**ESSEX COUNTY COLLEGE**

**Biology & Chemistry Division**

**CHM 101 – College Chemistry I**

**Course Outline**

**Course Number & Name:**  CHM 101 College Chemistry I

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

**Prerequisites**:  Grades of “C” or better in MTH 092, ENG 096 and RDG 096 or ESL 105/106. High school chemistry or CHM 100 and MTH 100 strongly recommended.

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

**Course Outline Revision Date:**  Fall 2010

**Course Description**: This course covers the major concepts of general chemistry which will include the states and properties of matter and energy, atomic structure, the mole concept and stoichiometry, solutions, acid/base chemistry, and equilibrium. Laboratory sessions will be included. This course is designed to provide appropriate chemistry background for nursing and health students.

**General Education Goals**: CHM 101 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 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 of chemistry:

1.1 *identify and explain the themes that connect the concepts of chemistry*;

 1.2 *explain* *how atomic theory is related to the properties of elements;*

1.3 *balance chemical equations;*

1.4 *prepare chemical solutions;* and

1.5 *predict the properties of acids and bases*

**Measurable Course Performance Objectives (MPOs)** (continued):

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.

* 10 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 1**, 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 | Introduction | Introduction to the use of the calculator |
| 2 | Chapter 1: Measurements | Experiment 1: Measurements |
| 3 | Chapter 2: Energy and Matter | Experiment 2: Conversions |
| 4 | Chapter 3: Atoms and Elements | Experiment 3: Density and Specific Gravity |
| 5 | Chapter 4: Nuclear Chemistry | Experiment 4: Compounds and their Formulas**Lab Quiz #1** |
| 6 | Review of Chapters 1 – 4 | **Test #1** on Chapters 1 – 4 |
| 7 | Chapter 5: Compounds and their Bonds | Experiment 5: Energy and Specific Heat |
| 8 | Chapter 6: Chemical Reactions and Quantities | Experiment 6: Chemical Reactions and Equations |
| 9 | Chapter 7: Gases | Experiment 7: Reaction Rates and Equilibrium |
| 10 | Review of Chapters 5 – 7 | **Test #2** on Chapters 5 – 7 |
| 11 | Chapter 8: Solutions | Experiment 8: Solutions, Electrolytes & Concentrations**Lab Quiz #2** |
| 12 | Chapter 9: Chemical Equilibrium | Experiment 9: Solutions, Colloids & Suspensions |
| 13 | Chapter 10: Acids and Bases | Experiment 10: Acids, Bases, pH & Buffers |
| 14 | Review of Chapters 8 – 10  | **Test #3** on Chapters 8 – 10  |
| 15 | Review of Chapters 1 – 10 for Test #4 | **Test #4** on Chapters 1 – 10 |