

Biology 1009 Spring 2011 Introduction to Biology: Origins, Ecosystems, and Evolution

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Note: ALL email must originate on the MU email server; emails from yahoo, gmail, etc will be discarded.

Website: d2l.marquette.edu for "Biology 1009 - 2011"

TEXT: What is Life? A Guide to Biology

Authors: Jay Phelan, WH Freeman 1st Ed., 2010

Supplemental (suggested): Norris & Warner: Student Study Guide for What is Life?

Required for bonus/extra credit: I-Clicker (for use in lecture)

Lecture Schedule

Lecture # - Topic - Reading Assignment

(text numbers based on reddish colored headings and reddish numbered circles on pp ix-xviii of text)

FUNDAMENTALS OF THE LIVING STATE.

1 1/19 Biology: Past and Future Ch.1

2 1/21 Experimental strategies. Ch.1

3 1/24 Elementary chemistry of matter. Ch.2 (overview) p

4 1/26 Defining life: Organisms, Species, and Cells Ch.3 (overview)

5 1/28 Maintenance of life: Chemistry of metabolism and growth Ch. 4

6 1/31 Components of cells. Ch.3.2-3.5 (overview)

7 2/02 Converting light into matter. Ch.4.1 & 4,2

8 2/04 Energy at environmental temperatures. Ch. 4.3 & 4.4

RULES FOR STABILITY AND FOR CHANGE.

9 2/07 Constancy of the species. Ch. 5.1

-- 2/09 ***** Exam 1 Lectures 1 - 7 *****

10 2/11 Constancy of the species. Ch. 6.1 & 6.2

11 2/14 Forming new generations: Ch. 6.3

12 2/16 Origins of biological diversity. Ch. 5.3

13 2/18 Coding molecular information. Ch.5.2

14 2/21 Decoding molecular information. Ch.5.2(cont.)

15 2/23 Genome: the basis for inheritance. Ch.5.3,5.5,7.3 & 7.4

16 2/25 Genetics of Sex, X and Y. Ch.6.4

17 2/28 Cloning genes. Ch. 5.4 - 5.6

EVOLUTIONARY MECHANISMS

18 3/02 Mechanisms of evolution. 7.1-7.3 & 8.3 (overview)

19 3/04 Changing species: genetically modified organisms. Ch.5.5

20 3/07 Cloning: Genes and Stem Cells (Accelerating evolution) Ch. 5.6

-- 3/09 ***** EXAM 2 Lectures 8- 18 *****

21 3/11 Ethical questions of modern biology. Ch. 5.4

SPRING BREAK

22 3/21 Origin of species. Ch. 8 (overview) and esp. 8.3

23 3/23 Geological Time. Ch. 8.4

THE KINGDOMS OF LIFE

24 3/25 Classifying diversity Ch. 10 (overview)

25 3/28 Microbial World Ch. 13

26 3/30 Plant World. Ch. 12

27 4/01 Animal World. Ch. 11

28 4/04 Animal World. Ch. 11 (cont.)

-- 4/06***** Exam 3 Lectures 19-26 *****

29 4/08 Primates Publisher PDF Files

ANIMAL PHYSIOLOGICAL SYSTEMS

30 4/11 Animal Embryology - lecture notes and Chap 8.5.19

31 4/13 Specialization and function. Publisher PDF Files

32 4/15 Sensing the environment. Publisher PDF Files

33 4/18 Internal transmission of information. Publisher PDF Files

34 4/20 Integration of information Publisher PDF Files

HUMANS AND HUMAN IMPACTS

-- 4/27 ***** Exam 4 Lectures 27- 34 *****

35 4/29 Consciousness: emotion, space and memory. Publisher PDF Files

-- 4/29 Last Date for submission of Minitheme -

-- 4/29 Makeup Exams this week (only!)

36 5/02 Complexity, ecosystems, and evolution. Ch.14 (overview) & 15.1

37 5/04 Biological Energy and Community Interactions Ch.15.2-15.5

38 5/06 Biomes Human Impacts and Human Needs Ch. 16 p

FINAL EXAM 5/10 8:00-10:00 A.M. (Lectures 35-38 (10%) and cumulative (90%))

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Learning Objectives

1. Understand the importance of key experiments in biology for identifying the principles of its respective disciplines (e.g. biochemistry, genetics, ecology, evolution, growth, nutrition, etc).
2. Demonstrate an ability to use and to distinguish between observation, hypothesis, experiment, and theory.
3. Distinguish and explain the difference between the normal state and the pathogenic state for a variety of conditions, ranging from mutation and infections to cancer and systemic disease.
4. Demonstrate an understanding of energy as it is captured and utilized in organisms and ecosystems.
5. Understand and explain the how principles of genetics, taxonomy and evolution enable one to differentiate reliably between phyla and species.
6. Demonstrate how the basic principles of integrative biology apply to sensation, memory, and learning.
7. Know how principles of genetics and evolution and human ecology are relevant to species diversity in the biosphere.
8. Recognize biological problems as they are reported in the national and international media and understand the implications for human populations.

Content Objectives:

Biology 1009 is a course qualified for the MU University Core of Common Studies. The design and content of this course has been constructed so that the course will present not only major concepts in the biological sciences but will also make connections to other areas of human inquiry and endeavor. Human related issues require if not demand a scientific solution for their resolution and understanding. As such, much of the course will be issues-oriented so that the content will be focussed on those aspects which are relevant to a particular problem. The overall course objectives are summarized from the Core of Common Studies:

UCCS: Science and Nature (1 course)

At the completion of core studies the student will be able

1. Demonstrate knowledge of major concepts, tools and methodologies in one of the natural sciences.
2. Understand processes, limitations and ethics of scientific inquiry.
3. Use scientific inquiry to solve problems and evaluate information.

The content, text, and topics of the course are directed to the nonspecialist and do not cover the material in either depth or detail as that of the introductory course for the biological sciences major, Bio1001 or Bio1002. This course therefore is not designated to fulfill the prerequisite requirements for successful application to medical, dental, or other clinically directed post graduate education. Nonetheless, a reasonable familiarity with the primary concepts of biology and related aspects of chemistry and physics, as presented and explained in the text and lectures, is fully

assumed. Modern biology is a discipline that incorporates principles of personal health, nutrition, and to a significant degree, fundamental principles of chemistry and physics.

The key to understanding science is to envision how a basic concept explains a large number of related observations. Major concepts are those that are able to explain the largest number of observations of seemingly diverse systems. In understanding major concepts, it is important to develop an appreciation of how science progresses so that you should be able to understand many current developments that are presented in print and video media. In this context, the key to achieving a working mastery of modern science is to learn the most important aspects of a process, organism, or population and how they can be changed through chemical, environmental, or human intervention. Understanding modern biology means understanding how organisms work, where they live, and how they relate to other organisms. Selected topics will explore the process of science, how questions are formed, how evidence is obtained, and how results can be evaluated. Memorizing biological vocabulary is one way to start, but, in the end, a student needs to know the critical function of the process and what possible outcomes will result with a change in the system.

A necessary part of thinking scientifically is to develop one's analytical skills. This means identifying relevant parts of a complex process and determining which parts or components are critical to the function of the process. Good analysis is possible when vocabulary terms allow identification of these steps.

Vocabulary: The biology of many organisms is best understood from knowing either an anatomical structure or a biological process. Since many of these refer to terms that are beyond normal human experiences, specialized terms have needed to be brought into the scientific dictionary. While all attempts will be made to define novel terms as they are introduced, the text and other sources are alternative means of expanding one's vocabulary.

Attendance: Regular attendance is expected.

Iclickers. Class participation and responses will be obtained by remote input with I-Clickers. Use of the remote device will be linked to each student and participation will be recorded in each class period in which the clickers are used. Evidence of excessive nonparticipation in clicker related learning activities will be recorded and deemed to be equivalent to absences, in which case the rules of the Helen Way Klingler College of Arts and Sciences apply.

If you elect not to use an I-Clicker, then you must make other arrangements for class attendance with Ms. Cherukuri. Grade Penalties for Absence (according to the guidelines of the College of Arts and Sciences): " .. In the case of unavoidable absence (defined below), a student may make up missed

examinations, assignments and exercises within reason and at the discretion of the instructor according to conditions set forth in the course syllabus. It is the student's responsibility to make arrangements with the Teaching Assistant to complete missed work in a timely fashion. In all other cases of absence, instructors are not required to allow students to make up missed work. The final course grade may be reduced to a degree commensurate with any incomplete material. **** In the case of absences (regardless of cause) greater than the equivalent of seven class periods and/or lab, as defined in the syllabus, the student may be dropped from the course, earning a grade of WA. After the WA grade has been issued, the student may not apply for a grade of W...."

Class preparation and comity: To secure the greatest subject mastery, students are expected to preview assigned readings prior to class and should come to class prepared to engage in student based discussions. I-clickers will be used in class and students are expected to bring the I-clicker to every class (except examinations) and to have it ready for use. One should also be respectful of one's fellow students. Cell phone usage, talking, or other behavior are distracting to others (including use of iPhones, textmessaging, and/or other devices). If you plan on using a laptop computer in class, you must sit in the back row of TWC121 and it is expected that such use is solely for the purpose of taking notes. If you have a cell phone or other electronic device, it should be turned off prior to the beginning of class. Electronic devices or calculators are neither permitted nor required in exams.

IClickers: Every I-Clicker must be individually registered by its owner and one is expected to bring one's I-Clicker to every class. Use of one's own clicker as well as another student (on the same question) is not permitted and will result in loss of I-Clicker points for both registered owners. Points cannot be earned by use of I-Clickers that are not registered.

Examinations:

Exams: Examinations will include a combination of True/False, objective choice, short answer, matching, and/or short essay sections. Exams are written specifically for this course and therefore scores will not be "curved" to equal nationally based outcomes. The objective will be to examine the student's knowledge of relevant terminology and processes, ability to recognize or to apply general principles to specific instances and examples, and understanding of the dynamic interactions of organisms and their environments.

Final exam (150 points) is required regardless of course performance and there are no exemptions from the final exam. Absence from final exam results in a grade of X and must be taken in the next semester at a date designated by the registrar. The final examination will selectively include material (approximately 10%) presented since the previous hour exam and the remainder (90%) will be cumulative for the entire semester. Twenty (20) – 1 point questions on the final will be directly derived from questions from the previous 4 exams.

Scoring: 550 points (4 Exams + 150 point final). The lowest score from one of the 4 exams may be reduced by 10% ([see below]) and up to 25 points from the minitheme

submitted according to guidelines. A significant portion of each exam is recorded on "scan" forms, where your choice of correct answers must be recorded with a #2 pencil. **ALL scan forms must include your Exam Key #, MUID, Lastname, and first 5 letters of your first name (all "bubbled in").** Points will be deducted from the exam score for incorrect information (MUID, name, Exam key #, etc). Come to examinations with the required materials including your MUID.

Additional points may be used to add points from a minitheme to the lowest exam, done in such a manner as to generate the largest number of points for the student (with a maximum allowable of 100 points)

GRADING: NO PERMANENT LETTER GRADES ARE ASSIGNED TO ANY SINGLE EXAM. An excused absence from an examination permits one to average the 3 other exams to substitute for the missed exam. Optionally, a student may take a makeup exam on or about April 29; in an instance in which 2 excused exam absences occur, the student will be required to take at least 1 makeup exam. 10% of the lowest exam score may be substituted with up to 25 points from the minitheme score. Note: the optional minitheme will therefore be maximally beneficial to students with a lower than average exam score.

The grading scale is based only on the accumulated points (and not on any previously estimated letter grade or averages of letter grades) and approximately (as a per cent of possible points) as follows:

>92% A, >87% AB, >81% B, >76% BC, >70% C, >63% CD, >55% D, >50% F.

Approximately 25% of the class earns a grade of AB or higher. The letter grade assigned at midterm is approximate and NOT a permanent grade.

MISCELLANEOUS:

Quizzes: I-Clicker questions and quizzes will be administered in lecture and worth a maximum of 25 points. Discussion sections will provide additional practice in asking good questions, solving problems in short quizzes, and clarifying definitions and terminology. For the most part, examinations will assume that the student has mastered the relevant vocabulary and is able to apply that vocabulary to understanding a given biological process; therefore simple memorization of terms is not the route for high grades. Note that the final exam is cumulative and therefore success on the final exam cannot be simply achieved by memorization but rather by continual mastery of terms, processes and principles as they are introduced.

Maximum I-Clicker scores. It is anticipated that inclass clicker points will exceed 25 participation plus correct-answer points. This built in redundancy allows for I-Clicker failure for any of any reasons without penalty.

Total test score readjustment. I-Clicker points will be added to total raw scores after

the grade cutoff points are determined.

Minitheme. [OPTIONAL] 1 minitheme may be used to enhance your grade after the final exam. This 1 page theme can be on any BIOLOGICAL topic of your own choosing, derived from a single original report that appeared after Jan 19, 2011 and for the first time in current periodicals, newspapers, websites or scientific literature. To avoid excessive duplication of topics, students should declare their minitheme topic and source on the course d2l site. (under 'discussions' -details will be provided later) Minithemes may be submitted at any time but in absolutely no case after 29 Apr 2011.

Scoring of minithemes: A satisfactory minitheme is worth 25pts, one that does not meet one or more the minitheme requirements will receive a maximum score of 10pts, one with significant irregularities will receive 0 pts. The minitheme score will be added to an adjusted, lowest exam grade (i.e. less 10% + up to 25 minitheme points. The maximum allowable score for lowest exam (less 10%) + minitheme is 100 points. In no instance will the adjusted score be less than the original lowest exam score.

Failure to follow the minitheme requirements will result in a score of 0.0, without exception and without appeal or option for resubmission:

Minitheme Submission Requirements (no exceptions).

#1: Content of the minitheme must be unquestionably biological in a relevant context. Submission of a theme using a non biological topic is not acceptable and 0 points score will be entered. (this restriction applies to most business models, advertising brochures, climate, global warming and other quasi-biological topics. If in doubt, a minitheme with questionable biological content must first be approved by Dr. Courtright. In general, These non-biological articles are NOT valid sources.

#2: The relevant date is the primary discovery, and not the printed date on a web page.

#3: A copy of the original article is stapled or clipped to the submitted theme.

The purpose of the theme is to demonstrate and to explain a recent newsworthy development in the context of concepts emphasized in this course. Special alternatives (art criticism, creative writing, personal experiences) are also allowable WITH prior permission of the instructor. Examples of these themes will be presented in lectures and on the course web site.

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Writing Assessment Guidelines for Media/ Article Review

ALL minithemes submitted must be based on biologically relevant articles originating in the news or published on dates after 19 Jan 2011 Web sources may be used, but the relevant date is that the scientific publication or announcement, not the date the article was accessed on the Web. Themes dealing with exclusively nonbiological topics, i.e.. microwaves in space, are not acceptable.

The purpose of the report is demonstrate that a student has the ability to read, understand, and to make a judgment about recent biological science, including health related events or developments. This may include, and even emphasize, the prospect for individual or group action or commitment for ones own life or career.

Small group projects are permissible, but each student in the group must provide his or her own UNIQUE perspective and not simply a restating of another students comments. Further, all students collaborating on a multiperspective article should submit a single project or packet, with all students identified.

ALL minithemes must be based on an article not used by any other student; a process for avoiding duplication processed through the course discussion sections. (example: if a new discovery is made during the semester, only at most only two themes for that discovery can be submitted, with the intention of developing two separate interpretations or viewpoints of that discovery.) Approval of a topic will be updated on the course web site.

Priorities are based on the first submission. Information on the web site will be provided in class.

An outline can be included but only as an appendix to your written draft.

Source of biological science for the report may be obtained from the following:

- a) scientific literature, Science, Science News, Nature, etc.
- b) newspapers or newsmagazines, especially those considered to be highly regarded resource papers or magazines.
- c) PBS news (Lehrer News Hour) or PBS science (Scientific American frontiers, NOVA, etc) or PBS archives (for broadcasts after 19 Jan 2011)
- d) articles provided on the course web site as archived from the SigmaXi news stories service.p

e) each minitheme will deal with a unique discovery or report - in practice no two minithemes will report on the same scientific discovery.

Checklist:

1. __ Titled Minitheme - Title in your own words and relevant to the associated article
 2. __ One (single space) to two type-written (double space font is 12 pt.); total length generally not to exceed 500 words.
 3. __ Original article or copy of article included (source must be on the copy)
 4. __ Article / media source and title stated clearly at the start of the paper
 5. __ Review begins with a clear statement of the basic original hypothesis of the science.
 6. __ Review includes a brief summary of the article's content and point(s) of interest discussed.
 7. __ Review states the apparent scientific or logical strengths and/or weaknesses of the article.
 8. __ The minitheme states what new information, interpretation, or discovery is conveyed to the reader. Specific examples from the article (with quotes) are given as to why the point(s) are misleading or particularly insightful.
 9. __ Minitheme is completely free of grammatical and spelling errors and shows evidence have having been completely proofread. Manual diacritical markings are acceptable.
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