/>, or contact AES at 306-966-7273 or aes@usask.ca.

Students registered with AES may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.
