



Purpose: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

Course Title - General Biology I

Course Prefix and Number - BIOL 1406

Department - Biology

Division – Math & Science

Course Type: (check one)

- Academic General Education Course (from ACGM – but not in WCJC Core)
- Academic WCJC Core Course
- WECM course (This course is a Special Topics or Unique Needs Course: Y or N)

Semester Credit Hours # : Lecture Hours # : Lab/Other Hours # 4:3:2

Equated Pay Hours for Course – 4.2

Course Catalog Description – Fundamental principles of living organisms will be studied, including physical and chemical properties of life, organization, function, evolutionary adaptation, and classification. Concepts of cytology, reproduction, genetics, and scientific reasoning are included. Laboratory activities will reinforce these concepts.

List Lab/ Other Hours
Lab Hours 2
Clinical Hours
Practicum Hours
Other (list)

Prerequisites/Co-requisites - TSI satisfied in Reading and Writing

Prepared by Jennifer Jeffery

Date 8/5/13

Reviewed by Department Head Kim Raun

Date 8/6/13

Accuracy Verified by Division Chair Kevin Dees

Date 8/6/13

Approved by Dean or Vice President of Instruction *gghunt*

Date 8-6-13



I. Topical Outline – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, clinical or other non lecture instruction):

I. Introduction to Biology

- A. Biological Organization
- B. Introduction to Taxonomy
- C. Evolution and Natural Selection
- D. Scientific Method

II. Chemistry

- A. Chemical Foundations of Biology
 - 1. Elements and compounds
 - 2. Atomic structure
 - 3. Chemical bonding
- B. Importance of Water
 - 1. Effects of water's polarity
 - 2. Dissociation of water molecules
- C. Importance of Carbon
 - 1. Inorganic compounds vs. organic compounds
 - 2. Carbon skeleton variation
 - 3. Functional groups
- D. Structure and Function of Macromolecules: characteristics, functions and examples of the following molecules: carbohydrates, lipids, proteins and nucleic acids

III. The Cell

- A. Cell Theory
- B. Prokaryotic Cells vs. Eukaryotic Cells
- C. Endosymbiont Theory
- D. Cell Structure and Function:
 - 1. Nucleus and ribosomes
 - 2. Endomembrane system and other membranous organelles
 - 3. Cytoskeleton
 - 4. Cell surfaces
- E. Membrane Structure and Function
 - 1. Fluid mosaic model
 - 2. Selective permeability
- F. Membrane Transport
 - 1. Passive transport: diffusion, osmosis, facilitated diffusion
 - 2. Active transport: sodium-potassium pump
 - 3. Bulk transport: exocytosis vs. endocytosis

IV. Energy Flow

- A. Metabolism, Energy and Life
 - 1. Metabolic pathways: catabolic vs. anabolic
 - 2. Forms of energy
 - 3. Laws of thermodynamics
 - 4. Free energy and metabolism
 - 5. ATP
- B. Enzymes
- C. Regulation of metabolism

- V. Cellular Respiration
 - A. Principles of Energy Harvest
 - 1. Catabolic pathways and ATP production
 - 2. Redox reactions
 - B. Stages of Cellular Respiration Steps
 - 1. Glycolysis
 - 2. Citric acid cycle
 - 3. Oxidative phosphorylation
 - C. Fermentation
 - 1. Types - alcohol vs. lactic acid
 - 2. Comparison to cellular respiration

- VI. Photosynthesis
 - A. Leaf and chloroplast design
 - B. Light reactions
 - C. Calvin cycle (Light -Independent Reactions)

- VII. The Cell Cycle
 - A. Functions of cell division
 - B. Mitotic cell cycle
 - C. Regulation of cell cycle

- VIII. Genetics
 - A. Meiosis & Sexual Reproduction
 - 1. Comparison of asexual and sexual reproduction
 - 2. Inheritance of genes
 - 3. Meiotic phases
 - B. Mendelian Genetics
 - 1. Mendel's Laws of Segregation and Independent Assortment
 - 2. Solving monohybrid & dihybrid crosses with Punnett squares
 - C. Extending Mendelian Genetics: codominance vs. incomplete dominance, multiple alleles, pleiotropy, epistasis and polygenic inheritance
 - D. Mendelian Inheritance in Humans: pedigree, recessive & dominant disorders, multifactorial disorders and genetic testing & counseling

- IX. Chromosomal Basis of Inheritance
 - A. Sex-linked Genes
 - B. Alterations of Chromosome Structure - deletion, inversion, duplication, translocation
 - C. Aneuploid Conditions

- X. Molecular Basis of Inheritance
 - A. Discovering DNA Structure: Watson, Crick and Franklin
 - B. Structure & Function of DNA
 - C. DNA Replication

- XI. Protein Synthesis
 - A. Flow of Genetic Information
 - B. Structure & Function of RNA
 - C. Transcription & Translation
 - D. Point Mutations

- XII. DNA Technology and Genomics
 - A. DNA Cloning
 - B. Polymerase Chain Reaction (PCR)
 - C. Gel Electrophoresis
 - D. DNA Fingerprinting
 - E. Human Genome Project
 - F. Applications: medical, pharmaceutical, forensics, environmental cleanup, agricultural

Lab Outline

1. Orientation; Laboratory Safety and the Microscope
2. Properties of Water, Electrolytes, Acids & Bases
3. Biological Molecules
4. Cell Structure and Function
6. Movement of Molecules
7. Enzymes: Biological Catalysts
8. Lab Practical #1 Exam
9. Alcohol Fermentation
10. Photosynthesis
11. The Cell Cycle
12. DNA Structure and DNA Extraction
13. Intro to Biotechnology & DNA Fingerprinting I
14. DNA Fingerprinting II
15. Lab Practical #2 Exam

II. Course Learning Outcomes

Learning Outcome	Method of Assessment
<p>Upon successful completion of this course, students will:</p> <ol style="list-style-type: none">1. Describe the characteristics of life.2. Explain the methods of inquiry used by scientists.3. Identify the basic requirements of life and the properties of the major molecules needed for life.4. Compare and contrast the structures, reproduction, and characteristics of viruses, prokaryotic cells, and eukaryotic cells.5. Describe the structure of cell membranes and the movement of molecules across a membrane.6. Identify the substrates, products, and important chemical pathways in metabolism.7. Identify the principles of inheritance and solve classical genetic problems.8. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins.9. Describe the unity and diversity of life and the evidence for evolution through natural selection.10. Apply scientific reasoning to investigate questions and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.11. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory.12. Communicate effectively the results of scientific investigations.	<ol style="list-style-type: none">1. lecture, exam questions and post-test exam questions2. lecture, exam questions and post-test exam questions, short essay3. Exam, lab report, essay, presentation, discussion (online or in-class)4. Exam, lab report, essay, presentation, discussion (online or in-class)5. Exam, lab report, essay, presentation, discussion (online or in-class)6. Exam, lab report, essay, presentation, discussion (online or in-class)7. Exam, lab report, essay, presentation, discussion (online or in-class)8. Exam, lab report, essay, presentation, discussion (online or in-class)9. Exam, lab report, essay, presentation, discussion (online or in-class)10. Lab report*, graph/table/chart, presentation, project, group activity11. Exam, lab report, essay, presentation, discussion (online or in-class)12. Lab report*, graph/table/chart, presentation, project, group activity

III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

Text: Reece, et. al. *Campbell Biology*. Pearson. Current edition

Lab manual: Crowder, Durant, and Penrod. *Exploring the Unity of Organisms: Biology 1 Laboratory Manual*. Hayden-McNeil. Current edition

IV. Suggested Course Maximum – 36 lecture; 24 lab

V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

Laboratory classroom required

VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course

Lecture Average:	<u>55%</u>	A	100-90
Exam average (3-4 exams)	30-55%	B	89-80
Other (homework, quizzes, projects, etc.)	0-25%	C	79-70
Laboratory Average	<u>25%</u>	D	69-60
Final Exam (includes at least 50% comprehensive material)	<u>20%</u>	F	Below 60
Total	100%		

Lab grade based on:

Quiz Average (best 6 of 9 weekly quizzes) - 50%

Lab Practical #1 Exam - 25%

Lab Practical #2 Exam - 25%

VII. Curriculum Checklist

- **Academic General Education Course** (from ACGM – but not in WCJC Core)
No additional documentation needed

- **Academic WCJC Core Course**
Attach the Core Curriculum Review Forms

- Critical Thinking
- Communication
- Empirical & Quantitative Skills
- Teamwork
- Social Responsibility
- Personal Responsibility

- **WECM Courses**

Attach the following:

- Program SCANS Matrix
- Course SCANS Competencies Checklist



**Wharton County
Junior College**

Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: _____

Core Objective: **Critical Thinking Skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			

Department Head: _____

Date: _____



**Wharton County
Junior College**

Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: _____

Core Objective: **Communication Skills**—to include effective development, interpretation and expression of ideas through written, oral and visual communication

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

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<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			

Department Head: _____

Date: _____



Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: _____

Core Objective: **Empirical and Quantitative Skills**—to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
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Department Head: _____

Date: _____



**Wharton County
Junior College**

Core Curriculum Review Form

Foundational Component Area: **Life & Physical Sciences**

Course Prefix & Suffix: _____

Core Objective: **Teamwork**—to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
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