**Division of Applied Science & Management**

**School of Science**

**Fall 2015**



**COURSE OUTLINE**

**BIOLOGY 101**

**PRINCIPLES OF BIOLOGY I**

45 **HOURS**

3 **CREDITS**

PREPARED BY: Mark Andruskiw DATE: September 6, 2015

APPROVED BY: Margaret Dumkee DATE: September 9, 2015

APPROVED BY ACADEMIC COUNCIL: (date)

RENEWED BY ACADEMIC COUNCIL: (date)

**YUKON COLLEGE**

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Course Outline prepared by Mark Andruskiw, Sept. 6, 2015.

Yukon College

P.O. Box 2799

Whitehorse, YT

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**DIVISION OF APPLIED SCIENCE AND MANAGEMENT**

**Biology 101, Principles of Biology I**

**Credit Course**

**Fall 2015**

**BIOLOGY 101, PRINCIPLES OF BIOLOGY I**

**INSTRUCTOR:** Mark Andruskiw **OFFICE HOURS:** Thursday 2:30 - 3:30

**E-MAIL:** mandruskiw@yukoncollege.yk.ca **OFFICE LOCATION:**

**LECTURE TIME:** Tues & Thurs, 1:00 - 2:30 **LECTURE ROOM:** A2402

**LAB TIME:** Wed, Fri, 1:00 - 4:00 **LAB ROOM:** A2805 (Biology Lab)

**COURSE DESCRIPTION**

This course is a core introductory science course, transferrable to most Canadian universities as a first-year level Biology course, emphasizing principles with wide applications to all living organisms, including cell structure and function, mechanisms of inheritance, the diversity of life, evolution, and adaptations to the environment. A comparative approach to the unity and diversity of organisms is stressed. Weekly mandatory lab sessions reinforce subject matter presented in lectures.

**PREREQUISITES**

Admission to the Division of Applied Science & Management. Biology 11 or equivalent is highly recommended, and Biology 12 is recommended. Students who have not successfully completed Biology 11 are generally not successful in this course. Chemistry 11 is highly recommended. Math 12 (MATH 060 or other equivalent) is strongly recommended either as a pre-requisite or co-requisite. Students are expected to possess basic mathematical skills.

**RELATED COURSE REQUIREMENTS**

Mandatory Lab component BIOL 101L

**EQUIVALENCY, TRANSFERABILITY**

This course transfers as first-year biology (one semester) to most Canadian Universities. Please see the BC Transfer Guide or contact the School of Science for more information on transferability.

**LEARNING OUTCOMES**

Upon successful completion of the course, students will demonstrate knowledge and understanding of the following:

**1. General Biology Learning Outcomes**

* The steps taken in rigorous scientific process and what defines a living organism, including knowledge of the 8 unifying themes of living organisms

**2. Ecology Learning Outcomes**

* Levels of study in ecology and examples of new properties that emerge at each level; factors that determine and influence distribution of life on Earth based on climate; define concepts of habitat, fitness, regulation, niche; concepts of population ecology such as sample, density, dispersion, mark-and-recapture, and growth models; interpretation of life tables and survivorship curves; knowledge of life histories
* Structure and dynamics of communities, including types of interactions and how they influence growth models and diverse adaptations that exist as a result of community dynamics; trophic structures; concepts of species diversity, keystone species, disturbance; primary and secondary succession; invasive species
* Ecosystem structure and dynamics, including primary production and nutrient cycling

**3. Evolution Learning Outcomes**

* Observations and main inferences of Charles Darwin such as concepts of evolution, natural selection, mutation; sources of evidence for evolution; application of Hardy-Weinberg equilibrium; causes of evolutionary change (microevolution); patterns of change in phenotypes resulting from natural selection (macroevolution); causes of speciation; concept of hybridization and reproductive isolating mechanisms

**4. Diversity of Life Learning Outcomes**

* Overview of taxonomic groups and the origin of species; unifying characteristics and basic knowledge of the diversity within the following taxonomic groups: prokaryotes and the two main kingdoms within, protists and the five main groups within, fungi, plants and evolutionary patterns from non-vascular to seedless vascular to seed plants, evolution and adaptations in angiosperms, animals and evolutionary patterns from invertebrates, protostomates, and segmented animals, to deuterostomates, and to chordates; the challenges of life on land for both plants and animals

**5. Chemical Basis of Life Learning Outcomes**

* Unique properties of water that allow it to support life; basic understanding of chemical bonds, molecules, and atoms, and the elements that make up living things; classes of most commonly found compounds found in living things and common functional groups

**6. Cell Structure and Function Learning Outcomes**

* General cell structure; organelles and their structure and functions; differences in cell structure among taxonomic groups; functions of proteins in the cell; communication between cells; function of membranes; energy use and basic steps in metabolism by the cell; control and use of enzymes; mechanisms of transport at the cellular level
* Cellular respiration, redox reactions, and ATP (energy) production
* Photosynthesis, light pigments, and production of high energy compounds

**Lab Learning Outcomes**

Upon completion of mandatory lab sessions students will demonstrate knowledge of basic ecological practices such as estimating population size and density, complete basic statistical exercises, recognize sources of evidence for evolution, identify general groups of bacteria based on shape, differentiate between prokaryotic and eukaryotic cells, recognize cells of fungi and protists, and recognize the diversity within Kingdom Protista. Students will demonstrate correct procedures of microscopy using both compound and stereomicroscopes, including the ability to use oil immersion and preparation of their own wet mount slides with live organisms. Students will demonstrate the practical knowledge necessary to conduct dissections of several invertebrate organisms, including clams, roundworms, segmented worms, crayfish, insects, sea stars, and one (optional) vertebrate, frogs. Students will also be able to identify organelles within cells and conduct basic laboratory tasks such as incubation of test tube cultures in a water bath.

**COURSE FORMAT:**

Three hours of lecture, three hours of lab, and zero hours of tutorial per week.

**ASSESSMENTS**

**Attendance & Participation**

Attendance is mandatory in labs, and greatly encouraged in lectures. A student may be withdrawn from a course if a percentage (as stipulated in Yukon College Academic Regulations and Procedures) of scheduled contact hours are missed. Absence from labs results in a zero grade assigned for assignments and quizzes relevant to the missed lab. If the instructor is notified in advance of potential problems with attendance, alternate work can be arranged.

Students must attend the laboratory session assigned to them once per week.

**Assignments**

LAB ASSIGNMENTS

Assignments are handed out at the beginning of laboratory sessions and graded on the basis of understanding and applying principles involved, as well as the correctness of answers to solutions. Most students finish assignments during the lab session, although they are not due until the next week day. A quiz will be given during each scheduled lab to assess progress. Written reports may also be assigned.

**Tests**

Quizzes on lecture material are given approximately once every two weeks. There are 5 quizzes in total, worth 10% each, and a final exam worth 15% of the total grade. The final exam will cover the entire course. The final exam will be held at the end of the term, and the date will be announced as soon as confirmed by administration. Quizzes on laboratory material are given every lab session (except the first) and cover material from the lab exercises the week before. There is no final exam for the laboratory portion of the course.

**EVALUATION**

|  |  |
| --- | --- |
| Lecture quizzes (5 @ 10% each) | 50 % |
| Lecture final exam | 15 % |
| Lab assignments | 17.5 % |
| Lab quizzes | 17.5 % |
| Total | 100 % |

Students must pass the lab and lecture portions of the course independently.

**REQUIRED TEXTBOOKS AND MATERIALS**

Urry, Cain, Wasserman, Minorsky, Jackson, and Reece. (2014) “Campbell, Biology In Focus”. Pearson, Benjamin Cummings.

*Available for purchase in the bookstore*

OR Reece, Urry, Cain, Wasserman, Minorsky, and Jackson. “Campbell, Biology”. 7th, 8th, 9th Edition. Pearson, Benjamin Cummings.

Lab Manual: assembled by instructor and handed out during first lab session

**ACADEMIC AND STUDENT CONDUCT**

Information on academic standing and student rights and responsibilities can be found in the Academic Regulations:

http://www.yukoncollege.yk.ca//downloads/Yukon\_College\_Academic\_Regulations\_and\_Procedures\_-\_August\_2013\_final\_v1.pdf

**PLAGIARISM**

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person’s writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research, ideas of others are directly quoted, paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

**YUKON FIRST NATIONS CORE COMPETENCY**

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture, and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see [www.yukoncollege.yk.ca/yfnccr](http://www.yukoncollege.yk.ca/yfnccr).

**ACADEMIC ACCOMMODATION**

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition, any other grounds specified in section 8.0 of the Yukon College Academic Regulations (available on the Yukon College website). It is the student’s responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785, lassist@yukoncollege.yk.ca.

**TOPIC OUTLINE**

**Lab schedule**

|  |  |  |
| --- | --- | --- |
| **DATE** | **LAB #** | **SUBJECT** |
| Sept. 16, 18 | 1 | Ecology 1 - The Boreal Forest: Introduction to Ecosystems (Outside) |
| Sept. 23, 25 | 2 | Ecology 2 - Population Ecology and Community Interactions (Outside) |
| Sept 30, Oct 2 | 3 | Evidence for Evolution, Evolution and Natural Selection |
| Oct. 7, 9 | 4 | The Microscope, Diversity of Life 1 - Archaea, Eubacteria, Protists |
| Oct. 14, 16 | 5 | Fungi and Plant Diversity 1 - Seedless Plants |
| Oct. 21, 23 | 6 | Plant Diversity 2 - Seed Plants |
| Oct. 28, 30 | 7 | Animal Diversity 1 - Sponges, Cnidaria, Flatworms, Roundworms, Rotifers |
| Nov. 4, 6 | 8 | Animal Diversity 2 - Molluscs, Annelids |
| Nov. 11, 13 | - | Remembrance Day (no labs this week) |
| Nov. 18, 20 | 9 | Animal Diversity 3 - Arthropods, Echinoderms, Chordates |
| Nov. 25, 27 | 10 | Chemistry of Life - Water |
| Dec. 2, 4 | 11 | Cell structure and function |

**Lecture schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| **SUBJECT** | **TEXT** | **TOPIC** | **QUIZ (approx.)** |
| Introduction | CH 1 | Biology, scientific method |  |
| Ecology | CH 40 | Population ecology |  |
|  | CH 41 | Community ecology |  |
|  | CH 42 | Energy flow |  |
| Evolution | CH 19, 21 | Variation & natural selection | Quiz 1 - Sept. 24 |
|  | CH 22 | Speciation |  |
| Diversity of Life | CH 23 | Taxonomy, diversity |  |
|  | CH 24 | Prokaryotes | Quiz 2 - Oct. 8 |
|  | CH 25 | Protists |  |
|  | CH 26 | Fungi |  |
|  | CH 26 | Plants | Quiz 3 - Oct. 22 |
|  | CH 27 | Invertebrates |  |
|  | CH 27 | Vertebrates |  |
| Chemistry of Life | CH 2 | Inorganic chemistry, water | Quiz 4 - Nov. 5 |
|  | CH 3 | Organic chemistry |  |
| Cells | CH 4 | Cell structure & function |  |
|  | CH 5 | Cell membranes |  |
| Metabolism | CH 6 | Enzymes, energy flow | Quiz 5 - Nov 19 |
| Respiration | CH 7 | Glycolysis, citric acid cycle |  |
| Photosynthesis | CH 8 |  |  |