**ESSEX COUNTY COLLEGE**

**Biology & Chemistry Division**

**CHM 102 – College Chemistry II**

**Course Outline**

**Course Number & Name:**  CHM 102 College Chemistry II

**Credit Hours:**  4 .0 **Contact Hours:**  6.0 **Lecture:** 3.0 **Lab:**  3.0 **Other:**  N/A

**Prerequisites**:  Grade of “C” or better in CHM 101

**Co-requisites:** None **Concurrent Courses:** None

**Course Outline Revision Date:**  Fall 2010

**Course Description**: This course is an introduction to organic and biological chemistry for students preparing for careers in the health fields. The content includes hydrocarbons, alcohols, organic acids, carbohydrates, amines, lipids, amino acids and proteins, enzymes, biochemical energy transfer, metabolism, and nutrition. The course combines lecture and laboratory.

**General Education Goals**: CHM 102 is affirmed in the following General Education Foundation Category: **Scientific Knowledge and Reasoning.** The corresponding General Education Goal is as follows: Students will use the scientific method of inquiry through the acquisition of scientific knowledge.

**Course Goals:** Upon successful completion of this course, students should be able to do the following:

1. demonstrate knowledge of the fundamental concepts and theories that are the basis of the field of chemistry;

2. utilize various qualitative and quantitative problem-solving and critical-thinking techniques to perform experimental procedures investigating chemical phenomena and to analyze collected experimental data; and

3. utilize triple beam balances, top loader balances, pH meters, basic laboratory glassware and other laboratory equipment effectively as tools in carrying out experiments investigating chemical phenomena.

**Measurable Course Performance Objectives (MPOs)**: Upon successful completion of this course, students should specifically be able to do the following:

1. Demonstrate knowledge of the fundamental concepts and theories that are the basis of the field of chemistry:

1.1 *draw and name the principle organic functional groups*;

1.2 *identify and describe the principle organic reactions involved in biochemical processes;*

1.3 *define the structures, chemical properties, and biochemical functions of carbohydrates, lipids, proteins and nucleic acids;*

1.4 *define the structure, biochemical function, and mechanisms of action of enzymes, vitamins, and hormones;* and

1.5 *identify the major biochemical pathways in the body and integrate carbohydrate, lipid, and protein metabolism into these major biochemical pathways*

2. Utilize various qualitative and quantitative problem-solving and critical-thinking techniques to perform experimental procedures investigating chemical phenomena and to analyze collected experimental data:

2.1 e*xplain the basic principles of scientific method and laboratory safety;*

2.2 *construct and perform experiments investigating chemical phenomena utilizing qualitative and quantitative lab equipment;* and

2.3 *collect and analyze the data generated from these experiments*

3. Utilize triple beam balances, top loader balances, pH meters, basic laboratory glassware and other laboratory equipment effectively as tools in carrying out experiments investigating chemical phenomena:

3.1 *safely and effectively use balances and top loader balances in the production and analysis of lab data;*

3.2 *safely and effectively use pH meters in the production and analysis of lab data;* and

3.3 *safely and effectively use basic laboratory glassware in the production and analysis of lab data*

**Methods of Instruction**: Instruction will consist of a combination of Socratic lecture, PowerPoint presentation, laboratory procedures, and data analysis.

**Outcomes Assessment:** Quiz and test questions will be blueprinted to course objectives. Lab experiments are scored with checklist rubrics for the presence of course objectives. Data is collected and analyzed to determine the level of student performance on these assessment instruments in regards to meeting course objectives. The results of this data analysis are used to guide necessary pedagogical and/or curricular revisions.

**Course Requirements:** All students are required to:

1. Attend class regularly. Excessive absences or late arrivals negatively affects student understanding of the material and, therefore, performance in the course.

1. Complete assigned reading and homework in a timely manner and contribute to class discussions. In addition, note that science cannot be understood without doing a significant amount of outside study.

3. Take quizzes and tests when scheduled. Policies regarding make-up quizzes/tests are established by individual instructors.

**Methods of Evaluation:** Final course grades will be computed as follows:

**% of**

**Grading Components final course grade**

* **4 Tests** (dates specified by the instructor) **70%**

Tests will show evidence of the extent to which students meet course objectives, including, but not limited to, identifying and applying concepts, analyzing and solving problems, estimating and interpreting results, and stating appropriate conclusions using correct terminology.

* 4 or more Lab Experiments 20%

Students are required to perform laboratory experiments, which are designed to enhance the learning of course objectives, throughout the semester. Experiment format is written description and analysis and explanation of laboratory data using proper scientific technique.

* 2 or more Lab Quizzes 10%

Quizzes will provide evidence of the extent to which students meet course objectives, including, but not limited to, identifying and applying concepts of the scientific method, laboratory procedures and data analysis.

**Academic Integrity:** Dishonesty disrupts the search for truth that is inherent in the learning process and so devalues the purpose and the mission of the College.  Academic dishonesty includes, but is not limited to, the following:

* plagiarism – the failure to acknowledge another writer’s words or ideas or to give proper credit to sources of information;
* cheating – knowingly obtaining or giving unauthorized information on any test/exam or any other academic assignment;
* interference – any interruption of the academic process that prevents others from the proper engagement in learning or teaching; and
* fraud – any act or instance of willful deceit or trickery.

Violations of academic integrity will be dealt with by imposing appropriate sanctions.  Sanctions for acts of academic dishonesty could include the resubmission of an assignment, failure of the test/exam, failure in the course, probation, suspension from the College, and even expulsion from the College.

**Student Code of Conduct:** All students are expected to conduct themselves as responsible and considerate adults who respect the rights of others. Disruptive behavior will not be tolerated. All students are also expected to attend and be on time all class meetings. No cell phones or similar electronic devices are permitted in class. Please refer to the Essex County College student handbook, *Lifeline*, for more specific information about the College’s Code of Conduct and attendance requirements.

**Course Content Outline:** The lecture portion of the course is based on the text **General, Organic, and Biochemical Chemistry** **Volume 2**, 4th edition, by Karen Timberlake; published by Pearson Custom Publishing, 2007. The laboratory portion of the course is based on **Catalyst: the Benjamin Cummings Custom Laboratory Program for Chemistry;** published by Pearson Custom Publishing.

Note: Goggles are mandatory for all chemistry labs. A hand-held scientific calculator is also required for this course.

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| **Week** | **Lecture Topic** | **Laboratory Session** |
| 1 | Chapter 11: Introduction to Organic Compounds: Akanes | Chapter 12: Unsaturated Hydrocarbons |
| 2 | Chapter 13: Alcohols, Phenols, Thiols, and Ethers | Chapter 14: Aldehydes, Ketones, and Chiral Molecules |
| 3 | Chapter 15: Carbohydrates | Experiment 1: Alcohols and Phenols |
| 4 | Review Chapters 11 – 15 | **Test #1** on Chapters 11 – 15 |
| 5 | Chapter 16: Carboxylic Acids and Esters | Experiment 2: Aldehydes and Ketones |
| 6 | Chapter 17: Lipids | Chapter 18: Amines and Amides |
| 7 | Chapter 19: Amino Acids and Proteins | Experiment 3: Tests for Carbohydrates  **Lab Quiz #1** |
| 8 | Chapter 20: Enzymes and Vitamins | Review Chapters 16 – 20 |
| 9 | **Test #2** on Chapters 16 – 20 | Experiment 4: Peptides and Proteins  **Lab Quiz #2** |
| 10 | Chapter 21: Nucleic Acids and Protein Synthesis | Chapter 21: Nucleic Acids and Protein Synthesis (continued) |
| 11 | Chapter 22: Metabolic Pathways for Carbohydrates | Chapter 22: Metabolic Pathways for Carbohydrates (continued) |
| 12 | Review Chapters 21 & 22 | **Test #3** on Chapters 21 & 22 |
| 13 | Chapter 23: Metabolism and Energy Production | Chapter 23: Metabolism and Energy Production (continued) |
| 14 | Chapter 24: Metabolic Pathways for Lipids and Amino Acids | Chapter 24: Metabolic Pathways for Lipids and Amino Acids (continued) |
| 15 | Review Chapters 23 & 24 | **Test #4** on Chapters 23 & 24 |