

NEW COURSE PROPOSAL

PROGRAM: BIOLOGICAL AND PHYSICAL SCIENCES

1. **Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

CHEM 312. ORGANIC CHEMISTRY I LABORATORY (1)

Three hours of lab per week.

Prerequisite: CHEM 311 (or taken concurrently with CHEM 311) with a grade of C or better

A laboratory course designed to provide students with an exposure to the techniques and instrumentation (NMR, GC, GC-MS, LC, IR, and UV-visible) used to purify and characterize organic molecules resulting from organic reactions. Lab fee required.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture			
Seminar			
Laboratory	1	3	18
Activity			

3. **Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

This course accompanies the first semester organic chemistry course (CHEM 311) and is generally an admission requirement for medical, veterinary, dental, or pharmacy schools. In combination with CHEM 311, 314, 315 and CHEM 400, or CHEM 311 and CHEM 318, this course completes the chemistry requirements for the Biology major.

Students who successfully complete this course will be able to:

- Describe the scientific method and how it is used to approach the study of organic molecules
- Evaluate the relationship between the geometric structures of various molecules
- Explain the behavior of organic reactions using their knowledge of thermodynamics and kinetics and the geometric and electronic structures of organic molecules
- Utilize chromatography, crystallization, extraction, and distillation to purify organic molecules
- Analyze reaction products utilizing infrared and ultraviolet spectrophotometry, mass spectrometry, and nuclear magnetic resonance spectrometry
- Perform syntheses and reactions of alkyl halides, alkenes, alkynes, and dienes

4. **Is this a General Education Course**
If Yes, indicate GE category:

YES

NO

5. **Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*

Molecular Properties

Boiling points
Melting points
Density
Solubility
Polarity
Acidity-basicity
Optical activity and purity

Separation of Organic Molecules

Liquid-liquid extractions
Acid-base separations
Recrystallization
Simple and fractional distillation
Column chromatography

Characterization of the Purity of Organic Molecules

Thin-layer chromatography
Gas Chromatography (GC)
Liquid Chromatography (LC)

Determination of Molecular Structure

Mass Spectrometry (MS and GC/MS)
Infrared spectroscopy (IR)
Nuclear Magnetic Resonance spectroscopy (NMR)
Ultraviolet-visible spectroscopy (UV-vis)

Kinetics and Thermodynamics of Reactions

Conformational analysis and molecular modeling of molecules
Determination of rates of reactions
Determination of equilibrium constants
Predicting the outcome of a reaction using kinetics and thermodynamics

Organic Reactions

Synthesis
Purification of reaction products
Characterization of reaction products

Nucleophilic Substitution and Elimination

Substitution rates vs. substrate structure
Substitution mechanisms
Elimination mechanisms

6. References. [Provide 3 - 5 references on which this course is based and/or support it.]

Schoffstall, A. M. *et al. Organic Microscale and Miniscale Laboratory Experiments*, 1999
Pavia, D. L. *et al. Introduction to Organic Laboratory Techniques: A Small Scale Approach*, 1997
Mayo, D. W. *et al. Microscale Organic Laboratory with Multistep and Multiscale Syntheses*, 2000

7. List Faculty Qualified to Teach This Course.

Dr. Philip Hampton

8. Frequency.

a. Projected semesters to be offered: Fall X Spring Summer

9. New Resources Required.

None.

10. Consultation.

Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

Philip Hampton 1/8/03
Proposer of Course Date