

(Updated: Spring 2024)

PREREQUISITES:	BI 1000 INTRODUCTION TO BIOLOGY I
CATALOG DESCRIPTION:	An integrated exploration of major principles of biology. Emphasis on diversity of life, development, cell division, molecular biology, genetics, evolution, and ecology. Consideration of issues and applications related to society.
RATIONALE:	The typical second half of the introductory biology 4cr. course with labs, suitable for science-oriented programs which provides a good understanding of what biology is and why it has assumed such an important role in society today. Many aspects of human activity are specialized examples of more universal biological principles, making knowledge and understanding imperative to the educated individual. Besides the direct relationship of biology to one's own existence and to certain fields of study, such as life sciences and medicine, it is also closely associated with environmental science and psychology. The course is also closely connected with the disciplines of technology, philosophy and sociology, where some knowledge of ethical and social and technology related issues is essential. Biological concepts are indirectly considered in many professional activities such as writing poetry, legislating and engaging in commerce.
LEARNING OUTCOMES:	<p><i>As a result of taking this course, the student should be able to:</i></p> <ol style="list-style-type: none"> 1. Demonstrate good knowledge of the embryonic and fetal stages of vertebrate and human development. 2. Outline the stages of the cell cycle, and how it is controlled together with the stages of mitosis and meiosis and their relationship to the human life cycle 3. Explain the Mendel's laws of inheritance in terms of a single trait and two trait crosses. Explain inheritance beyond simple Mendelian patterns and analyse family pedigrees. 4. Demonstrate good knowledge of the chromosomal basis of inheritance and disorders. 5. Explain the DNA structure and replication. State and explain the steps of gene expression and gene regulation. Define gene mutations and their relation to cancer. <p>Discuss ethical and social issues of health and disease and the implications of Biotechnology and Genomics.</p> <ol style="list-style-type: none"> 6. Explain the theories of origin of life in relation to the theory of evolution and in terms of evidences for evolution, the Hardy- Weinberg equilibrium, the agents of evolutionary change and types of natural selection. Describe the process and pace of speciation. 7. Classify and characterize the major phyla of organisms in the five kingdoms. Evaluate the interactions of organisms in ecosystems, the energy flow, the chemical cycling, the nature of biomes and aquatic communities, the human population concerns and the human impact on ecosystems. 8. Develop the necessary analytical skills to understand the nature of scientific inquiry by practicing inquiry in the laboratory and by addressing the right questions and applying the appropriate methodology.
METHOD OF TEACHING AND LEARNING:	<p>In congruence with the teaching and learning strategy of the college, the following tools are used:</p> <ul style="list-style-type: none"> • Class lectures, interactive learning (class discussions, group work) video presentations, and practical problems solved in class. • Use of the online platform Connect McGraw Hill • Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class

- Laboratory work (some laboratory reports and drawings may be required).
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.
- Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

ASSESSMENT:

Summative:

<p>1st assessment: a) In-class lab midterm (1/2-hour), 10% (Microscopy slide identification, diagram labelling, organ identification, problem solving, short answers, classification of organisms, chemical reactions of processes etc.) b) In-class midterm examination (2-hour), 30% (Multiple choice, short answers, matching, essay questions combination, problem solving)</p>	40 %
<p>2nd assessment: a) In-class lab final (1/2-hour), 10% (Microscopy slide identification, diagram labelling, organ identification, problem solving, short answers, classification of organisms, chemical reactions of processes etc.) b) In-class final examination (2-hour, comprehensive), 50% (Multiple choice, short answers, matching, essay questions combination, problem solving)</p>	60%

Formative:

Multiple "diagnostic on-line" tests	0
Multiple choice, short answers	
Essay questions	0

The **formative MC (on-line) and written essays** aim to prepare students for the examination. Students are expected to submit feedback on their performance. The two lab exams test the practical component of all learning outcomes of the course as stated in learning outcome 8. The midterm examination tests Learning Outcomes 1-5.

The final examination tests all learning outcomes and it is comprehensive.

The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. If students pass the comprehensive assessment that tests all Learning Outcomes for this module and the average grade for the module is 40 or higher, students are not required to resit any failed assessments.

INDICATIVE READING:

REQUIRED READING:

Required Textbook: Mader, S. S. & Windelspecht, M. *Latest Edition. Inquiry Into Life.* McGraw-Hill Higher Education.
Required Lab Manual: Mader, S. S. *Latest Edition. Inquiry Into Life, Lab Manual.* McGraw-Hill Higher Education.

RECOMMENDED READING:

Other sources, including journal and newspapers' articles, research papers etc. recommended by the instructor throughout the semester.

INDICATIVE MATERIAL: (e.g. audiovisual, digital material, etc.)	REQUIRED MATERIAL: N/A RECOMMENDED MATERIAL: N/A
COMMUNICATION REQUIREMENTS:	N/A
SOFTWARE REQUIREMENTS:	MS Office and Blackboard CMS
WWW RESOURCES:	http://www.dnalc.org http://www.medtropolis.com/VBody.asp http://www.whitman.edu/biology/vpd/ http://www.cellsalive.com/ http://multimedia.mcb.harvard.edu/media.html http://www.mcb.harvard.edu/BioLinks.html http://www.mhhe.com/biosci/esp/2002_general/Esp/default.htm http://nhscience.lonestar.edu/biol/bio1int.htm http://biology.uco.edu/AnimalBiology/Tissues/Tissuhome.html http://www.sciam.com
INDICATIVE CONTENT:	<ol style="list-style-type: none"> 1. Embryology and Development <ol style="list-style-type: none"> 1.1. Cleavage, differentiation, and morphogenesis 1.2. Embryonic membranes 1.3. Birth and circulation changes, etc. 2. Reproduction: Cellular Aspects (mitosis and meiosis) 3. Genetics <ol style="list-style-type: none"> 3.1. The chromosome theory of heredity 3.2. Genes and their action – Biotechnology 4. The History of Life <ol style="list-style-type: none"> 4.1. Geological time scale and historical record 4.2. The origin of life 4.3. Fossils 5. Evolution <ol style="list-style-type: none"> 5.1. History and Darwin 5.2. Genetics of populations and natural selection 5.3. Variation, species, and speciation 6. The Diversity of Life <ol style="list-style-type: none"> 6.1. Principles of classification 6.2. Monera, viruses, protista and fungi 6.3. Major groups of animals (basic features and relationships) 6.4. Major groups of plants (basic features and relationships) 7. Ecology <ol style="list-style-type: none"> 7.1. Environment (physical and biotic) 7.2. Cycles of materials and transfers of energy 7.3. Interactions between species 7.4. Succession, and limiting and balancing factors 7.5. Biomes 8. The Geography of Life <ol style="list-style-type: none"> 8.1. Terrestrial communities 8.2 Ecological and historical biogeography 9. Population Ecology
INDICATIVE CONTENT (LAB):	<ol style="list-style-type: none"> 1. Laboratory Safety. Rules and Regulations. Early Starfish and Human Development 2. Cellular Details of Reproduction: Mitosis and Meiosis

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| | <ol style="list-style-type: none">3. Basic Principles of Heredity4. Human Genetics5. DNA Biology and Technology6. Monera, Protista, Fungi7. Seedless Plants8. Seed Plants9. Sponges, Cnidaria, Flatworms, Roundworms, Annelida10. Mollusks, Arthropods11. Echinodermata, Chordata12. Fossils, Symbiotic Relationships13. Effects of Pollution on Ecosystems |
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