SURVEY OF BIOLOGY

GENERAL INFORMATION

COURSE ITEMS

TITLE & CREDIT: Biol 101 - Survey of Biology, 3 semester credits.

DESCRIPTION: This course will survey the broad conceptual framework of the biological sciences. We will start by discussing the nature of life, and the basic processes conducted by living organisms. Initially we will stress unity, or similarity of living systems. We will then move on to evolution and study biological diversity, or the differences between living organisms. We will finish our course by discussing how the extensive diversity of life coexists in the biosphere.

OBJECTIVES: You have one main objective in this course:
To learn the fundamental principles of biology, the science of life.

You have two main reasons to justify why you should pursue this objective:
1) As students you must broaden your horizons: Biology is one of those horizons.
2) As persons, you must be able to form sound opinions, make rational decisions, act accordingly, and then argue logically to support your actions and beliefs: Understanding the principles of biology helps you do these whenever the science of life is involved in the issue.

Only after you understand the principles of biology will you be ready to use your scientific knowledge to form sound opinions, make rational decisions, act intelligently and argue logically on such issues as pollution, licit and illicit drug use, genetic engineering, controversial medical drugs, population growth and abortion. These issues are complex. Solving problems associated with these issues is not easy. But solving these problems is enhanced by a good understanding of the principles of biology. Indeed, lack of knowledge inhibits problem solving.

PREREQUISITES: A willingness to study hard and to think deeply is the only prerequisite for this class. This is not a class for science majors, nor is at taught at that level. There is no correlation between grades earned and previous exposure to high school science classes or your college class standing. This means that you can do well if you have ability and work hard. It also means that you can do poorly if you do not make a good effort to learn biology.

FORMAT: The size of this class limits us to a standard lecture-type format. Nonetheless, you are encouraged to ask questions on difficult concepts when you are confused, and offer thoughtful opinions on controversial topics whenever you wish.

CLASS MEETINGS: TTh, 8:40-10:10 am, Science 104

INSTRUCTOR ITEMS

INSTRUCTOR: Michael Dennis     Office: Sci 136
Phone and voice mail: 657.2016     E-mail: mdennis@msubillings.edu
Home page: www.msubillings.edu/sciences/dennis/

OFFICE HOURS: MW: 12:00-12:45 pm & TTh 10:15-11:00 pm. Sci 136.
Other Hours: By appointment, and whenever you can catch me in my office.

CONSULTATIONS: It is your responsibility to monitor your own progress in class. But, you are encouraged to visit with me to keep track of your progress if necessary.
EVALUATION ITEMS

EXAMS: There will be 4 (45-60 minute) exams and a comprehensive final. Material for examinations will be taken primarily from lecture discussions. Exams may be composed of a variety of types of questions including: multiple choice, matching, true-false, short answer and essay. Overall, it is much more important to understand the material you are studying, than to try to memorize all the details or worry about the kinds of questions that may be on an exam.

Exams #1, #2 and #3 will be given at the beginning of class periods. Exam #4 will be given in conjunction with the comprehensive final.

I will try to schedule review/study sessions before every exam to help you with questions/difficulties you may be having. Remind me if I forget to do this.

Make-up exams will not be given without prior approval. Make-up exams due to illness require an excuse from a physician. Approved make-up exams may be composed of all essay questions. The final exam will be given at the scheduled time. Under no circumstances will it be given in advance of the scheduled time. My very strong recommendation is that you plan to take all exams at the scheduled times because it is greatly to your advantage to do so.

GRADING: The approximate value of the examinations to your final grade is as follows:
- Exams #1, #2, #3 and #4 20% each
- Final Exam - Comprehensive 20%

STANDARDS: My interpretation of the university grading scale is as follows:
- A = Excellent Thorough understanding of all major concepts; and, concepts supported by extensive details.
- B = Good Thorough understanding of most major concepts; and, concepts minimally supported by details
- C = Average General understanding of most major concepts; but, deficiency of, or errors in, many details.
- D = Minimally Passing Weak grasp of even major concepts; or, extensive errors in concepts and details
- F = Failure Weak grasp of major concepts and many factual errors.

ASSESSMENT: Due to the size of the class, the only item used to measure your academic achievement will be your exam scores. The exams will be largely information-type exams. Additional extra credit will not be available.

FINAL GRADES: Grades will be curved at my option but to no higher than:
- A=>90%, B=80-89%, C=70-79%, D=60-69%, F=<60%

Changing these standards is at my discretion. Often there is a significant curve downward (to approximately A=85%, B=75%, C=65%, D=60%).

The per cent of past students achieving a particular grade is approximately:
- A=10%, B=30%, C=40%, D=10%, F=10%

Most students who fail do so because they quit, rather than a lack of ability.

ACADEMIC HONESTY: It is your responsibility to familiarize yourself with the Student Affairs Handbook (in particular Part IX, B.1, Academic Misconduct). All students are expected to adhere to the highest standards of academic honesty and refrain from any action which is dishonorable or unethical. In all exams, quizzes, etc., students are expected to submit their own work entirely. Cheating or alleged cheating on an exam or a quiz will result in a grade of 'F' for the class. I will ask you to space yourselves widely for your exams, because even attempted cheating will earn you an immediate 'F' for the course.

Plan on purchasing a text and actually using it for studying. You can use the above text, or, if available to you, any recent, high quality biology textbook. If you use a different text it will be up to you to make the minor adjustments in assigned reading. I do not recommend you purchase or use a study guide. I do recommend you use the Student Resource CD that comes with the text. Your class notes, my reading guidelines and the text and CD should be your sources of information.

READING GUIDE: Use the following as a guide for the intensity of your reading effort:

- **Read very carefully** = Read and study hard, even the details. The material is very important and fundamental to basic biology.
- **Read carefully** = Read and study well, even the details. The material is important and will be used at later times in the course.
- **Read** = Read and understand the concepts well. The concepts are important but the extensive details are not worth memorizing.
- **Review** = Read for background and perspective. The material is valuable, it helps provide insight, but it is not essential to ‘study’ it.
- **Summarize** = Read superficially if time permits. The material is interesting or informative, but may not be covered in class.
- **Skip** = We will not cover this in class.

SCHEDULE: We will do our best to keep to the Schedule of Events. We will complete the entire course. Exams are scheduled, but may be changed by me or by a 65% vote of the class if done so in advance of the test date.

ATTENDANCE: Attention and attendance at lectures is highly recommended because there is a direct correlation between active attendance in class and success in biology. Learning biology by studying the text alone is difficult.

I will provide lecture outlines on a daily basis to help guide you through the important topics that we cover. You need to come to class to pick up the outlines. I will not supply detailed lecture notes to students for any reason.

CLASS ETIQUETTE: Regretfully, I need to establish a few guidelines to maintain a quality learning environment for the benefit of the entire class. I will come to class on time, prepared and with a plan to fully utilize your valuable time. I will treat you with the respect you deserve. I will help you learn biology, and try to make biology relevant to your education and your daily life. I take my responsibilities very seriously and expect you to do the same by following these guidelines:

- Tape recording of lectures is strictly prohibited without prior approval.
- Cell phones are not permitted in class.
- Class begins at the scheduled time: if emergency requires that you come late to class, do so without interrupting the class. Enter the lecture hall quietly and from the side. Chronic tardiness is grounds for failure of the class.
- Class ends when I finish the lecture. Do not make plans or efforts to leave early. You can gather your materials together when class is over.
- Do not come to class to sleep, listen to music or just to visit with each other. Failure to abide by these simple guidelines is not only disrespectful to the class, it is disruptive to the learning process, and may result in failure of the class.

DISABILITIES: Students with disabilities should contact Disabilities Support Services so that appropriate accommodations can be made as quickly as possible.
SUMMARY

RECOMMENDATIONS: I believe learning is an active process, and the responsibility for learning is yours. I would offer you the following hints for success:
- Prepare for class a day or two in advance by reviewing the text and THINKING about and trying to learn the major concepts.
- Come to class, listen, take good notes, and THINK about what you hear. Try to support the concepts you know with the details presented in class.
- Read your book after class and THINK about what you are reading. You should try to accomplish a deeper understanding of biological concepts.
- Study hard for exams by THINKING about what you are studying.

Understanding biology takes effort. It is not a passive activity. Success in biology is not related as much to the amount of time spent in and after class, as it is to the quality of the effort. Plan to begin studying for exams well before they are scheduled: cramming before exams is generally not sufficient, and studying old exams is practically worthless. A constant, sustained effort is better for actually learning biology, and is essential for surviving a comprehensive final.

RESPONSIBILITY: I expect you to become an active participant in the learning process. I am responsible for guiding you through and helping you achieve the goals you set for yourself, but you are ultimately responsible for your progress in this class.

COURSE OUTLINE AND SCHEDULE OF EVENTS: Fall, 2004

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<tr>
<th>Day</th>
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<th>Topic</th>
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<td>9 Sept</td>
<td>Course Introduction</td>
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<td><strong>I: Introduction to the Life Sciences</strong></td>
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<td>The Process of Science</td>
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<td>The Nature of Life: A Definition</td>
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<td>The Chemistry of Life: General Chemistry</td>
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<td>The Chemistry of Life: Biochemistry</td>
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<td>? Hormonal Coordination of Activities: Anabolic Steroids</td>
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<td><strong>II: The Unity of Biological Systems: The Cellular Basis of Life</strong></td>
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<td>21</td>
<td>The Nature of Cells: Cell Structure and Function</td>
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<td>The Nature of Cells: The Living Cell</td>
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<td>Energy: Cells as Energy Trapping Machines</td>
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<td>Energy Trapping in Cells: Respiration</td>
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<td>? Nutrition and Digestion: Ethanol</td>
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<td>Energy Trapping in Cells: Photosynthesis</td>
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<td>? The Biology of Light</td>
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<td><strong>EXAM #1 - The Cellular Basis of Life</strong></td>
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<td>Cellular Reproduction</td>
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<td><strong>III: The Unity of Biological Systems: The Genetic Basis of Life</strong></td>
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<td>Inheritance: Mendel and the Laws of Genetics</td>
<td>9</td>
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T 12  Inheritance: Human Genetics 9
Th 14  The Molecular Genetic Basis of Life: Genes 10

T 19  The Molecular Genetic Basis of Life: Gene Expression 11
Th 21  Human Perspective: Modern Genetic Technology 12

T 26  Human Perspective: Gene Mutations and Cancer --
Th 28  EXAM #2 - The Genetic Basis of Life 8-12
IV: Evolution: The Generation of Biological Diversity
Darwin and His Legacy 13

T  2 Nov  HOLIDAY: VOTE!
Th  4  Evidence and Mechanisms of Evolution: How, Not Why! 13
     The Products of Evolution: Speciation 14

T  9  Evolution: The Origin of Life 15
     ? Science and Religion --
Th 11  HOLIDAY

T 16  Diversity of Life: Bacteria, Protists 16
     Diversity of Life: Viruses 10
     ? The Immune System: AIDS 24
Th 18  Diversity of Life: Fungi, Plants and Animals 17-18
     Human Evolution 19
     Human Perspective: Humanness --
     ? Reproduction, Development, Birth Control and Abortion 27

T 23  EXAM #3 - The Diversity of Life 13-19
V: Ecology: Interactions of Organisms in the Biosphere
Ecosystems: Distribution of Organisms in the Biosphere 34
Th 25  HOLIDAY

T 30  Population Dynamics and Human Population Growth 35
Th 2 Dec  Ecology: Interactions of Organisms in Communities 36

T  7  Ecosystem Structure: Flow of Energy and Cycling of Nutrients 36
Th  9  Human Ecology: Human Impacts on the Biosphere 38
     Human Ecology: Solutions to Problems 38
     ? The Nervous System: Drugs as Toxicants 28

W 15 Dec  EXAM #4 (34-38) and FINAL EXAM (Comprehensive):
    12:00-1:50pm  Note: The date and time of this exam cannot be changed!

? We will try to squeeze these optional topics into the class lecture sequence as best we can.
The chapter listings are for reference only. If we cover these topics then you are responsible for them for test purposes. However, you are not expected to study the reference chapters in any detail!