

GEORGIA PERIMETER COLLEGE
DIVISION OF SCIENCE
COMMON COURSE OUTLINE
REVISION DATE: NOVEMBER 12,2004

COURSE ABBREVIATION	CHEM 2642L
CREDIT HOURS	1 Semester Hours
COURSE TITLE	Fundamental Organic Chemistry II Laboratory
PREREQUISITES	CHEM 2641 lecture and lab with C or better
COREQUISITE	CHEM 2642 Lecture

CATALOG DESCRIPTION

This is a second semester organic chemistry laboratory to accompany CHEM 2642. There is emphasis on organic synthesis and product analysis. A minimum of three hours per week is scheduled.

GENERAL COURSE PURPOSE

This laboratory course emphasizes the synthesis of organic compounds from one or more steps. The experiments chosen are illustrative of the functional group transformations presented in CHEM 2642 lecture. A variety of new techniques plus techniques introduced in CHEM 2641L are used to isolate and analyze reaction products.

GENERAL EDUCATION OUTCOMES

- I. This course addresses the general education outcome relating to communications as follows:
 1. The student must become proficient in the interpretation of technical procedures, such as those found in laboratory manuals, class handouts, and special instruction sheets.
 2. The student will develop the listening skills necessary to implement pre-laboratory lecture information efficiently.
 3. The student learns to transform ideas into written form in accurate detail.
 4. The student will learn to plan laboratory work by methods such as, the preparation of procedural outlines, researching literature, and reviewing theory from lecture sources.
- II. This course improves problem solving skills and critical thinking skills in the following ways.
 1. By encouraging the student to use the team approach to develop problem solving strategies. The student is also encouraged to make informed choices in instances where more than one approach is possible to solving a problem.
 2. By instituting written evaluations where appropriate which employ a combination of objective and subjective criteria for judging a student's work.
 3. By encouraging instructors to conduct either formal or informal oral evaluations of student as a means of gauging the student's ability to communicate his or her depth of knowledge.

III. This course addresses the general educational outcome relating to the recognition and application of the scientific method in a variety of settings as follows.

1. The student is challenged to identify causes of experimental error in a laboratory experiment and to identify the causal relationship between these experimental errors and their conclusions.
2. The laboratory experiments chosen give the student an opportunity to investigate and apply theoretical concepts discussed in lecture. Conversely, in lecture the student is challenged to relate laboratory experiences with new theoretical concepts.
3. Periodic quizzes and a comprehensive final exam are administered to monitor a student's progress in mastering the application of theory and practices emphasized in the course.

ENTRY LEVEL COMPETENCIES

Upon entering this course the student is expected to be able to:

1. Acquire physical constants relating to intrinsic properties such as melting point, boiling point, density, and refractive index.
2. To carry out an efficient fractional distillation on a simple liquid mixture.
3. To purify a compound by recrystallization either from a simple solvent or binary solvent mixtures.
4. To separate a mixture of any combination of acid, base, or neutral organic compounds by a systematic series of solvent extractions and manipulations of pH.
5. To characterize compounds and evaluate the composition of organic mixtures by chromatographic methods such as thin layer chromatography, column chromatography, gas chromatography.
6. To demonstrate the appropriate safety practices for the correct usage of the equipment commonly found in the organic lab.

EXPECTED EDUCATIONAL RESULTS:

Upon successful completion of this course, the student should be able to:

1. Plan the procedural details for the synthesis of an assigned organic compound.
2. Assemble and manipulate the necessary glassware, equipment, solutions, and reagents specified in a planned organic synthesis.
3. Demonstrate the efficient use of methods and techniques for the isolation and purification of organic compounds.
4. Interpret acquired physical data and spectroscopic information and draw from these an accurate conclusion about the structure of an organic compound
5. Explain the mechanism for the formation of the major product in a planned synthesis.
6. Accurately record the procedural details, observations, and data of an organic synthesis in a properly maintained laboratory notebook.
7. Demonstrate an ability to communicate the full and accurate details of an experiment or series of experiments in an organized report.

COURSE TOPICS

1. Unsaturated systems: alkenes, alkynes, polyenes, aromatic hydrocarbons, and aromatic heterocyclic systems. Depending on the examples chosen in this group, the following are some of the mechanistic principles illustrated:
 - Electrophilic addition (alkenes, alkynes)
 - Aromatic electrophilic substitution
 - Nucleophilic substitution (eg. deprotonation of alkynes)
 - Free radical addition or polymerization
2. Organometallic chemistry: primarily the Grignard reaction or other organometallic examples suitable to this course level.
3. Carbonyl chemistry: aldehydes, ketones, carboxylic acids and acid derivatives. The carbonyl is the most diverse functional group studied in the course. The experiments chosen for this group should be limited to the illustration of the following concepts:
 - Aldol condensation of aldehydes, ketones, and dicarbonyl compounds.
 - Ester reactions such as synthesis from alcohols and acids, hydrolysis, or the addition of nucleophiles such as Grignard reagents or hydrides (i.e. reduction).
 - Carbonyl transformations of ketones and aldehydes such as the Wittig reaction, various Schiff base derivatives (oximes, carbazones, etc.), oxidations, and reductions.
4. Spectroscopy

ASSESSMENT OF EXPECTED EDUCATIONAL OUTCOMES

The course grade will be determined by the individual instructor. A quantitative evaluation of the student will be made using a balanced combination of quizzes, outside homework, individual projects such as experiments, and written exercises such as notebooks and reports. The instructor shall assess the quality of these activities in a manner consistent with the norms common to the organic teaching profession, the general education outcomes and expected educational results. A comprehensive final exam is required that must count for no less than 20% and no more than 30% of the course grade.

EFFECTIVE DATE: August 2005

APPROVED DATE: November 12, 2004