



Philadelphia University
Faculty of Science
Department of Biotechnology and Genetic Engineering
Second Semester, 2009/2010

Course Syllabus

Course Title: General Biology (2)	Course code: 240107
Course Level: 1-2	Course prerequisite (s) and/or corequisite (s):
Lecture Time: Sec.(1): 10:10 – 11:00 (Sun, Tue, Thu)	Credit hours: 3

Academic Staff Specifics

Name	Rank	Office No.	Office Hours	E-mail Address
Dr. Fuad A. Al-Horani	Associate Professor		9:00–10:00 Sunday, Tuesday, Thursday 9:00-12:00 Wednesday	fal_horani@hotmail.com

Course module objectives:

- The course will provide the students with the basic understanding of the fundamental principles of biology.
- The topics covered in this course will allow the students to better comprehend other courses during the following academic years.

Course/ module components

Title: Biology, 8th edition (2008).

Author(s): Neil A. Campbell and Jane B. Reece

Publisher: Benjamin Cumming's Publishing Company.

Year of publication: 2008

ISBN:0-8053-7146-x

- **Support material (s).**
- **Study guide (s).**
- **Homework and laboratory guide (s).**

Teaching methods:

- Lectures, discussion groups, tutorials, problem solving, debates, etc.
- The use of Colored Transparent Slides, Power Point presentation, Illustration with models, educational animations, and movies.
- The publisher of the text book, Benjamin Cummings, provide a useful free website, which student can access upon purchase of the text book. This website contains several activities and applications that support the understanding of the biological concepts.

Learning outcomes:

- **Knowledge and understanding**

At the end of this module, students will be able to:

- * Describe plant physiological characteristics.
- * Describe animal physiological characteristics.

- **Cognitive skills (thinking and analysis).**

- The Thinking and Meditation about the Great Ability of God in Creation of our body and the biological systems.
- The thinking skills will be developed by encouraging students to conclude answers to different questions that the instructor intends to use during the presentation of the scientific material.
- The instructor intends to stimulate the student's analytical thinking side via connections with general aspects in daily life or through questions, net searching, and home works.

- **Communication skills (personal and academic).**

- Gain Teamwork skills
- The students have the option to share open discussion and to ask questions during the class or any other times.
- Students have the opportunity to communicate with others especially professors, while searching answers for home works or through encouraging them to attend different scientific activities that are available in the department.

- **Practical and subject specific skills (Transferable Skills).**

- Improve the ability to search using the scientific ways to get the biological concepts.
- Improve the ability to analyze different terms or phrases to its basic parts.
- Enhance the using of the most appropriate ways for studying the text book material in order to benefit from the biological subjects for life.
- The students will be encouraged to convert the theoretical material to 3-dimensional models from simple available raw materials.

Allocation of Marks	
Assessment Instruments	Mark
First examination	20%
Second examination	20%
Final examination: 50 marks	50%
Reports, research projects, Quizzes, Home works.	10%
Total	100%

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Course/module academic calendar

Week No.	Chapter No.	Topic	Pages
1	38	ANGIOSPERM REPRODUCTION & BIOTECHNOLOGY 38.1. Flowers, double fertilization, and fruits are unique features of the angiosperm life cycle Flower Structure and Function Development of Male Gametophytes in Pollen Grains Development of Female Gametophytes (Embryo Sacs) Pollination Double fertilization Seed development, form and function Endosperm development Embryo development Structure of the mature seed Seed Germination and seedling development	801 801-809
2	36	RESOURCE ACQUISITION AND TRANSPORT IN VASCULAR PLANTS 36.2. Transport occurs by short-distance diffusion or active transport and long-distance bulk flow Diffusion and active transport of solutes Diffusion of water (osmosis) How solutes and pressure affect water potential Measuring water potential Aquaporins: Facilitating diffusion of water Three major pathways of transport Bulk flow in long-distance transport 36.3. Water and Minerals are Transported From Roots to Shoots Absorption of water and minerals by root cells Transport of water and minerals into the xylem Bulk flow driven by negative pressure in the xylem Pushing xylem sap: Root pressure Pulling xylem sap: The transpiration-cohesion-tension mechanism Cohesion and adhesion in the ascent of xylem sap Xylem Sap Ascent by bulk flow: A review 36.4. Stomata Help Regulate the Rate of Transpiration Stomata: Major Pathways for Water Loss Mechanisms of stomatal opening and closing Stimuli for stomatal opening and closing Effect of transpiration on wilting and leaf temperature 36.5 . Sugars are Transported from Leaves and Other Sources to Sites of Use or Storage Movement From Sugar Sources to Sugar Sinks Bulk flow by positive pressure: The mechanism of translocation in Angiosperms	764 767-772 772-776 776-778 779-780
3	39	PLANT RESPONSES TO INTERNAL AND EXTERNAL SIGNALS 39.1. Signal Transduction Pathways Link Signal Reception to Response Reception, Transduction and Response 39.2. Plant hormones help coordinate growth, development and response to stimuli The Discovery of Plant Hormones A Survey of Plant Hormones	821 821-823 824-834

4	46	ANIMAL REPRODUCTION 46.3. Reproductive Organs Produce and Transport Gametes Female reproductive anatomy Male reproductive anatomy 46.4. The Timing and Pattern of Meiosis in Mammals Differ For Males and Females Spermatogenesis and Oogenesis 46.5. The interplay of Tropic and Sex hormones Regulates Mammalian Reproduction Hormonal control of the male reproductive system The reproductive cycles of females 46.6. In Placental Mammals, An Embryo Develops Fully Within The Mother's Uterus Conception, embryonic development and birth First, second and third trimesters Lactation	997 1003-1006 1007 1007-1012 1012-1015
5	47	ANIMAL DEVELOPMENT 47. 1. After Fertilization, Embryonic Development Proceeds Through Cleavage, Gastrulation and Organogenesis Fertilization The acrosomal and cortical reactions Activation of the egg Fertilization in mammals Cleavage and gastrulation Organogenesis	1021-1032

6-7	42	CIRCULATION AND GAS EXCHANGE 42.1. Circulatory Systems link Exchange surfaces with Cells Throughout the Body Organization of vertebrate circulatory systems Single and double circulations Adaptations of double circulatory systems (Amphibians, reptiles, mammals and birds) 42.2. Coordinated Cycles of Heart Contraction Drive Double Circulation in Mammals Mammalian circulation The Mammalian Heart: A closer look Maintaining the Heart's Rhythmic Beat 42.3. Patterns of Blood Pressure and Flow Reflect the Structure and Arrangement of Blood Vessels Blood Vessels Structure and Function Blood Flow Velocity Blood Pressure Capillary Function Fluid Return by the lymphatic system 42.4. Blood Components Function in Exchange, Transport and Defense Blood Composition and Function Blood Clotting Stem Cells and Replacement of Cellular Elements Cardiovascular Diseases 42.5. Gas Exchange Occurs Across Specialized Respiratory Surfaces Partial pressure gradients in gas exchange Mammalian Respiratory Systems: A closer look 42.6. Breathing Ventilates the Lungs How a Mammal Breathes	898 900-903 903-905 906-910 911-915 915, 919-920 920-922
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		Control of Breathing in Human 42.7. Adaptations for Gas Exchange Include pigments that Bind and Transport Gases Coordination of circulation and gas exchange Respiratory Pigments Hemoglobin Carbon Dioxide Transport	923-925
8	43	THE IMMUNE SYSTEM 43.1. In Innate Immunity, Recognition and Response rely on Shared Traits of Pathogens Innate immunity of vertebrates Barrier Defenses Cellular Innate defenses Antimicrobial peptides and proteins Inflammatory responses Natural killer cells 43.2. In acquired Immunity, Lymphocyte Receptors provide Pathogen-Specific Recognition Acquired immunity: An overview Antigen recognition by lymphocytes Amplifying lymphocytes by clonal selection 43.3. Acquired Immunity Defends Against infection of Body Cells and Fluids Helper T cells: A response to nearly all antigens Cytotoxic T cells: A response to infected cells B cells: A response to extracellular pathogens Active and passive immunization Immune rejection	930 933-935 936-938 940-941 942-948
9	44	OSMOREGULATION AND EXCRETION 44.2 Animal's Nitrogenous Wastes Reflects Its Phylogeny and habitat 44.3. Diverse Excretory Systems are Variations on Tubular Theme Structure of the mammalian excretory system 44.4.The Nephron is Organized for Stepwise Processing of Blood Filtrate From blood filtrate to urine Solute gradients and water conservation	954 959-960 963-964 964-968
10	45	HORMONES AND THE ENDOCRINE SYSTEM 45.1. Hormones and Other Signaling Molecules Bind to Target Receptors, Triggering Specific Response Pathways Types of secreted signaling molecules Chemical Classes of hormones Hormone receptor location: Scientific inquiry Cellular response pathways Multiple effects of hormones Signaling by local regulators 45.2. Negative feedback and antagonistic hormone pairs are common features of the endocrine system Insulin and glucagons: control of blood glucose 45.3. The Endocrine and Nervous Systems Act Individually and Together in Regulating Animal Physiology Coordination of endocrine and nervous systems in vertebrates Posterior pituitary hormones Anterior pituitary hormones 45.4. Endocrine Glands Respond to Diverse Stimuli in Regulating Metabolism, Homeostasis, Development and	975 975-981 981-984 984-989 990-994

		Behavior Thyroid hormone: Control of metabolism and development Parathyroid hormone and Vitamin D: Control of blood calcium Adrenal Hormones: Response to stress Gonadal sex hormones	
11-12	48	NEURONS, SYNAPSES AND SIGNALING 48.1. Neuron Organization and Structure Reflect Function in Information Transfer Introduction to Information processing Neuron structure and function 48.2. Ion Pumps and Ion Channels Maintain Resting Potential Formation of the resting potential Modeling of resting potential 48.3 Action Potentials are the Signals Conducted by Axons Production of action potentials Generation of action potentials: A closer look Conduction of action potentials 48.4 Neurons Communicate with Other Cells at Synapses Generation of postsynaptic potentials Summation of postsynaptic potentials Modulated synaptic transmission Neurotransmitters	1047 1047-1049 1050-1051 1052-1056 1056-1061
13	50	SENSORY AND MOTOR MECHANISMS 50.1. Sensory Receptors Transduce Stimulus Energy and Transmit Signals to the Central Nervous System Sensory pathways Types of sensory receptors 50.5. The Physical Interaction of Protein Filaments is Required for Muscle Function Vertebrate Skeletal Muscle Other Types of Muscle	1087 1087-1091 1105-1111
14	41	ANIMAL NUTRITION 41.3. Organs Specialized for Sequential Stages of food processing Form the Mammalian Digestive System The oral cavity, pharynx and esophagus Digestion in the stomach Digestion in the small intestine Absorption in the small intestine Absorption in the large intestine	875 884-890

Module references

Books

Title: Biology

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ISBN:0-8053-7146-x

In addition to the above, the students will be provided with handouts by the lecturer.

Students will be expected to give the same attention to these references as given to the Module textbook(s)

1. Karp, G. Cell and Molecular Biology, concepts and Experiments. 2002, 3rd edition, John Wiley publishing company, ISBN 0-471-38913-7.
2. Bruce, A., Bray, D., Hopkins, K., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P. Essential Cell Biology. 2004. Garland Publishing company. ISBN: 0-

Journals

(To be added)

Websites

www.campbellbiology.com (Use your own access code provided with the textbook)

www.biology.arizona.edu

www.cellsalive.com

www.ncbi.nlm.nih.gov