



University Senate Council  
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16 July 2002

TO: Members, University Senate

FROM: University Senate Council

RE: Course/Program Actions: Effective Date: Fall Semester, 2002,  
UNLESS OTHERWISE NOTED.

The Senate Council circulates for your approval the following curricular actions. Objections will be accepted from University Senators and faculty members and must be received on or before August 25, 2002. All other requirements for the courses or programs as approved below must be met.

SENATE COUNCIL

COLLEGE OF ARTS & SCIENCES:

Chemistry Department

Change in Undergraduate Program: B.S. with a Major in Chemistry

Major or Professional Course Requirements:

Current:

CHE 440G      Physical Chemistry I (4)

Proposed:

CHE 547      Principles of Physical Chemistry I      (3)

The change will drop CHE 440G (4 hours) from the program and add CHE 547 (3 hours) to the program resulting in a decrease of one credit hour bringing the total credit hours required to complete the program to 121. The other course modifications are listed below.

Background: The undergraduate curriculum in physical chemistry was restructured several years ago by combining the introductory physical chemistry courses for the

B.A. and B.S. majors into CHE 440, which is designed to cover most topics in an introductory fashion. The B.S. students then take a second semester (CHE 442) which is supposed to stress advanced topics. Since this change, the faculty in the Physical Chemistry Division have found this arrangement to be pedagogically unsound and a disservice to our B.S. majors, who require a less superficial approach.

It has also become apparent that our B.S. majors need greater exposure to a variety of the modern topics. This is especially noticeable when one considers that full 40% of the material on the physical chemistry graduate placement exam is now quantum chemistry and spectroscopy, topics which we may not cover in much depth in CHE 440 or 442. We are also troubled by the fact that other schools in the immediate area (Berea College, Transylvania University, Centre College) give their B.S. majors practical experience with quantum chemistry, but ours get none. These methods are now used by chemists of all disciplines and we should be teaching them.

With the recent acquisition of substantial computer resources (twelve 1-GHz machines) in the Physical Chemistry Laboratory, along with Windows versions of Gaussian 98, GaussView and HyperChem, we now have the tools to give our students practical experience in quantum chemistry and spectroscopy. Gaussian 98 and GaussView are programs for constructing Gaussian ab initio input files, doing the calculations, and viewing the results with a user-friendly graphical interface. HyperChem is a program with a convenient graphical interface for doing molecular mechanics, semi empirical and limited ab initio calculations. Instead of just telling the students about molecular vibrations, we can actually predict infrared spectra and animate the normal modes on the computer. In a similar manner, molecular orbital theory can be taught by actually doing the calculations and visualizing the resulting MOs.

The following proposal addresses the need for a dedicated two-semester sequence of physical chemistry courses for the B.S. majors, with in-depth instruction in quantum chemistry, spectroscopy, thermodynamics, kinetics and other modern topics. These minor changes in the curriculum will be a winning revision for our students, and we will be able to offer more in-depth instruction to our B.S. majors.

The following course modifications are required to implement the curriculum revisions:

CHE 440G	Change title (done by minor change: 1/9/02)
CHE 547	Change title, description and prerequisites (done by minor change: 1/9/2002)
CHE 441G	Modify prerequisite and description (done by minor change 1/8/2002)

and:

Course Change:

CHE 442G     Physical Chemistry II (3)  
Change in title, description, prerequisites

Change to:

CHE 442G     Thermodynamics and Kinetics (3)  
Principles of physical chemistry including thermodynamics,  
chemical kinetics, and statistical thermodynamics.  
Prereq: CHE 226; MA 213; PHY 213 or 232

New Course

CHE 553     Chemistry and Molecular Biotechnology (3)  
This course focuses on the chemical aspects of biotechnology  
development. Current topics in biotechnology are emphasized  
through extensive reading and classroom discussion of the most  
recent scientific literature. Biotechnology development in  
fields as diverse as agriculture, the environment, and medicine  
will be covered.  
Prereq: An introductory course in biology, biological chemistry,  
or biochemistry; and CHE 232; or consent of instructor.