GROSSMONT COLLEGE

Official Course Outline

CHEMISTRY 242L – ORGANIC CHEMISTRY II LABORATORY

1. Course Number Course Title Semester Units Semester Hours

*Based on a 16-18 week format*

CHEM 242L Organic Chemistry II 2 **6 hours laboratory**

Laboratory 96-108 total hours

2. Course Prerequisites

A “C” grade or higher or “Pass” in Chemistry 231 or Chemistry 241 and Chemistry 241L or equivalent

Corequisite

A “C” grade or higher or “Pass” in Chemistry 242 or equivalent or concurrent enrollment in Chemistry 242.

Recommended Preparation

None

3. Catalog Description

Second of a two semester laboratory sequence. The topics covered will include: structure and reactivity of carboxylic acids and their derivatives, amines and other nitrogen functional groups, aromatic compounds, heterocyclic compounds, polyfunctional compounds, conjugation and aromaticity, and multistep organic synthesis. This class is intended as a second semester organic chemistry laboratory for students needing additional laboratory expertise.

4. Course Objectives

The student will:

a. **Demonstrate proficiency in** basic organic laboratory operations such as melting point determination, boiling point determination, liquid-liquid extraction, gravity and vacuum filtration, and both simple and fractional distillation as well as **separation and purification tec**hniques including TLC, column chromatography, recrystallizations and distillations

b. Demonstrate appropriate laboratory notebook recordkeeping techniques. Included in this is a clear outline of the structures of the reactants, solvents, and catalysts needed to optimize yields in a variety of organic reactions.

c. Characterize compounds using a variety of laboratory instrumentation including but not limited to NMR, FTIR spectroscopy, gas chromatography, UV spectroscopy, and HPLC.

d. Synthesize, isolate, purify and characterize compounds using traditional chemistry procedures and modern instrumentation.

e. Predict the outcome of organic reactions.

f. Identify reagents necessary to carry out organic reactions.

g. Perform organic reactions and separations in the laboratory.

h. Design and carry out multistep organic transformations.

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5. Instructional Facilities

a**.** Standard laboratory.

b. Smart Cart.

c. Wall mounted Periodic Chart.

d. Laboratory equipped with same utilities as lecture room, each student station having gas, air, vacuum, water, sink and fume hoods. Other resources including but not limited to:

(1) Drying ovens.

(2) pH meters.

(3) Fume hoods.

(4) Hot plates.

(5) Magnetic stir plates.

(6) Triple beam balances.

(7) Analytical balances.

(8) Melting point apparati.

(9) vortexers

(10) Bunsen burners and microburners.

(11) IR spectrometer.

(12) UV-vis spectrometer.

(13) GC.

(14) Oil baths and resistance heaters.

e. Individual student drawers containing:

(1) Kem-Kit (Kontes Company).

(2) Standard laboratory equipment including but not limited to beakers, Erlenmeyer flasks, graduated cylinders, filter flasks, Buchner funnels, glass funnels, pipets, test tubes, test tube racks, glass sample vials, drying tubes, and assorted scoopulas, stir rods and spatulas.

1. Three instruments which tremendously increase the quality of the course are a gas chromatograph, infrared spectrometer and NMR spectrometer
2. Variety of organic chemicals and solvents as well as thin layer chromatography supplies

6. Special Materials Required of Student

1. Laboratory apron or jacket.
2. Scientific calculator with exponential and logarithmic functionality.
3. Approved safety glasses or goggles.
4. Molecular model kit.

7. Course Content

1. Synthesis, isolation, purification and characterization of carbon compounds in the laboratory.
2. Structure and function relationships will be investigated using modeling techniques which include model kits, Spartan molecular modeling software and chemdraw.
3. Use of a variety of laboratory instrumentation including but not limited to FTIR spectroscopy, gas chromatography, UV spectroscopy, and HPLC to characterize products.
4. Multistep synthetic transformations.

8. Method of Instruction

1. Lecture.
2. Videos and appropriate media.
3. Computer assisted instruction.
4. Inquiry based laboratory experience.

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9. Methods of Evaluating Student Performance

1. Written exams and final exam.
2. Laboratory activities that evaluate students’ ability to observe the properties of a wide range of organic compounds, to apply competent observational skills, to demonstrate proper collection and recording of data, to assemble and utilize complex glassware setups for synthesis and purification, and to operate modern laboratory instruments.
3. Written laboratory reports that measure students’ ability to interpret and analyze both qualitative and quantitative data. (for example descriptions and analysis of chemical reactions or analytical determinations).
4. Laboratory techniques to include proper safety procedures, use of laboratory equipment, and complete documentation of data.
5. Essays/presentations on topics such as experimental results, descriptive chemistry or current issues in chemistry.
6. Capstone multistep organic synthesis project
7. Homework.
8. Computer drills.

10. Outside Class Assignments

1. Laboratory reports (for example descriptions and analysis of chemical reactions or analytical determinations)
2. Essays/presentations on topics such as experimental results, descriptive chemistry or current issues in chemistry.
3. Homework, both text and computer based.

11. Texts

1. Required Text(s):

(1) Wade, L.G. *Organic Chemistry*. 9th ed. Upper Saddle River, New Jersey: Pearson, 2016.

(2) Lehman, John W. *Multiscale Operational Organic Chemistr*y. 2nd ed. Upper Saddle River, New Jersey: Pearson, 2009.

1. Supplementary texts and workbooks:

None.

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

* 1. Demonstrate a working knowledge of the language of organic chemistry.
  2. Recognize the major functional groups of organic compounds.
  3. Predict the major products of chemical reactions of representative organic functional groups.
  4. Apply a theoretical approach to explain the chemical and physical behavior of organic compounds.
  5. Employ laboratory equipment and techniques to collect, analyze and evaluate experimental data.

Date approved by the Governing Board: December 13, 2016