



January 25, 2011

Pierre Sokolsky, Dean

College of Science

University of Utah

CAMPUS

Dear Dean Sokolsky,

I am writing to support the formal recognition of the various ways to complete the chemistry major as Emphases to be listed on a student’s transcript.

The full faculty in chemistry voted to support the proposal to have each of the following degree programs listed as a transcripted emphasis:

1. Chemistry, Professional
2. Chemistry, Biological
3. Chemistry, Business
4. Chemistry, Chemical Physics
5. Chemistry, Geology
6. Chemistry, Materials Science & Engineering
7. Chemistry, Mathematics
8. Chemistry, Teaching

All chemistry majors consist of a core set of courses and the particular flavor of the chemistry major is defined by the indicated course work in specific areas relevant to the field in the attached proposal. All of these paths to the chemistry degree have long been in place, but approval of this proposal will allow the full nature of the course of study to be indicated on a transcript. We believe this change will help students in the job market and as they apply to graduate and professional programs.

We are asking for your approval and a letter of support for these emphases so that the proposal can be forwarded to the administration and the Board of Regents.

Sincerely,

Henry S. White

Distinguished Professor and Chair

Section I: Action

The Chemistry Department at the University of Utah proposes to offer eight emphases in Chemistry to reflect the breadth and diversity of the degree programs that have historically been offered in the department. As is current practice, students must complete the Core Requirements and one of the indicated emphases to earn the chemistry degree. Approval of these emphases will enable the precise nature of each student’s degree program to be indicated on his/her transcript.

**Proposed Emphases for Chemistry Majors**

**Core Requirements for the Chemistry Major**Chemistry Core Courses (required of all majors):
CHEM 1210, 1220 General Chemistry I, II (4, 4)
CHEM 1215, 1225 General Chemistry Lab I, II (1, 1)
CHEM 2310, 2320 Organic Chemistry I, II (4, 4)
CHEM 2315, 2325 Organic Chemistry Lab I, II (2, 2)
CHEM 3000 Quantitative Analysis (4)
CHEM 3060 Quantum Chemistry and Spectroscopy (4)
CHEM 3100 Inorganic Chemistry (5)

Math and Physics Core (required of all majors)
MATH 1210, 1220, 2210 Calculus I, II, III (4, 4, 3)
PHYS 2210, 2220 Physics for Scientists and Engineers I, II (4, 4)
PHYS 2215, 2225 Physics Laboratory for Scientists and Engineers I, II (1, 1)

**A. Chemistry, Professional Emphasis**
*Core courses, plus:*
MATH 2250 Differential Equations and Linear Algebra (4)
MATH 3150 Partial Differential Equations for Engineering Students (2)
CHEM 3070 Thermodynamics and Chemical Kinetics (4)
CHEM 3510 Biological Chemistry I (3)

Five laboratory courses selected from the following:

CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)
CHEM 3515 Biological Chemistry Lab (2)

or 3525 Molecular Biology of DNA Lab (3)
CHEM 4800 Undergraduate Research (2)

or CHEM 4999 Honors Thesis/Project (3)

**B. Chemistry, Biological Emphasis**

*Core courses, plus:*
BIOL 2020 Principles of Cell Biology (3)
BIOL 2030 Genetics (3)
BIOL 3510 Biological Chemistry I (3)
BIOL 3515 Biological Chemistry Laboratory (2)

 *or* BIOL 3525 Molecular Biology of DNA Lab (3)
BIOL 3520 Biological Chemistry II (3)
CHEM 3070 Thermodynamics and Chemical Kinetics (4)

 or CHEM 3090 Biophysical Chemistry (3)

Five or more semester units selected from approved Biology courses numbered 3000 or higher. Selected chemistry graduate level courses may be used to fulfill this requirement with the approval of the chemistry advisor.

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

**C. Chemistry, Business Emphasis**
*Core courses, plus:*
CHEM 3070 Thermodynamics and Chemical Kinetics (4)

or CHEM 3090 Biophysical Chemistry (3)

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

*Twelve or more units selected from the College of Business*

*(Business Minor courses are recommended)*
 **D. Chemistry, Chemical Physics Emphasis**
*Core courses, plus:*
CHEM 3070 Thermodynamics and Chemical Kinetics (4)
MATH 2250 Differential Equations and Linear Algebra (4)
MATH 3150 Partial Differential Equations for Engineers (2)
MATH 3160 Complex Variables for Engineers (2)
MATH Elective (3 credits) chosen in consultation with the chemistry advisor

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

*Six or more units selected from the following:*
CHEM 7000 Introduction to Quantum Mechanics I (2)
CHEM 7010 Introduction to Quantum Mechanics II (2)
CHEM 7020 Introduction to Spectroscopy I (2)
CHEM 7030 Introduction to Spectroscopy II (2)
CHEM 7040 Statistical Thermodynamics (2)
CHEM 7050 Classical Thermodynamics (2)
CHEM 7070 Chemical Kinetics (2)
CHEM 7080 Chemical Dynamics (2)

**E. Chemistry, Geology Emphasis**
*Core courses, plus:*
CHEM 3070 Thermodynamics and Chemical Kinetics (4)

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

*Twelve or more units selected from the following:*
GEO 1110 Physical Geology (3)
GEO 3060 Structural Geology and Tectonics (3)
GEO 3080 Earth Materials I (4)
GEO 3090 Earth Materials II (4)
GEO 4100 Petrography and Petrogenesis (3)
GEO 5450 Ore Genesis and Mineral Exploration (3)
GEO 5660 Geochemistry (3)
GEO 5670 Isotope Tracers in Earth Science (3)

**F. Chemistry, Materials Science and Engineering Emphasis**
*Core courses, plus:*
MATH 2250 Differential Equations and Linear Algebra (4)
CHEM 3070 Thermodynamics and Chemical Kinetics (4)

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

*Fifteen or more units selected from the following:*
MSE 2010 Introduction to Materials Science and Engineering (4)
MSE 3010 Materials Processing Lab (3)
MSE 3210 Electronic Properties of Solids (3)
MSE 3310 Introduction to Ceramics (3)
MSE 3410 Introduction to Polymers (3)
MSE 5011 Adv Mtrls Tech: Experiment, Theory & Characterization (2)

MSE 5032 Advanced Thermodynamics (3)
MSE 5034 Kinetics of Solid-state Processes (3)
MSE 5470 Polymer & Organic Materials fro Renewable energy Application I (3)

**G. Chemistry, Mathematics Emphasis**
*Core courses, plus:*
CHEM 3070 Thermodynamics and Chemical Kinetics (4)
MATH 2250 Differential Equations and Linear Algebra (4)
MATH 3150 Partial Differential Equations for Engineers (2)
MATH 3160 Applied Complex Variables (2)
MATH Elective (3 credits) chosen in consultation with the chemistry advisor

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

*Six or more units selected from the following:*
MATH 5010 Introduction to Probability (3)
MATH 5080 Statistical Inference I (3)
MATH 5090 Statistical Inference II (3)
MATH 5210 Introduction to Real Analysis (4)
MATH 5600 Survey of Numerical Analysis (4)
MATH 5610 Introduction to Numerical Analysis I (4)
MATH 5620 Introduction to Numerical Analysis II (4)

**H. Chemistry, Teaching Emphasis**

*Core courses, plus:*
CHEM 3070 Thermodynamics and Chemical Kinetics (4)

or CHEM 3090 Biophysical Chemistry (3)

*Two laboratory courses selected from:*
CHEM 5700 Advanced Analytical Chemistry Lab (2)
CHEM 5710 Advanced Organic Chemistry Lab (2)
CHEM 5720 Advanced Physical Chemistry Lab (2)
CHEM 5730 Advanced Inorganic Chemistry Lab (2)

**Teaching Major, Minor, Certification.** Please refer to Education in the Colleges section for information on teaching major and minor course requirements and state secondary teacher certification.

Section II: Need

Since long before the transition to semesters, the chemistry department has offered students a variety of ways to complete the requirements for the Chemistry Degree but there has not been a way to indicate this information on a transcript until the recently approved mechanism involving emphases. There is a common core for all chemistry majors and the unique flavor of each emphasis is indicated by name assigned to each emphasis.

The Professional and Biological Emphases are certified by the American Chemical Society as meeting ACS standards for a traditional chemistry major and a biochemistry major, respectively. It should be noted that the Biochemistry Department on campus does not offer an undergraduate degree program so including the Biological Emphasis on a transcript is important to our students. With an annual production of approximately 60 chemistry graduates, the Chemistry Department ranks in the top ten in the nation with about 50 ACS Certified graduates in a typical year.

Recognition of the other options (Business, Chemical Physics, Geology, Materials Science and Engineering, Mathematics and Teaching) on a transcript will make clear that students completing these degree programs have had an exposure to diverse fields where chemical training matters. Students have frequently requested that the precise nature of their chemistry degree be indicated on their transcripts so this change should help students as they apply to graduate and professional programs or pursue a career in the chemical sciences.

Section III: Institutional Impact

There will be no impact to the department or institution as these degree programs are already in place and we have sufficient advising resources to direct students to the appropriate program of study..

Section IV: Finances

There will be no financial impact to the department or institution.

