ATENEO DE MANILA UNIVERSITY
Loyola Schools
Generic Course Syllabus for 2nd Semester, School Year 2012-2013

Department	Biology Dept.	School	SOSE

Course No.	Bi 5
Course Title	Biotechnology for Everyone (Lecture)
No. of Units	3

Course Description:

This is a course that introduces the scientific basis, historical development and current applications of traditional and modern biotechnology. It will focus on the basic principle of biotechnology and its application in food, agriculture, industry, environment, health and medicine. Discussions on the ethical, legal and moral issues brought by these applications will guide students to make informed decisions as our society adopts more of what modern biotechnology has to offer.

Course Objective/s:

1. To describe the historical development of biotechnology and appreciate its importance on the advancement of civilization;
2.To analyze and appreciate the principles behind experiments that paved the way to modern genetic manipulation; and
3. To evaluate the ethical, legal and social implications of proposed applications of biotechnology

Course Outline:

I. Introduction (weeks 1 – 4)
- A. History and Development
- B. The Eukaryotic and Prokaryotic Cell
- C. Prokaryotic and Eukaryotic Cell Division

II. Central Dogma of Molecular Biology (weeks 5 – 9)
- A. The Message in the Double Helix
- B. DNA Replication
- C. Transcription
- D. Protein Synthesis(Translation)

III. Basic Recombinant DNA Technology (weeks 11 – 15)
- A. Cloning Vectors and Restriction Enzymes
- B. rDNA techniques
- C. DNA microarray
- D. Plant, Animal and Microbial Biotechnology
- E. Regulation of Biotechnology

IV. Biotechnology Updates (weeks 16 – 17)
    A. Latest Trends in Biotechnology
    B. Applications of Biotechnology

References (optional):

Bruce A, Johnson A, Lewis J, Raff M, Roberts K, Walter P. 2002. Molecular biology of the cell. 4th ed. New York: Garland Science.

Barnum S. 2005. Biotechnology: An introduction. 2nd ed. USA: Thomson Brooks/Cole.

Ignacimuthu S. 2008. Biotechnology: An introduction. UK: Alpha Science International Limited.

Smith JE. 2009. Biotechnology. 5th ed. USA: Cambridge University Press.

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Department	Biology Dept.	School	SOSE

Course No.	Bi 6
Course Title	Biotechnology for Everyone (Laboratory)
No. of Units	1

Course Description:

This course introduces the scientific basis, historical development and current applications of traditional and modern biotechnology. It will focus on the basic application of biotechnology in food, agriculture, industry, environment, health and medicine.

Course Objective/s:

1. To describe the principles behind experiments that paved the way to modern genetic manipulation;
2. To describe the principles behind the experiments of modern biotechnological innovations;and
3. To evaluate the ethical, legal and social implications of proposed applications of biotechnology.

Course Outline:

Week 1: Introduction to the laboratory safety rules
Week 2: Experiment 1- Use of the micropipette
Week 3: Experiment 2- The Prokaryotic and Eukaryotic Cells
Week 4: Experiment 3- Plant Mitosis
Week 5: Experiment 4- Fermentation: yogurt making
Week 6: Experiment 5- Microorganisms in the environment
Week 7-8: Experiment 6- Isolation of bioluminescent bacteria
Week 9-10: Experiment 7- Plant extracts with antimicrobial activity
Week 11: Experiment 8- DNA isolation
Week 12: Experiment 9- Gel electrophoresis
Week 13: Experiment 10- Restriction digestion of plasmid DNA

References (optional):

Bruce A, Johnson A, Lewis J, Raff M, Roberts K, Walter P. 2002. Molecular biology of the cell. 4th ed. New York: Garland Science.

Barnum S. 2005. Biotechnology: An introduction. 2nd ed. USA: Thomson Brooks/Cole.

Ignacimuthu S. 2008. Biotechnology: An introduction. UK: Alpha Science International Limited.

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Department	Biology	School	SOSE

Course No.	Bi 7
Course Title	Introduction to the plant world (Lecture)
No. of Units	3

Course Description:

Introduction to the Plant World (Bi 7 & 8) is an introduction and overview on the different aspects of plant form, structure, and development as it affects life, people and the environment. At the end of the course, the student is expected to appreciate the relevance of plant activities which are vital to the welfare of nearly all organisms that share Earth, including man. Renewed interests in plants, should be an important output, as environmental issues have brought the importance of plants back into sharp focus and new approaches have catalyzed botanical research.

Course Objective/s:

After the course, the student should have gained
1. a comprehensive knowledge of the structural and functional characters of plants at various levels of organization, i.e. cell, organism, population, community, ecosystem
2. an appreciable understanding of the principles underlying plant diversity, heredity and variation and
3. a clear grasp of existing interrelationship among and between plants and their environment.

Meeting the above objectives can take on a greater significance only if students likewise gain a sense of responsibility, an active appreciation and a genuine respect for life and the environment.

Course Outline:

I. INTRODUCTION
- Science, life and plants
- The Importance of plants to man
- General distinctive features of plants

II. EVOLUTION AND DIVERSITY OF LIFE
- Origin of Life on Earth
- The Concept of Evolution
- Survey of the Plant Kingdom

III. THE PLANT BODY: STRUCTURE AND FUNCTION
- The cell theory
- Cell Structure and Function
- Cell Cycle
- Cell types and tissues
- Plant Organs and Plant Physiology
- Root Flower

Stem Fruit
Leaf Seed

IV. PERPETUATION OF LIFE
Classical Genetics
Molecular Genetics

V. BIOTECHNOLOGY

VI. PLANTS AND THEIR ENVIRONMENT
The Concept of Ecosystem
Organism, population and community

VII. SPECIAL TOPICS IN BIOLOGY (Group Reports)

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Department	Biology	School	SOSE

Course No.	Bi 9
Course Title	Introduction to the Animal World, Lecture
No. of Units	3

Course Description:

The course is an integrated approach to the study of the unity and diversity of animal life. It includes the application of these basic principles to man's development of a person.
The course introduces the student to the wonders of the animal world. It lets him/her discover and appreciate his/her own oneness, as well as his/her uniqueness in relation to the other members of the animal world.

Course Objective/s:

This course aims to familiarize students to:

1. basic principles and processes in animal biology
2. introduce the diversity of the animal kingdom, and
3. help students to appreciate biology.

Course Outline:

Orientation
Introduction to Zoology/ Origin of Science
The Scientific Process
Basic Chemical Principles
- A. Macromolecules: Carbohydrates and Proteins
- B. Macromolecules: Lipids and Nucleic Acids

Organization of the Cell
- A. Structure and Function
- B. Cellular Metabolism

Basic Principles of Genetics
- A. Mitosis
  - A. B. Meiosis

Body Systems: Concepts and Connections
- A. Neural Control
- B. Sensory Perception
- C. Endocrine Control
- D. Structural Support and Movement
- E. Circulation
- F. Immunity
- G. Respiration
- H. Digestion and Nutrition

I. The Internal Environment
J. Principles of Animal Reproduction and Development
Animal Diversity
Classification and Phylogeny
Animal Behavior
Biosphere and Animal Distribution

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Department	Biology	School	SOSE

Course No.	Bi 101
Course Title	General Biology II, Lecture
No. of Units	3

Course Description:

General Biology II, Lecture (Bi 101) is a 3-unit lecture course that deals with the diversity of form and function in the animal kingdom. The major topics of discussion are animal taxonomy and biodiversity, and structure-function relationships as seen from the cellular to the organismic level, thus covering the major evolutionary trends across the major animal taxa and their structures and functions, and also increasing awareness of the plight of animals on Earth.

Course Objective/s:

The course aims to enable the students to:
1) appreciate the diversity of animal life on earth;
2) understand the anatomical and physiological features of members of the animal kingdom; and
3) understand the influence of humans on animal life.

Course Outline:

Introduction/Orientation
The origins and history of animal life on Earth
Animal cells
Mitosis and meiosis: A review
Animal metabolism
Animal development
Animal tissues
Genetics: A review
Evolution
Animal classification and phylogeny
Animal-like protists
Porifera and Radiata (Cnidaria and Ctenophora)
Bilateria, Protostomia: Plathelminthes
Bilateria, Protostomia: Mollusca and Annelida
Bilateria, Protostomia: Arthropoda and Nematoda
Bilateria, Deuterostomia: Echinodermata and Chordata
Animal Structure, Support, and Movement
Animal Digestion, Circulation, and Respiration

Animal Excretion and Reproduction
Animal Nervous Coordination

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Department	Biology	School	SOSE

Course No.	Bi 101.1
Course Title	General Biology II, Laboratory
No. of Units	2

Course Description:

General Biology II, Laboratory (Bi 101.1) is a 2-unit laboratory course that deals with the diversity of form and function in the animal kingdom. The major topics of discussion are animal taxonomy and biodiversity, and structure-function relationships as seen from the cellular to the organismic level, thus covering the major evolutionary trends across the major animal taxa and their structures and functions, and also increasing awareness of the plight of animals on Earth.

Course Objective/s:

The course aims to enable the students to:

4) appreciate the diversity of animal life on earth;
5) understand the anatomical and physiological features of members of the animal kingdom; and
6) have a firm grasp of the basic techniques in zoological laboratory work.

Course Outline:

Introduction/Orientation
Evolution
Animal cells
Mitosis and meiosis
Animal tissues
Animal classification and phylogeny
Animal-like protists
Porifera and Radiata (Cnidaria and Ctenophora)
Bilateria, Protostomia: Plathelminthes
Bilateria, Protostomia: Mollusca and Annelida
Bilateria, Protostomia: Arthropoda and Nematoda
Bilateria, Deuterostomia: Echinodermata and Chordata
Animal Structure, Support, and Movement
Animal Digestion, Circulation, and Respiration
Animal Excretion and Reproduction
Animal Nervous Coordination

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Department	Biology	School	SOSE

Course No.	Bi 150
Course Title	Comparative Vertebrate Anatomy, Lecture
No. of Units	2

Course Description:

Comparative Vertebrate Anatomy, Lecture (Bi 150) is a two-unit course. The subject deals with important principles and theories with emphasis on the study of comparative anatomy, phylogeny and an introduction to relationship in structure, function and evolution in vertebrates.

Course Objective/s:

The course aims to enable the students to:

7) comprehend the evolution of chordate and vertebrate anatomy across time;
8) appreciate the diversity of biological design across vertebrate groups; and
9) grasp the complexity of the vertebrate systems.

Course Outline:

Introduction/Orientation
Evolution and Systematics
Overview of Phylum Chordata, Subphylum Vertebrata
Biological Design
Vertebrate Integumentary System
Vertebrate Skeletal System
Vertebrate Muscular System
Vertebrate Digestive System
Vertebrate Circulatory System
Vertebrate Respiratory System
Vertebrate Urogenital System
Vertebrate Endocrine System
Vertebrate Nervous System

References (optional):

Kardong KV. 2008. Vertebrates: Comparative Anatomy, Function, Evolution, 5th ed. New York (NY): McGraw-Hill.

Hyman LH. 1942. Comparative Anatomy. Chicago: The University of Chicago Press.

Kent GC, Carr RK. 2000. Comparative Anatomy of the Vertebrates. New York (NY): McGraw-Hill.

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Department	Biology	School	SOSE

Course No.	Bi 150.1
Course Title	Comparative Vertebrate Anatomy, Laboratory
No. of Units	1

Course Description:

Comparative Vertebrate Anatomy, Laboratory (Bi 150.1), the laboratory component of Bi 150, is a one-unit course. The subject provides skills-based learning of common techniques in anatomical laboratory work, as applied in the study of vertebrate form and function. Through dissections and comparison of various vertebrate specimens, evolutionary trends in this animal group are explored.

Course Objective/s:

The course aims to enable the students to:

10) comprehend the evolution of chordate and vertebrate anatomy across time;
11) learn common techniques in anatomical laboratory work;
12) appreciate the diversity of biological design across vertebrate groups; and
13) apply the principles learned to theoretical biological designs.

Course Outline:

Introduction/Orientation
Evolution and Systematics
Overview of Phylum Chordata, Subphylum Vertebrata
Biological Design
Vertebrate External Anatomy and Integumentary System
Vertebrate Skeletal System
Vertebrate Muscular System
Vertebrate Digestive System
Vertebrate Circulatory System
Vertebrate Respiratory System
Vertebrate Urogenital System
Vertebrate Endocrine System
Vertebrate Nervous System

References (optional):

Chanco CR, Buelo MA. 1992. Comparative Vertebrate Anatomy Atlas. Philippines: Chanco-Buelo Enterprise.

Duran E, Duran A. 1980. Atlas on Comparative Vertebrate Anatomy. Philippines: AP Duran Enterprises.

Hyman LH. 1942. Comparative Anatomy. Chicago: The University of Chicago Press.

Kardong KV. 2008. Vertebrates: Comparative Anatomy, Function, Evolution, 5th ed. New York (NY): McGraw-Hill.

_____ . 2008. Comparative Vertebrate Anatomy: A Laboratory Dissection Guide, 5th ed. New York (NY): McGraw-Hill.

Sy MC. 1986. Atlas of Comparative Anatomy. Philippines: Merriam & Webster, Inc.

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Department	Biology	School	SOSE

Course No.	Bi 176
Course Title	Evolution
No. of Units	3

Course Description:

This course focuses on evidences and principles involved in the evolution of plants and animals including man. It also emphasizes the concepts and theories of modern evolutionary biology including the mechanism of genetic change in populations, speciation pattern, and geologic change through time.

Course Objective/s:

The course aims to enable the students to:

1) Have a firm grasp of the major concepts and theories of evolutionary biology;
2) Appreciate the relationship between evolution and the diversity of life;
3) Apply evolutionary concepts to a wide range of biological endeavors, including medical concerns;
4) Understand how humans are evolving; and
14) Be able to confidently discuss evolution and defend its core principles.

Course Outline:

Introduction to evolutionary biology
Evidences for evolution
Classification and phylogeny
Patterns of evolution
Evolution and the fossil record
The origin and history of life
Evolution and geography
Evolution and biodiversity
Variation
Genetic drift
Natural selection and adaptation
Species and speciation
Sex and reproductive success
Conflict and cooperation
Evolution of genes and genomes
Evolution and Development (Evo-Devo)
Evolution and Medicine
Evolution and society

References (optional):

Futuyma DJ. 2009. Evolution, 2nd ed. Sunderland, MA (USA): Sinauer Associates, Inc.
Mayr E. 2001. What Evolution Is. New York, NY (USA): Basic Books.

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Department	Biology	School	SOSE

Course No.	Bi 190
Course Title	Research Methods in Biology
No. of Units	1

Course Description:

Bi 190 is a 1-unit preparatory seminar course for undergraduate research. It includes an introduction to techniques in reading scientific literature; required attendance in Department-sponsored lectures and talks; required attendance in thesis defense sessions of current seniors; selection of thesis adviser and topic for the next year; and submission of a thesis proposal.

Course Objective/s:

The course aims to enable the students to:

1. conduct a thorough literature search and evaluate the research of others;
2. identify, delineate and properly state a research problem;
3. write, present and defend a research proposal; and
4. demonstrate effective scientific communication.

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Department	Biology	School	SOSE

Course No.	Bi 197
Course Title	Bioseminar
No. of Units	2

Course Description:

Bioseminar (Bi 197) is a 2-unit course that teaches students basic skills in verbal and written communication in biological research. Toward this end, the emphasis is on choosing topics for research, doing the actual research, writing the scientific paper, and presenting it orally both in the classroom setting and in the form of seminars. Steps in evaluating a seminar delivered by a peer are also discussed and applied in this course. The training is further enhanced by required attendance in Department-sponsored lectures and talks and in thesis defense sessions of current seniors.

Course Objective/s:

The course aims to enable the students to:

1) Understand the importance of scientific research;
2) Learn how to choose research topics and develop them through rigorous research of related literature;
3) Evaluate papers on their scientific merit, particularly with regard to their experimental design;
4) Proficiently write a scientific paper; and
5) Confidently and proficiently present their research orally in a public setting.

Course Outline:

Introduction
The importance of scientific research
The scientific literature and index citations
Primary and non-primary sources
MODULE 1: The Research Topic
- How to decide on a research topic
- Corresponding with researchers
- Building your research topic
- Writing a topic proposal
MODULE 2: Review of Related Literature
- How and where to look (print and online)
- Narrowing and breaking down your topic
MODULE 3: Evaluation of Research Papers
- The standard parts of a research paper
- Experimental design
MODULE 4: Writing a Scientific Paper
- How NOT to write a scientific paper

- How to write an Abstract
- How to write the specific parts of a scientific paper
- How to properly cite your sources (citation styles)

MODULE 5: Oral Presentation of a Scientific Paper

- Making your slides for presentation (dos and don'ts)
- Public speaking: speaking with confidence, conviction, and clarity
- Making a poster for your research
- Evaluating research posters

References (optional):

Girden ER. 2001. Evaluating Research Articles: From Start to Finish, 2nd ed. Thousand Oaks: Stage Publications.

Jolles RL. 1993. How to Run Seminars and Workshops: Presentation Skills for Consultants, Trainers, and Teachers. New York: Wiley.

Lucas S. 2001. The Art of Public Speaking, 7th ed. BostonL McGraw-Hill.

Rendle-Short J. 2006. The Academic Presentation: Situated Talk in Action. Aldershot: Ashgate.

Valiela I. 2000. Doing Science: Design, Analysis, and Communication of Scientific Research. London: Oxford University Press.

Wager E. 2002. How to Survive Peer Review. London: BMJ Books.

Scitable by Nature Education. 2011. English communication for scientists. http://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/contents.