

## 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 315. ORGANIC CHEMISTRY II LABORATORY (1)**

Three hours of lab per week.

Prerequisites: CHEM 311, 312, and 314 (or taken concurrently with CHEM 314) with grades of C or better

A laboratory course designed to provide students with experience in single-step and multi-step syntheses and characterization of organic molecules with hands-on access to instrumentation (NMR, GC, GC-MS, LC, IR, and UV-visible). 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, 312, 314, and CHEM 400, 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
- 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 substituted arenes, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amides, and amines
- Interpret infrared, mass, and nuclear magnetic resonance spectra of molecules that have arene rings and/or multiple functional groups
- Perform organic reactions using enzymes as reagents
- Adapt literature procedures for performing a reaction
- Perform multi-step synthesis reactions

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]*

*Organic Reactions*

Synthesis of substituted arenes, alcohols, ethers, aldehydes, ketones, acids, esters, amides, and amines  
Purification of reaction products using distillation, recrystallization, and column chromatography  
Determination of product purity using thin-layer, liquid, and gas chromatography  
Characterization of reaction products using infrared, mass, and NMR spectroscopy  
Modification of a literature procedure

*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  
Substituent effects on reactivity and regioselectivity

*Multi-Step Syntheses*

*Enzymes in Organic Synthesis*

**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 \_\_\_\_\_ Spring   X   Summer \_\_\_\_\_

**9. New Resources Required.**

No new Lab

**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