

GENERAL BIOLOGY I

Course Syllabus

for

Biology 1101

Coordinators: Profs. D.M. Bakewicz and T. Voza

Textbook: BIOLOGY by Sylvia Mader, 10th Ed., McGraw-Hill, 2010

Laboratory Manual: General Biology I Lab Manual, Wm. C. Brown Publishers, 1998

WEEK	LECTURES	TOPIC	PAGES
I	1.	<u>BASICS</u> Introduction to the Course Definition, Characteristics and Hierarchy of Life Ecosystems and Populations The Scientific Method Classification and Naming	1-19 338-340
	2.	<u>THE ORIGIN & EVOLUTION OF LIFE</u> Evolution The Origin of Life The Geological Time Scale Cellular History Kingdoms and Domains	265-282 317-319 348-351
II	3.	<u>INORGANIC CHEMISTRY I</u> Definition, Classification and Properties of Matter Energy Chemical Reactions: Exergonic and endergonic Activation Energy Atomic Structure Oxidation and Reduction The periodic Table Isotopes Electrons and Energy	22 104 106 108 22-25 112 23 24 25
	4.	<u>INORGANIC CHEMISTRY II</u> Elements, Compounds, Molecules and Mixtures Bonds: Weak and Strong	26-27 26-28
III	5.	<u>WATER & pH</u> Importance and Properties of H ₂ O Acids, Bases, pH, Buffers	28-31 32-34

	6. <u>ORGANIC CHEMISTRY</u>	38-39
	Importance of Carbon	
	Organic vs. Inorganic Compounds	
	The Hydrocarbons	
	Functional Groups	
	Isomers	
IV	7. Examination I (Lectures 1-6 inclusive)	
	8. <u>MACROMOLECULES I</u>	40-47
	Monomers and Polymers	
	Dehydration Synthesis and Hydrolysis	
	Carbohydrates	
	Lipids	
V	9. <u>MACROMOLECULES II</u>	
	Proteins	48-51
	Enzymes and Metabolic Pathways	108-111
	Nucleic Acids	52-56
	ATP	53-54
	10. <u>CELLS</u>	
	The Cell Theory	60-63
	Methods of Studying Cells	
	Cellular Size Limitations	
	Cell Composition	
	Prokaryotic and Eukaryotic Cells	64-69
	Cellular Evolution	320-327
	Anaerobic and Aerobic Cells	
	Endosymbiosis	
	Multicellularity	
	Viruses, Bacteria and Archaea	354-372
VI	11. <u>THE EUKARYOTIC CELL</u>	
	Eukaryotic Cell Structure and Function	68-84
	12. <u>MEMBRANES & TRANSPORT</u>	
	Membrane Structure and Function	85-90
	Passive Transport Processes	91-94
	Active Transport Processes	94-97
	Cell Surface Modifications	98-100
VII	13. Examination II (Lectures 8-12 inclusive)	
	14. <u>ENERGY</u>	
	Cells and the Flow of Energy	104-105
	Metabolic Reactions and Energy Transformations	105-107
	Metabolic Pathways	108
	Organelles and the Flow of Energy	112-114
VIII	15. <u>CELLULAR RESPIRATION I</u>	

	Cellular Respiration (Anaerobic)	134-137
	Outside the Mitochondria: Glycolysis	
	Fermentation	138-139
	16. <u>CELLULAR RESPIRATION II</u>	
	Cellular Respiration (Aerobic)	136-141
	Inside the Mitochondria:	140-144
	The Preparatory Reaction	
	Citric Acid Cycle	
	Electron Transport Chain	
	Metabolic Pool	145-147
IX	17. <u>PHOTOSYNTHESIS I</u>	
	Photosynthetic Organisms	118-119
	The Process of Photosynthesis	120-121
	Plant as Solar Energy Converters:	122-125
	Light Reactions	
	18. <u>PHOTOSYNTHESIS II</u>	
	Calvin Cycle Reactions :	126-127
	Dark Reactions	
	Other Types of Photosynthesis	128-130
X	19. <u>ASEXUAL REPRODUCTION</u>	
	The Cell Cycle and Its Control	152-154
	Mitosis and Cytokinesis	153-160
	The Cell Cycle and Cancer	161-163
	Prokaryotic Cell Division	164-166
	20. <u>SEXUAL REPRODUCTION</u>	
	Halving the Chromosome Number	170-171
	Genetic Variation	172-173
	The Phases of Meiosis	173-176
	Comparison of Meiosis and Mitosis	177-178
	The Human Life Cycle (Spermatogenesis & Oogenesis)	178-179
	Life Cycles	380
XI	21. Examination III (Lectures 14-20 inclusive)	
	22. <u>GENETICS I</u>	
	Gregor Mendel	190-191
	Mendel's Law	192-197
	Human Genetics Disorders	198-201
XII	23. <u>GENETICS II</u>	
	Extending the Range of Mendelian Genetics	202-209
	Multiple Allelic Traits	
	Incomplete Dominance	
	Pleiotropy	
	Polygenic Inheritance	

X-Linked Inheritance

	24.	<u>CHROMOSOMES</u> Changes in Chromosome Number and Structure	180-186
XIII	25.	<u>DNA</u> The Genetic Material DNA Structure DNA Replication Prokaryotic versus Eukaryotic Replication	212-213 214-216 217-218 219
	26.	<u>GENE FUNCTION</u> The Genetic Code Transcription Translation Structure of the Eukaryotic Chromosome	220-221 222-223 224-228 228-230
XIV	27.	<u>GENETIC REGULATION</u> Prokaryotic Eukaryotic Regulation Through Mutations	234-236 237-242 243-246
	28.	<u>BIOTECHNOLOGY & GENOMICS</u> DNA Cloning Biotechnology Products Gene Therapy Genomics	250-252 252-254 254-255 255-261
XV	29.	<u>ANIMAL DEVELOPMENT</u> Early Developmental Stages Developmental Processes Human Embryonic and Fetal Development	778-781 782-786 787-795
	30.	Examination IV (Lectures 22-29 inclusive)	

LABORATORY SCHEDULE

<u>WEEK</u>	<u>EXERCISE</u>	<u>PAGE</u>
I	The Microscope: Basic skills	1
	The Origin Of Life (time permitting):	9
	Prepare microspheres	10
	Stain Eukaryotic cheek cells	
II	pH Determination: Acids, Bases, Buffers and Coacervates	45
III	Amino Acid Chromatography (Theory)	25
	Separation of dye molecules (on sheets to be provided)	
	Measurements in Science: Metric System	27
IV	Biologically Important Molecules I:	
	Carbohydrates &	11
	Lipids	16
V	Biologically Important Molecules II:	
	Proteins	15
	Nucleic Acids	17
	The Enzymatic Purification of DNA	115
	Dische's Test	116
VI	Quantitative Determination of Proteins (Colorimetry Background)	31 34
VII	Enzyme Kinetics	75
VIII	Membranes and Biological Transport:	55
	Diffusion and Osmosis	
	Active Transport (theory only)	67
IX	Cellular Respiration : Anaerobic and Aerobic	179
X	Photosynthesis	185
XI	Principles of Gel Electrophoresis	95
	Restriction Enzyme digestion (theory)	
	Polymerase Chain Reaction (theory)	
XII	DNA Fingerprinting	103
XIII	Mitosis: Replication of Eukaryotic Cells	117
	Meiosis: Reduction Division and Gametogenesis	129

XIV	Genetics Problems (numbers 3, 6, 9, 11, 15, 20, 24, a single factor cross-page 145, a double factor cross-page 147 Human Variations (for reference and practice)	143 155
XVI	Mendelian Genetics I: Corn Mendelian Genetics II: Chi-Square	167 171

BIOLOGY I (BY 1101) COURSE INFORMATION

MATERIALS

In addition to the lecture text and the lab manual, you will need a separate notebook for lecture and lab. For the lab, you will also need pencils, a pen, a ruler, an electronic calculator, a lab coat, and a china marker (grease pencil). These supplies can all be obtained from the bookstore.

WORKLOAD

Considerable effort must be expended in order to satisfactorily complete the course. It is expected that you will spend at least 3 hours per week in preparation for each credit hour of course work; this is a total of 12 hours. If you are not able to devote the requisite amount of time to your studies then you should seriously reconsider your decision to take the course at this time.

ATTENDANCE AND LATENESS

You must attend both lecture and lab. Absences in excess of 10% of the total lecture or lab hours will result in your being dropped from the course with a failing grade. This means that no more than 3 lecture or 2 lab absences will be tolerated. It is expected that you will be in your seat and ready to work at the start of each period. Any 2 latenesses will be considered to be equal to 1 absence.

GRADING POLICY

Your grade for the course is computed by adding 60% of your lecture average to 40% of your lab average. There are 4 lecture examinations which each cover one quarter of the lecture work as indicated in the outline; these are announced at least one week in advance by your instructor. Seventy five percent of your lab grade is derived from your quiz average; quizzes are given every other week. The remaining 25% of your lab average is based on the quality and completeness of your lab work. ALL GRADES ARE COUNTED; NONE ARE DROPPED NOR ARE THEY CURVED. NO MAKE-UPS ARE GIVEN EXCEPT AT THE DISCRETION OF THE INSTRUCTOR PENDING SUBMISSION OF WRITTEN PROOF OF REASON FOR ABSENCE.

<u>Letter Grade</u>	<u>Numerical Ranges</u>
A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	70-76.9
D	60-69.9
F	59.9 and below

SUGGESTIONS

You are responsible for all material, announcements, or assignments mentioned in class whether you are present or not. It is therefore advisable to write down the name of your instructor(s), the office, phone extension and office hours. It is also advised to get the names and phone numbers of several classmates who may be contacted in the event that you are absent.

In order to optimize your performance, it is strongly advised that you read your lecture and lab assignments prior to coming to class. At the end of each chapter in the text and in the lab manual review questions are available for you to test yourself. A Student Study Guide may be purchased along with your text book. Tutorial help in the Resource Center is usually available if additional assistance is needed.

For those of you that have computers, a student interactive CD-ROM is provided with each text. McGraw-Hill's ARIS (Assessment, Review and Instruction System) at <http://www.mhhe.com/maderbiology10> has much to offer. This includes: Interactive Activities (practice quizzes, animations, labeling exercises, flashcards, etc.); Online Tutoring; Animations and Animation Quizzes.

If you encounter any serious difficulties during the semester, it is suggested that you make an appointment with an instructor to discuss them.