ESF Course Proposal Form
Committee on Instruction - ESF Faculty Governance
Office of Instruction & Graduate Studies

Date: January 20, 2012
Course Number: FCH 620
Course Title: Chemical Kinetics

☑ New Course OR ☐ Changes in existing course (check all that apply):

☐ Prefix ☐ Description ☐ Shared Resources
☐ Number ☐ Pre-requisite(s) ☐ Course Format
☐ Credits ☐ Co-requisite(s) ☐ Content
☐ Title

This course meets the General Education standards in the following knowledge and skills area (check all that apply):

☐ American History ☐ Humanities ☐ Other World Civilizations
☐ The Arts ☐ Mathematics ☐ Social Sciences
☐ Basic Communication ☐ Natural Sciences ☐ Western Civilization

Prequisites or co-requisite requirements:

☑ Prerequisites: 1 year undergraduate physical chemistry ☐ Co-requisites:

Institutional Impact:

Anticipated Enrollment: 10 per semester

Technology and Classroom Resource Demands: Classroom with computer projector and document camera
Computing Resources: Will require use of a computer cluster up to four (4) times a semester. Outside of class, access to internet connection to obtain reference data.
Library Resources: Access to electronic journal articles
Transportation Requirements: none
Forest Properties or Field Practicum Facilities Required: none
Health and Safety Considerations:

Conditions or situations present in association with the course? Yes / No

1. Will substances with any of the following properties be used during instruction: flammability, toxicity, corrosivity, reactivity, registered pesticide, legally controlled, or other characteristics with the potential to cause harm or injury? No

2. Will any physical hazards be present during instruction? (e.g., machines that need safety guards; razor blades or syringes; compressed gases, etc.). No

3. Will any biological hazards be present during instruction? (e.g., handling animals (rabies or hantavirus); cultures or stocks of infectious agents (fungal spores, viruses, bacteria, etc.). No

4. Will any radiation hazards be present during instruction? (e.g., radioisotopes, X-rays, ultraviolet rays, lasers, etc.). No

5. Will any electrical equipment that, due to its design, location, or method of use, pose any threat to safety during instruction? (Give considerable thought to electrical use outdoors, or any potentially wet location.). No

6. Will there be any personal safety issues related to the class? (e.g., due to time of day or location, at the end of any organized class exercise, will students be in danger of physical assault, etc.). No

7. Will any students be driving official state or research sponsored land or water vehicles during any class or instructional exercise? No

8. Will any type of personal protective equipment be necessary during class exercises? (e.g., hard-hats, eye/face protection, hearing protection, hand/foot protection, lab coat, visibility clothing, etc.) No

If the answer was “Yes” to any of the HEALTH AND SAFETY questions, please explain:

CATALOG DESCRIPTION (Please provide using the precise format currently used in the ESF catalog, please do not exceed 500 characters):

DETAILED COURSE DESCRIPTION

COURSE:  FCH 620 – Chemical Kinetics
         3 Credit Hours – Spring Semester even-numbered years
         3 Hours Lecture Per Week
         Prerequisite(s): 1 year undergraduate physical chemistry

SCOPE:

1.  Level of Instruction:
    a.  FCH 620 is a graduate-level course intended to fulfill requirements for ESF chemistry
        graduate students

2.  Relation to curriculum or to other ESF or Syracuse University courses:
    a.  Satisfies elective requirements for graduate students in chemistry  There is no comparable
        course at SU, and this course may enroll SU chemistry graduate students.

CATALOG DESCRIPTION

CATALOG DESCRIPTION  (Please provide using the precise format to be included in the ESF
catalog, please do not exceed 50 words)

   FCH 620. Chemical Kinetics  (3)

   Three hours of lecture/discussion per week. Graduate course in chemical kinetics. Building rate
laws and analyzing experimental data. Transition state and RRKM theories. Kinetics in the
aqueous phase and on surfaces. Kinetic modeling of complex reaction systems. Analysis of
published papers in chemical kinetics. Spring of alternating years.

☑  Prerequisite(s): 1 year undergraduate physical chemistry

   Instructor:  Dibble, Theodore

   Course format:  three hours of lecture and discussions.

STUDENT LEARNING OUTCOMES:

After completing this course the student should be able to:

   1.  Analyze kinetic data using models of gas, solution, and surface reactions
   2.  Calculate unimolecular and bimolecular rate constants using transition state theory
   3.  Calculate and explain trends in unimolecular reaction rate constants with energy, temperature,
       pressure, and molecular size based on RRK and RRKM theory
   4.  Compute ionic strength effects on rate constants in aqueous solution
   5.  Construct a kinetic model using data from the literature, use the model to predict species
       concentrations versus time, and analyze the relative importance of competing processes
   6.  Critically review a published kinetics paper, including conceptual and technical strengths and
       weaknesses, and present their review in writing

MAJOR CONCEPTS OR METHODOLOGIES:
1. Statistical mechanics
2. Collision theory
3. Transition state theory
4. Rice-Ramsperger-Kassel-Marcus theory
5. Computational chemistry
6. Computer modeling of complex reaction mechanisms
7. Reaction dynamics

RELATION TO CURRICULUM OR TO OTHER ESF OR SYRACUSE UNIVERSITY COURSES:

FCH 620 fulfills graduate chemistry elective requirements. There is no comparable course at SU.

COURSE HISTORY:

This course has never been taught at ESF.
Last approved: never.

Revised Draft: September 9, 2011