I. Approval of CUSA Minutes from April 24, 2012

II. Chair’s Report
   Election of 2012-2013 CUSA Chair

III. Dean’s Office Report

IV. CLA&S Student Academic Services Report

V. Subcommittee Chair Reports
   A. Advising & Awards
   B. Curricular Changes/Degree Requirements
      1. Curricular Changes for Approval:
         NEW COURSES: CLSX 550, SOC 230
         CHANGES: DANC 375, GINS 101
         DELETIONS: DANC 170
         Old Business: HWC 335, ISP 335
      Old Business Chemistry:
      2. Degree Requirements for Approval:
         a. Change to Existing Major in Classical Languages
         b. Change to Existing Major and Minor in Dance
         c. Change to Existing Major in Classical Antiquity
            • New concentration within existing major
         d. Change to Existing Major in Humanities
            • New concentration within existing major
            • Deletion of existing major TRACK
         Old Business Chemistry Related Changes to Degree Requirements:
         e. Change to BA in Chemistry
f. Change to BS in Chemistry  
g. Change to Minor in Chemistry  
h. Change to BA in Astronomy  
i. Change to BS in Atmospheric Science  
j. Change to BA Biochemistry  
k. Change to BS Biochemistry  
l. Change to BA Biology  
m. Change to BS Biology-all emphases  
n. Change to BA Human Biology  
o. Changes to BA Microbiology  
p. Changes to BS Microbiology  
q. Changes to BS Molecular Biosciences  
r. Changes to BS Environmental Studies  
s. Changes to BS Geography  
t. Changes to BA Geology  
u. Changes to BS Geology-all emphases  
v. Changes to BS Mathematics  
w. Changes to BA Physics  
x. Changes to BS Physics  
y. Changes to BS Behavioral Neuroscience  
z. Changes to BA in Astrobiology

C. Academic Standards Report

VI. Old Business

Discussion of degree specific general education requirements in the College.
COMMITTEE ON UNDERGRADUATE STUDIES AND ADVISING  
Minutes of the Meeting for April 24, 2012

The committee met on Tuesday, April 24, 2012, at 11:00 a.m. in Room 210 Strong Hall. The following were present: Bradley, Burright, Childers, Conrad, Corbeill, Crosby, Fischer, Gray, Hurst, Jackson, Jelks, Ledom, Neidert, Pye, Vanchena

MINUTES Professor Fischer chaired the meeting. A motion was made to approve (as corrected) April 10, 2012 meeting minutes of the Committee on Undergraduate Studies & Advising. The motion was seconded and passed unanimously

CHAIR’S REPORT Professor Fischer brought forth a request from Ms. Karen Ledom that the committee meet again on May 8 to try to complete some of the unfinished business of this committee. Professor Fischer reminded members that this will be during finals week. Concerns were expressed that the committee was expected to complete the general education requirements for the KU Core by the next meeting. Given the short amount of time the committee has had to work on this issue, and given the scope and complexity, holding an additional meeting will not necessarily guarantee a definitive outcome from this committee on this issue. Ms. Ledom mentioned that was not the only reason to ask for an additional meeting as there are other unfinished business items to discuss as well. Lunch will be provided at this meeting.

Professor Fischer reported that he attended a meeting of the School of Engineering’s Curriculum Committee. During this meeting they discussed the KU Core and what they would need to do to meet the requirements in their department.

DEAN’S OFFICE REPORT Ms. Ledom reported that Dean Goldstein was out of town.

CLA&S STUDENT ACADEMIC SERVICES REPORT No report at this time.

SUBCOMMITTEE CHAIR REPORTS

A. ADVISING & AWARDS
The following awards were presented:

- Allen S. Wilbert Scholarship: Jong J. Jeon-$7,000; Kelli K. Williams-$7,000
- Betty Wahlstedt: Paul A. Thomas-$750; Jon M. Nelson-$750
- Hilden Gibson Award: Jon M. Nelson-$700
- Paul Lawson Award: Bonnie K. Ewart-Fisher-$1,000
- Van Eekeren Family Scholarship: Carolisa G. Watson-$2,000; Regina L. Bird-$1,200; Skyler Q. Richardson-$1,200; Bobby B. Golen-$1,200; Joann X. Gonzalez-$1,200
- Veta B. Lear: Liesel A. Reussner-$500; Mitchell D. Newton-$500; Jessica F. Gregory-$500

B. CURRICULAR CHANGES/DEGREE REQUIREMENTS
Professor Conrad presented the following:

1a. Curricular Changes for Approval:

NEW COURSES APPROVED: ABSC 360, ABSC 562, CLSX 538, GIST 202, GIST 203, GIST 502, HA 538, HWC 538, TAJ 510, TAJ 532

Approved with the following contingents: ABSC 562, not a cross listed course; GIST 203, with consult from African & African American Studies as to possible duplication; TAJ 510 and TAJ 532, the committee asked for additional rational from the department.

CHANGES APPROVED: PHSX 681
DELETIONS:
* FIRST YEAR SEMINAR COURSES APPROVED:
BIOL 177, GEOL 177, HIST 177, LING 177, MATH 177,
PSYC 177, PUAD 177, SPAN 177, THR 177

Degree Requirements for Approval

APPROVED:
- Changes to Existing BA Major in Dance
- New Principal Course Designation for ASTR 394
- New Principal Course Designation for CHEM 170

TABLED:
- Change to Existing Major in Humanities
  - New concentration within existing major
  - Deletion of existing major TRACK

Approved with the following change to ASTR 394, change word starts to stars in description.

*FIRST YEAR SEMINAR EXPERIENCES COURSE DEGREE REQUIREMENTS APPROVED:
BIOL 177, BUS 177, ENGR 177, GEOL 177, HIST 177, JOUR 177, LING 177, MATH 177, PSYC 177, PUAD 177, SPAN 177, THR 177

*The committee was asked to consider, as a pilot program, the new First Year Seminar Courses from the Office of First Year Experience in advance of the new general education requirements. It was noted that these courses will need to go through the vetting process for the KU Core next year and this would be a temporary, one semester approval only.

After lengthy discussion, many questions and concerns were brought forward and extensive debate took place. Two motions were made; the first motion was made and seconded to approve the courses for one semester only, the motion passed by a vote of: 8-approve and 2-oppose. The second motion was made to review each course individually to see if they constitute principal courses. The motion was not seconded. After much more debate and discussion about what constituted principal courses, another motion was made and seconded to approve all courses as principal courses for the pilot program for the Fall 2012 semester. The motion carried by a vote of: 5-approve, 4-oppose, 1-abstention.

A request was made that the CUSA membership be consulted in a much more timely manner in the future, so that they can be allowed the time to carefully consider the matters at hand to better help them make more informed decisions.

C. ACADEMIC STANDARDS
No report at this time.

Meeting adjourned at 12:39 p.m.
B. Curricular Changes/Degree Requirements

1. Curricular Changes for Approval/Motion to File

CLASSICS

CHANGE: NEW COURSE
CLSX 550  CAPSTONE IN CLASSICS 1-3 H
This capstone seminar synthesizes various aspects in the discipline of Classics by focusing on recent award-winning scholarship or creative work in the field. Specific assignments and additional readings vary from one semester to another and will be stated on the instructor's syllabus. Introductory knowledge of Greek or Latin is required. Prerequisite: 15 hours in CLSX/LAT/GRK at the 200 level or above, or status as a senior major in the department, or permission of the instructor.

CHANGE: DELETE COURSE
DANC 170  CONDITIONING AND INJURY PREVENTION 1.0 H
This course introduces principles of conditioning (strength, flexibility, and endurance) and factors leading to injury (muscular imbalances, structural problems, postural deviations, improper mechanics or techniques) so that students can develop individualized conditioning programs and learn how to prevent injuries.

CHANGE: COURSE DESCRIPTION
DANC 375  IDEOKINESIS 3.0 H
(OLD) Basic concepts of neuromuscular education for the dancer through the use of ideokinesis. This class will focus on application of the work of Mabel Todd, Lulu Sweigard, and Irmgard Bartenieff. Emphasis will be on the neuromuscular and skeletal systems, dynamic alignment, body connectedness, prevention of injury, and maximum realization of movement potential. Prerequisite: DANC 370 or consent of instructor.

DANC 375  IDEOKINESIS 3.0 H
(NEW) Basic concepts of neuromuscular and skeletal education through the use of specific imagery (ideokinesis). Based on the work of Mabel Todd, Lulu Sweigard and Irmgard Bartenieff, the emphasis is on body connectedness and dynamic alignment. The aim is to realize full movement potential in the most efficient way through intrinsic body awareness. Injury prevention is addressed by introducing principles of conditioning (strength, flexibility, endurance) and factors leading to injury such as muscular imbalances or postural deviations.

GLOBAL INDIGENOUS NATIONS STUDIES

CHANGE: COURSE DESCRIPTION  NUMBER
GINS 101  INTRODUCTION TO INDIGENOUS STUDIES 3 H, NW
An introduction to the study of Indigenous peoples. It surveys the concepts, methods and content relevant to Applied Indigenous Studies, using case studies drawn from diverse cultures. The course illustrates that the social, political, religious, and economic aspects of American Indian life are interconnected and that tribal histories cannot be understood without an awareness of these fields. Students are introduced to controversies over how to research, write and interpret American Indians, and will address the foundations of Indigenous Studies, and that is Indigenous concepts of decolonization, empowerment and Nation-building. The course explores how the lives of Indigenous people have been affected by colonization, while exploring the varying definitions of "colonialism", "colonizer" and the "colonized."

HUMANITIES AND WESTERN CIVILIZATION

CHANGE: NEW CROSS-LISTED COURSE
HWC 335  INTRODUCTION TO INDIGENOUS STUDIES 03 H, NW
This course is an introduction to the study of modern and historic indigenous peoples. It surveys the concepts, methods, and content relevant to Indigenous Studies, using case studies drawn from the diverse indigenous cultures. Special attention is paid to the various ways in which standard academic disciplines—history, anthropology, literature, law, political science, among others—contribute to the study of Indigenous cultures and current issues. The course illustrates that the social, political, religious, and economic aspects of indigenous life are interconnected and tribal histories and cultures cannot be understood without an awareness of these fields. (Same as ISP 335) LEC

ISP 335 INTRODUCTION TO INDIGENOUS STUDIES 3 H, NW

SOCIOLOGY

CHANGE: NEW COURSE

SOC 230 INTRODUCTION TO SOCIAL INEQUALITY IN THE U.S. 3 S

By the end of this course, students will be able to describe the major dimensions of inequality in the U.S. (including race, class, and gender), understand the structural basis of inequality, critically assess how inequality exists in major social institutions, and understand how inequalities in race, class, and gender shape social interaction.

Chemistry Course Changes for Approval:

ATMOSPHERIC SCIENCE

CHANGE: PREREQUISITE

ATMO 525 AIR POLLUTION METEOROLOGY 3 S

(OLD) A study of background levels and concentrated sources of atmospheric pollution together with considerations of pollution buildup in urban areas as related to particular weather conditions. Inadvertent weather modifications and effects of atmospheric pollution on particular weather events and general climate will be discussed. Prerequisite: ATMO 105, MATH 121, EECS 138 and CHEM 184.

ATMO 525 AIR POLLUTION METEOROLOGY 3 S

(NEW) A study of background levels and concentrated sources of atmospheric pollution together with considerations of pollution buildup in urban areas as related to particular weather conditions. Inadvertent weather modifications and effects of atmospheric pollution on particular weather events and general climate will be discussed. Prerequisite: ATMO 105, MATH 121, EECS 138 and CHEM 130 or equivalent.

BIOLOGY

CHANGE: PREREQUISITE

BIOL 150 PRINCIPLES OF MOLECULAR AND CELLULAR BIOLOGY 4 N

(OLD) An integrated lecture and laboratory course for biology majors and students planning to take additional courses in biology. This course covers basic biochemistry, cell structure and function, molecular biology, genetics, physiology, and development of plants and animals. Three hours of lecture and two hours of laboratory per week. An honors section (BIOL 151) is offered for students with superior academic records. Prerequisite: Concurrent or prior enrollment in CHEM 184, or consent of instructor.

BIOL 150 PRINCIPLES OF MOLECULAR AND CELLULAR BIOLOGY 4 N

(NEW) An integrated lecture and laboratory course for biology majors and students planning to take additional courses in biology. This course covers basic biochemistry, cell structure and function, molecular biology, genetics, physiology, and development of plants and
animals. Three hours of lecture and two hours of laboratory per week. An honors section (BIOL 151) is offered for students with superior academic records. Prerequisite: Concurrent or prior enrollment in CHEM 130, or consent of instructor.

CHANGE: PREREQUISITE
BIOL 151  PRINCIPLES OF MOLECULAR AND CELLULAR BIOLOGY, HONORS 4 N
(OLD) An integrated lecture and laboratory course for students with superior academic records who are biology majors or who plan to take additional courses in biology. This course covers basic biochemistry, cell structure and function, molecular biology, genetics, physiology, and development of plants and animals. Three hours of lecture and two hours of laboratory per week. Concurrent or prior enrollment in CHEM 184 is recommended. Prerequisite: Membership in the University Honors Program or permission of instructor.

BIOL 151  PRINCIPLES OF MOLECULAR AND CELLULAR BIOLOGY, HONORS 4 N
(NEW) An integrated lecture and laboratory course for students with superior academic records who are biology majors or who plan to take additional courses in biology. This course covers basic biochemistry, cell structure and function, molecular biology, genetics, physiology, and development of plants and animals. Three hours of lecture and two hours of laboratory per week. Prerequisite: concurrent or prior enrollment in CHEM 130 and membership in the University Honors Program, or consent of instructor.

CHANGE: PREREQUISITE
BIOL 408  PHYSIOLOGY OF ORGANISMS 3 N
(OLD) A comprehensive and integrative approach to the study of organisms with an emphasis on physiological, ecological, structural, and behavioral adaptations to differing environments. Prerequisite: BIOL 152, or BIOL 153, and CHEM 184, or consent of the instructor.

BIOL 408  PHYSIOLOGY OF ORGANISMS 3 N
(NEW) A comprehensive and integrative approach to the study of organisms with an emphasis on physiological, ecological, structural, and behavioral adaptations to differing environments. Prerequisite: BIOL 152, or BIOL 153, and CHEM 130, or consent of the instructor.

CHANGE: PREREQUISITE
BIOL 416  CELL STRUCTURE AND FUNCTION 3 N
(OLD) Lecture survey of molecular cell biology with emphasis on experimental approaches to understanding cell function; topics include biological membranes and transmembrane transport, vesicular trafficking (secretion and endocytosis), cell signaling, cell motility and the cytoskeleton, and the regulation of the cell division cycle. Prerequisite: BIOL 150, BIOL 350, CHEM 184 and CHEM 188, or consent of the instructor.

BIOL 416  CELL STRUCTURE AND FUNCTION 3 N
(NEW) Lecture survey of molecular cell biology with emphasis on experimental approaches to understanding cell function; topics include biological membranes and transmembrane transport, vesicular trafficking (secretion and endocytosis), cell signaling, cell motility and the cytoskeleton, and the regulation of the cell division cycle. Prerequisite: BIOL 150, BIOL 350, CHEM 130 and CHEM 135, or consent of the instructor.

CHANGE: PREREQUISITE
BIOL 426  LABORATORY IN CELL BIOLOGY 3 N
(OLD) Laboratory exercises will examine the function, organization, and composition of eukaryotic cells. Prerequisite: BIOL 150 and CHEM 184, concurrent or prior enrollment in BIOL 416, or consent of the instructor. BIOL 350 is highly recommended. Prerequisite:

BIOL 426  LABORATORY IN CELL BIOLOGY 3 N
(NEW) Laboratory exercises will examine the function, organization, and composition of eukaryotic cells. Prerequisite: BIOL 150 and CHEM 130, concurrent or prior enrollment in BIOL 416, or consent of the instructor. BIOL 350 is highly recommended.

CHANGE: PREREQUISITE
BIOL 594  FOREST ECOSYSTEMS 3 N
Students learn basic concepts of forest productivity, forest water relations, forest hydrology, nutrient cycling, through soils and vegetation, nutrient uptake, carbon cycling, decomposition, linkages to aquatic ecosystems, and agents of disturbance to these cycles. The class spends a significant part of the semester exploring forest soil profiles and the challenges they present to different forest ecosystems. We discuss the function of forested ecosystems in a global context and identify and understand smaller-scale processes that drive forest function. Prerequisite: CHEM 188 and BIOL 414.

**BIOL 594  FOREST ECOSYSTEMS 3 N**

Students learn basic concepts of forest productivity, forest water relations, forest hydrology, nutrient cycling, through soils and vegetation, nutrient uptake, carbon cycling, decomposition, linkages to aquatic ecosystems, and agents of disturbance to these cycles. The class spends a significant part of the semester exploring forest soil profiles and the challenges they present to different forest ecosystems. We discuss the function of forested ecosystems in a global context and identify and understand smaller-scale processes that drive forest function. Prerequisite: CHEM 135 and BIOL 414.

**CHANGE: PREREQUISITE**

**BIOL 636  BIOCHEMISTRY I 3 N**

First semester of a two-semester lecture course in introductory biochemistry. Emphasis upon the physical structure of macromolecules and membranes, enzyme structure/function, and enzyme kinetics. Prerequisite: CHEM 626 or consent of instructor.

**BIOL 636  BIOCHEMISTRY I 3 N**

First semester of a two-semester lecture course in introductory biochemistry. Emphasis upon the physical structure of macromolecules and membranes, enzyme structure/function, and enzyme kinetics. Prerequisite: CHEM 335 or consent of instructor.

**CHANGE: PREREQUISITE COURSE IS CURRENTLY CROSSLISTED**

**BIOL 656  ECOSYSTEM ECOLOGY 3 N**

An introduction to the patterns and processes that affect terrestrial ecosystems. Emphasis is placed on understanding nutrient cycles (e.g., carbon nitrogen phosphorous), hydrologic cycles, and patterns of net primary productivity. The role of both natural and anthropogenic disturbances in structuring terrestrial ecosystems is examined in the context of global land-use patterns. Discussion of current research literature will be expected. (Same as EVRN 656.) Prerequisite: BIOL 414 and CHEM 184.

**BIOL 656  ECOSYSTEM ECOLOGY 3 N**

An introduction to the patterns and processes that affect terrestrial ecosystems. Emphasis is placed on understanding nutrient cycles (e.g., carbon nitrogen phosphorous), hydrologic cycles, and patterns of net primary productivity. The role of both natural and anthropogenic disturbances in structuring terrestrial ecosystems is examined in the context of global land-use patterns. Discussion of current research literature will be expected. (Same as EVRN 656.) Prerequisite: BIOL 414 and CHEM 130.

**CHANGE: PREREQUISITE**

**BIOL 662  AQUATIC ECOLOGY LABORATORY 2 N**

A field and laboratory course introducing biological, physical, and chemical characteristics of lentic (ponds and lakes) and lotic (creeks and rivers) habitats. Students learn sampling and monitoring techniques and how to classify aquatic biota at higher taxonomic levels. Co- or prerequisite: CHEM 184 and either BIOL 660 or 661.

**BIOL 662  AQUATIC ECOLOGY LABORATORY 2 N**

A field and laboratory course introducing biological, physical, and chemical characteristics of lentic (ponds and lakes) and lotic (creeks and rivers) habitats. Students learn sampling and monitoring techniques and how to classify aquatic biota at higher taxonomic levels. Co- or prerequisite: CHEM 130 and either BIOL 661 or 662.

**CHEMISTRY**
“The original chemistry proposals were tabled because of a problem with proposed numbering. Chemistry has sent a revised proposal that raises the proposed numbering of the organic chemistry courses from 200-level to 300-level.

The department has also proposed a means by which students at a community college may be tested and awarded junior/senior level credit. This is a new part of the proposal for review.”

CHANGE: COURSE DESCRIPTION NUMBER TITLE
CHEM 184 FOUNDATIONS OF CHEMISTRY I 5 N
(OLD) This course seeks to develop a working knowledge of the conceptual foundation and the quantitative chemical relationships on which subsequent chemistry courses are built. Atomic structure, chemical bonding, properties of gases, liquids, and solids, acid-base chemistry, and chemical equilibria are emphasized. The class meets each week for three one-hour lectures, a one-hour tutorial period, and a three-hour laboratory. Students with credit in CHEM 125 will have two hours added on to their total number of hours required for graduation. Prerequisite: Must be eligible for MATH 115. LEC

CHEM 130 GENERAL CHEMISTRY I 5 N
(NEW) This course seeks to develop a working knowledge of the conceptual foundation and the quantitative chemical relationships on which subsequent chemistry courses are built. Atomic structure, chemical bonding, reaction stoichiometry, thermochemistry, and periodic trends are emphasized in this integrated lecture and laboratory course. Students pursuing or considering a major in one of the chemical sciences should strongly consider taking CHEM 170 or 190. Students with credit in CHEM 125 will have two hours added on to their total number of hours required for graduation. Prerequisite: Must be eligible for MATH 115. LEC

CHANGE: COURSE DESCRIPTION NUMBER
CHEM 185 FOUNDATIONS OF CHEMISTRY I, HONORS 5 N
(OLD) This course, which is designed for qualified and motivated students having a strong interest in chemistry, provides a more thorough treatment of the concepts and topics covered in CHEM 184 and CHEM 186. It is anticipated that students in CHEM 185 plan to take more than one year of chemistry at the college level. Class meets each week for three one-hour lectures, a one-hour tutorial period, and a three-hour lab. Students with credit in CHEM 125 will have two hours added on to their total number of hours required for graduation. Prerequisite: high-school chemistry and calculus; at least one of the following: (a) acceptance into the KU Honors Program, (b) an AP exam score in chemistry of 3 or higher, (c) a mathematics ACT score of 28 or higher; or permission of instructor. LEC

CHEM 190 FOUNDATIONS OF CHEMISTRY I, HONORS 5 N
(NEW) This integrated lecture and laboratory course, which is designed for qualified and motivated students having a strong interest in chemistry, provides a more thorough treatment of the concepts and topics covered in CHEM 130 and CHEM 170. It is anticipated that students in CHEM 190 plan to take more than one year of chemistry at the college level. Students with credit in CHEM 125 will have two hours added on to their total number of hours required for graduation. Prerequisite: high-school chemistry and calculus; at least one of the following: (a) acceptance into the KU Honors Program, (b) an AP exam score in chemistry of 3 or higher, (c) a mathematics ACT score of 28 or higher; or permission of instructor. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER TITLE
CHEM 188 FOUNDATIONS OF CHEMISTRY II 5 N
(OLD) This course is a continuation of CHEM 184 and provides an introduction to inorganic chemistry and qualitative and quantitative analysis. Electrochemistry, thermodynamics, chemical kinetics, and coordination chemistry are stressed. The class meets each week for three one-hour lectures, an optional tutorial period, and a five-hour laboratory. Prerequisite: CHEM 184, LEC

CHEM 135 GENERAL CHEMISTRY II 5 N
(NEW) This course, which is a continuation of CHEM 130, focuses on chemical kinetics, chemical equilibrium, acid-base chemistry, and thermodynamics. Additional topics, such
as environmental chemistry, electrochemistry, coordination chemistry, nuclear chemistry, organic chemistry, and/or polymers, may also be introduced in this integrated lecture and laboratory course. Students pursuing or considering a major in one of the chemical sciences should strongly consider taking CHEM 175 or 195. Prerequisite: CHEM 130, 170 or 190. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 189 FOUNDATIONS OF CHEMISTRY II, HONORS 5 N
(OLD) A course designed for qualified and motivated students with strong interest in chemistry to provide a more thorough treatment of the concepts and topics of advanced general chemistry. It is anticipated that the students in CHEM 189 have completed CHEM 185 or excelled in CHEM 184. Prerequisite: Membership in the University Honors Program, CHEM 184, CHEM 185, or consent of the department. LEC

CHEM 195 FOUNDATIONS OF CHEMISTRY II, HONORS 5 N
(NEW) CHEM 195: Foundations of Chemistry II, Honors (5) N
A course designed for qualified and motivated students with strong interest in chemistry to provide a more thorough treatment of the concepts and topics of advanced general chemistry. It is anticipated that the students in CHEM 195 have completed CHEM 190 or excelled in CHEM 130 or 170. Prerequisite: Membership in the University Honors Program, CHEM 130, CHEM 170 or CHEM 190, or consent of the department. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 516 ANALYTICAL CHEMISTRY 3 N
(OLD) Principles of analytical chemistry with emphasis on the fundamental reactions used for chemical analysis. Topics include chemical equilibria in acid/base, complexation, separations, and redox systems, data analysis, and potentiometry. Three class periods per week. Prerequisite: CHEM 188, CHEM 622 or CHEM 624, CHEM 625, and concurrent enrollment in CHEM 517. LEC

CHEM 620 ANALYTICAL CHEMISTRY 3 N
(NEW) Principles of analytical chemistry with emphasis on the fundamental reactions used for chemical analysis. Topics include chemical equilibria in acid/base, complexation, separations, and redox systems, data analysis, potentiometry and spectrophotometry. Prerequisites: one semester of organic chemistry and organic chemistry laboratory, CHEM 535 or CHEM 510 (or concurrent enrollment in CHEM 510), or permission of instructor. Corequisite: CHEM 621. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 517 ANALYTICAL CHEMISTRY LABORATORY 2 U
(OLD) Experiments illustrate fundamental principles of chemical analysis methods. The course serves as an introduction to advanced instrumental methods of analysis. One five-hour laboratory and one fifty minute lecture each week. Prerequisite: CHEM 188, CHEM 622 or CHEM 624, CHEM 625, and concurrent enrollment in CHEM 516. LAB Prerequisite: ANALYTICAL CHEMISTRY LABORATORY 2 U

CHEM 621 ANALYTICAL CHEMISTRY LABORATORY 2 U
(NEW) Experiments illustrate fundamental principles of chemical analysis methods. The course serves as an introduction to advanced instrumental methods of analysis. Prerequisites: one semester of organic chemistry and organic chemistry laboratory, CHEM 535 or CHEM 510 (or concurrent enrollment in CHEM 510), or permission of instructor. Corequisite: CHEM 620. LAB

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 622 FUNDAMENTALS OF ORGANIC CHEMISTRY 3 N
(OLD) A study of the structures and reactions of important classes of organic compounds. Along with the organic laboratory, CHEM 625, this course will fulfill the needs of students requiring a single semester of organic chemistry. Students requiring more than one semester of organic chemistry should enroll in CHEM 624. Prerequisite: CHEM 188. LEC

CHEM 310 FUNDAMENTALS OF ORGANIC CHEMISTRY 3 N
(NEW) A study of the structures and reactions of important classes of organic compounds. Along with the organic laboratory, CHEM 331, this course will fulfill the needs of students requiring a single semester of organic chemistry. Students requiring more than one
semester of organic chemistry should enroll in CHEM 330. Prerequisite: CHEM 135, 175 or 195. LEC

CHEM 624  ORGANIC CHEMISTRY I 3 N
(OLD) Three class periods each week. A study of the structure and reactivity of selected classes of organic compounds. CHEM 624 is the first course of a two-semester sequence. Students who require only one semester of organic chemistry should enroll in CHEM 622. Students with credit in CHEM 622 will have two hours added on to their total number of hours required for graduation. Prerequisite: CHEM 188. LEC

CHEM 330  ORGANIC CHEMISTRY I 3 N
(NEW) A study of the structure and reactivity of selected classes of organic compounds. CHEM 330 is the first course of a two-semester sequence. Students who require only one semester of organic chemistry should enroll in CHEM 310. Students with credit in CHEM 310 will have two hours added on to their total number of hours required for graduation. Prerequisite: CHEM 135, 175 or 195. LEC

CHEM 625  ORGANIC CHEMISTRY I LABORATORY 2 U
(OLD) One five-hour laboratory and one one-hour lecture each week. Emphasis on basic techniques for the preparation, separation, and purification of organic compounds. Required for a major in chemistry and by those departments and programs specifying a complete undergraduate organic chemistry course. Prerequisite: CHEM 622 or CHEM 624, or concurrently. LAB

CHEM 331  ORGANIC CHEMISTRY I LABORATORY 2 U
(NEW) Emphasis on basic techniques for the preparation, separation, and purification of organic compounds. Required for a major in chemistry and by those departments and programs specifying a complete undergraduate organic chemistry course. Prerequisite or corequisite: CHEM 310 or CHEM 330 or CHEM 380. LAB

CHEM 626  ORGANIC CHEMISTRY II 3 N
(OLD) Three class periods each week. A continuation of CHEM 624, intended for students who want further training in organic chemistry. Prerequisite: CHEM 624. LEC

CHEM 335  ORGANIC CHEMISTRY II 3 N
(NEW) A continuation of CHEM 330, intended for students who want further training in organic chemistry. Prerequisite: CHEM 330 or CHEM 380. LEC

CHEM 627  ORGANIC CHEMISTRY II LABORATORY 2 U
(OLD) One five-hour laboratory period and one one-hour lecture each week. More advanced organic laboratory techniques with emphasis on modern spectroscopic methods for determining the structure and purity of organic compounds. Required by all programs which specify a full year of organic chemistry. Prerequisite: CHEM 625 and CHEM 626 or CHEM 626 concurrently. LAB

CHEM 336  ORGANIC CHEMISTRY II LABORATORY 2 U
(NEW) More advanced organic laboratory techniques with emphasis on modern spectroscopic methods for determining the structure and purity of organic compounds. Prerequisite: CHEM 331. Prerequisite or corequisite: CHEM 335 or CHEM 385. LAB

CHEM 628  ORGANIC CHEMISTRY I, HONORS 3 H
(OLD) Three class periods and one tutorial period each week. This is the first half of a two-semester sequence in organic chemistry for students with strong records in previous chemistry courses and who are planning or considering a major in a chemistry-related field. The content is similar to that of CHEM 624 but with coverage in greater depth and
more emphasis on developing problem-solving skills. Students requiring only one semester of organic chemistry should not enroll in this course but take CHEM 622. Students with credit in CHEM 622 who take and complete CHEM 628 will have two hours added to their total number of credit hours required for graduation. Prerequisite: CHEM 188 or CHEM 189 and membership in the University Honors Program or consent of instructor. LEC

CHEM 380  ORGANIC CHEMISTRY I, HONORS 3 H
(NEW)  This is the first half of a two-semester sequence in organic chemistry for students with strong records in previous chemistry courses and who are planning or considering a major in a chemistry-related field. The content is similar to that of CHEM 330 but with coverage in greater depth and more emphasis on developing problem-solving skills. Students requiring only one semester of organic chemistry should not enroll in this course but take CHEM 310. Students with credit in CHEM 310 who take and complete CHEM 380 will have two hours added to their total number of credit hours required for graduation. Prerequisite: CHEM 135, 175 or 195 and membership in the University Honors Program or consent of instructor. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 630  ORGANIC CHEMISTRY II, HONORS 3 N
(OLD)  Three class periods and one tutorial period each week. This is the second course in a two-semester sequence in organic chemistry for students with strong records in previous chemistry courses and who are planning or considering a major in chemistry or in a chemistry-related field. The content is similar to that of CHEM 626 but with coverage in greater depth and more emphasis on developing problem-solving skills. Prerequisite: CHEM 624 or CHEM 628 and membership in the University Honors Program, or consent of instructor. LEC

CHEM 385  ORGANIC CHEMISTRY II, HONORS 3 N
(NEW)  This is the second course in a two-semester sequence in organic chemistry for students with strong records in previous chemistry courses and who are planning or considering a major in chemistry or in a chemistry-related field. The content is similar to that of CHEM 335 but with coverage in greater depth and more emphasis on developing problem-solving skills. Prerequisite: CHEM 330 or CHEM 380 and membership in the University Honors Program, or consent of instructor. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE
CHEM 635  INSTRUMENTAL METHODS OF ANALYSIS 2 U
(OLD)  Theory and application of instrumental methods to modern analytical problems. Topics covered include atomic and molecular spectroscopy, electrochemistry, mass spectrometry, and separations. Two class periods per week. Students must be enrolled concurrently in CHEM 636. Prerequisite: CHEM 516 and CHEM 517. CHEM 640 or CHEM 646 strongly recommended. Corequisite: CHEM 636. LEC

CHEM 635  INSTRUMENTAL METHODS OF ANALYSIS 2 U
(NEW)  Theory and application of instrumental methods to modern analytical problems. Topics covered include atomic and molecular spectroscopy, electrochemistry, mass spectrometry, and separations. Prerequisites: CHEM 620 and CHEM 621 and one semester of physical chemistry laboratory, or permission of instructor. Corequisite: CHEM 636. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE
CHEM 636  INSTRUMENTAL METHODS OF ANALYSIS LABORATORY 2 U
(OLD)  Theory and application of instrumental methods to modern analysis problems. Experiments covered include atomic and molecular spectroscopy, electrochemistry, and separation methods. One five-hour laboratory each week. Students must be enrolled concurrently in CHEM 635. Prerequisite: CHEM 516 and CHEM 517. A course in physical chemistry is strongly recommended. Corequisite: CHEM 635. LAB

CHEM 636  INSTRUMENTAL METHODS OF ANALYSIS LABORATORY 2 U
(NEW)  Theory and application of instrumental methods to modern analysis problems. Experiments covered include atomic and molecular spectroscopy, electrochemistry, and separation methods. Prerequisites: CHEM 620 and CHEM 621 and one semester of physical chemistry laboratory, or permission of instructor. Corequisite: CHEM 635. LAB
CHEM 640 BIOLOGICAL PHYSICAL CHEMISTRY 3 N
A one semester course, designed particularly for biology, biochemistry, and premedical students, which surveys the fundamentals of physical chemistry. The basic principles of thermodynamics, chemical kinetics, quantum chemistry, and spectroscopy will be introduced, and their application to aqueous solutions and biochemical systems will be emphasized. Prerequisite: One semester of organic chemistry, two semesters of calculus, and two semesters of physics. LEC

CHEM 510 BIOLOGICAL PHYSICAL CHEMISTRY 3 N
A one semester course, designed particularly for biology, biochemistry, and premedical students, which surveys the fundamentals of physical chemistry. The basic principles of thermodynamics, chemical kinetics, quantum chemistry, and spectroscopy will be introduced, and their application to aqueous solutions and biochemical systems will be emphasized. Prerequisite: One semester of organic chemistry, two semesters of calculus, and two semesters of physics. LEC

CHEM 641 BIOLOGICAL PHYSICAL CHEMISTRY LABORATORY 2 U
A course particularly for biology, biochemistry, and premedical students. Experiments in physical chemistry illustrating the fundamental principles of quantum mechanics, spectroscopy, thermodynamics, and kinetics as applied to chemical systems. Prerequisite: CHEM 640. LAB

CHEM 511 BIOLOGICAL PHYSICAL CHEMISTRY LABORATORY 2 U
A course particularly for biology, biochemistry, and premedical students. Experiments in physical chemistry illustrating the fundamental principles of quantum mechanics, spectroscopy, thermodynamics, and kinetics as applied to chemical systems. Prerequisite: CHEM 510. LAB

CHEM 646 PHYSICAL CHEMISTRY I 3 N
An introduction to the basic principles of quantum mechanics, atomic and molecular structure, molecular rotations and vibrations, group theory, spectroscopy, and statistical mechanics. Prerequisite: CHEM 188; PHSX 211 and PHSX 212; MATH 121, MATH 122 and MATH 220 or MATH 320; and completion of, or concurrent enrollment in MATH 290 or consent of instructor. LEC

CHEM 530 PHYSICAL CHEMISTRY I 3 N
An introduction to the basic principles of quantum mechanics, atomic and molecular structure, molecular rotations and vibrations, group theory, spectroscopy, and statistical mechanics. Prerequisite: CHEM 135, 175 or 195; PHSX 211 and PHSX 212; MATH 121, MATH 122 and MATH 220 or MATH 320; and completion of, or concurrent enrollment in MATH 290 or consent of instructor. LEC

CHEM 647 PHYSICAL CHEMISTRY I LABORATORY 2 U
Experiments in physical chemistry, with emphasis on the fundamental principles of quantum mechanics and spectroscopy as applied to chemical systems. Prerequisite: CHEM 646. LAB

CHEM 531 PHYSICAL CHEMISTRY I LABORATORY 2 U
Experiments in physical chemistry, with emphasis on the fundamental principles of quantum mechanics and spectroscopy as applied to chemical systems. Prerequisite: CHEM 530. LAB

CHEM 648 PHYSICAL CHEMISTRY II 4 N
Emphasizes the thermodynamics of molecular systems with application to the structure and properties of gases, liquids, solids, materials, statistical thermodynamics, chemical kinetics, and reaction dynamics. Prerequisite: CHEM 646 and MATH 290 or consent of instructor. LEC

CHEM 535 PHYSICAL CHEMISTRY II 4 N
Emphasizes the thermodynamics of molecular systems with application to the structure and properties of gases, liquids, solids, materials, statistical thermodynamics, chemical kinetics, and reaction dynamics. Prerequisite: CHEM 530 and MATH 290 or consent of instructor. LEC

CHANGE: COURSE DESCRIPTION PREREQUISITE NUMBER
CHEM 649 PHYSICAL CHEMISTRY II LABORATORY 2 U
(OLD) One four-hour laboratory and one one-hour lecture per week. Experiments in physical chemistry, with emphasis on the fundamental principles of chemical thermodynamics and kinetics. Prerequisite: CHEM 648 or consent of instructor. LEC

CHEM 536 PHYSICAL CHEMISTRY II LABORATORY 2 U
(NEW) Experiments in physical chemistry, with emphasis on the fundamental principles of chemical thermodynamics and kinetics. Prerequisite: CHEM 535 or consent of instructor. LEC

CHANGE: PREREQUISITE NUMBER
CHEM 667 SYSTEMATIC INORGANIC CHEMISTRY 3 N
(OLD) A systematic study of the elements and their compounds, emphasizing the relationship between properties of substances and their atomic and molecular structures and the positions of the elements in the periodic systems. Prerequisite: CHEM 640 or CHEM 646 or CHEM 648, or CHEM 648 concurrently. LEC

CHEM 660 SYSTEMATIC INORGANIC CHEMISTRY 3 N
(NEW) A systematic study of the elements and their compounds, emphasizing the relationship between properties of substances and their atomic and molecular structures and the positions of the elements in the periodic systems. Prerequisite: CHEM 510 or CHEM 530. LEC

CHANGE: PREREQUISITE NUMBER
CHEM 668 ADVANCED INORGANIC LABORATORY 2 U
(OLD) Experiments concerning the synthesis and characterization of inorganic compounds. Prerequisite: CHEM 667 or concurrent enrollment in CHEM 667. LAB

CHEM 661 ADVANCED INORGANIC LABORATORY 2 U
(NEW) Experiments concerning the synthesis and characterization of inorganic compounds. Prerequisite: CHEM 660 or concurrent enrollment in CHEM 660. LAB

ENVIRONMENTAL STUDIES

CHANGE: PREREQUISITE COURSE IS CURRENTLY CROSSLISTED
EVRN 335 INTRODUCTION TO SOIL GEOGRAPHY 4 N
(OLD) The course focuses on the properties and processes of soils as they occur in their environment. The student is introduced to the nature of soil as it functions as a body; genesis of soils; properties of soil solids, especially colloids; soil chemical composition, properties, and reactions; interaction between solid, liquid, and gaseous components in soils; plant-soil-water relationships; biological interactions with soil; classification of soils; and the distribution of soils on the landscape. Not open to students who have taken GEOG 535/EVRN 535. Prequisite GEOG 104 or GEOL 101 or consent of instructor; BIOL 100 and CHEM 184 or CHEM 185 recommended.

EVRN 335 INTRODUCTION TO SOIL GEOGRAPHY 4 N
(NEW) The course focuses on the properties and processes of soils as they occur in their environment. The student is introduced to the nature of soil as it functions as a body; genesis of soils; properties of soil solids, especially colloids; soil chemical composition, properties, and reactions; interaction between solid, liquid, and gaseous components in soils; plant-soil-water relationships; biological interactions with soil; classification of soils; and the distribution of soils on the landscape. Not open to students who have taken GEOG 535/EVRN 535. Prequisite GEOG 104 or GEOL 101 or consent of instructor; BIOL 100 and CHEM 130 or CHEM 190 recommended.
EVRN 535  
(OLD)  
A broad study of the principles and properties of soils and their distribution on the landscape. Topics covered include: pedology, clay mineralogy, soil physics, soil chemistry, management of soils, soil biology, taxonomy, and soil geomorphology. Laboratory section and a field project are required. Not open to students who have taken GEOG/EVRN 335. Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 100 and CHEM 184 or 185 recommended.

EVRN 535  
(NEW)  
A broad study of the principles and properties of soils and their distribution on the landscape. Topics covered include: pedology, clay mineralogy, soil physics, soil chemistry, management of soils, soil biology, taxonomy, and soil geomorphology. Laboratory section and a field project are required. Not open to students who have taken GEOG/EVRN 335. Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 100 and CHEM 130 or 190 recommended.

CHANGE: PREREQUISITE COURSE IS CURRENTLY CROSSLISTED

EVRN 538  
(OLD)  
This course examines the physical and chemical properties of soils and methods of evaluation. Physical topics include the movement of water, heat, gases, and solutes through soil. Chemistry topics include solid and solution speciation, mineral solubility, ion exchange, and oxidation-reduction reactions in soils. Prerequisite: GEOG/EVRN 335, or GEOG/EVRN 535; CHEM 188/189, MATH 121, and PHSX 114, or consent of instructor.

EVRN 538  
(NEW)  
This course examines the physical and chemical properties of soils and methods of evaluation. Physical topics include the movement of water, heat, gases, and solutes through soil. Chemistry topics include solid and solution speciation, mineral solubility, ion exchange, and oxidation-reduction reactions in soils. Prerequisite: GEOG/EVRN 335, or GEOG/EVRN 535; CHEM 135/195, MATH 121, and PHSX 114, or consent of instructor.

CHANGE: PREREQUISITE

EVRN 611  
(OLD)  
Water quality issues are integrated with land use planning and the development of watershed management strategies. Interrelationships among the hydrologic cycle, atmospheric deposition, nutrient transformations and pesticide use are examined in regards to stream, lake, and groundwater quality. Prerequisite: CHEM 125 or CHEM 184 and BIOL 414, or consent of instructor. LEC

EVRN 611  
(NEW)  
Water quality issues are integrated with land use planning and the development of watershed management strategies. Interrelationships among the hydrologic cycle, atmospheric deposition, nutrient transformations and pesticide use are examined in regards to stream, lake, and groundwater quality. Prerequisite: CHEM 125 or CHEM 130 and BIOL 414, or consent of instructor. LEC

CHANGE: PREREQUISITE

EVRN 656  
(OLD)  
An introduction to the patterns and processes that affect terrestrial ecosystems. Emphasis is placed on understanding nutrient cycles (e.g., carbon nitrogen phosphorous), hydrologic cycles, and patterns of net primary productivity. The role of both natural and anthropogenic disturbances in structuring terrestrial ecosystems is examined in the context of global land-use patterns. Discussion of current research literature will be expected. (Same as BIOL 656.) Prerequisite: BIOL 414 and CHEM 184. LEC

EVRN 656  
(NEW)  
An introduction to the patterns and processes that affect terrestrial ecosystems. Emphasis is placed on understanding nutrient cycles (e.g., carbon nitrogen phosphorous), hydrologic cycles, and patterns of net primary productivity. The role of both natural and anthropogenic disturbances in structuring terrestrial ecosystems is examined in the
context of global land-use patterns. Discussion of current research literature will be expected. (Same as BIOL 656.) Prerequisite: BIOL 414 and CHEM 130. LEC

GEOGRAPHY

CHANGE: PREREQUISITE COURSE IS CURRENTLY CROSSLISTED
GEOG 335 INTRODUCTION TO SOIL GEOGRAPHY 4 N
(OLD) This course focuses on the properties and processes of soils as they occur in their environment. The student is introduced to the nature of soil as it functions as a body; genesis of soils; properties of soil solids, especially colloids; soil chemical composition, properties, and reactions; interaction between solid, liquid, and gaseous components in soils; plant-soil-water relationships; biological interactions with soil; classification of soils; and the distribution of soils on the landscape. Not open to students who have taken GEOG 535. Prerequisite: GEOG 104 or GEOL 101 or consent of instructor; BIOL 100 and CHEM 184 or CHEM 185 recommended.

GEOG 335 INTRODUCTION TO SOIL GEOGRAPHY 4 N
(NEW) This course focuses on the properties and processes of soils as they occur in their environment. The student is introduced to the nature of soil as it functions as a body; genesis of soils; properties of soil solids, especially colloids; soil chemical composition, properties, and reactions; interaction between solid, liquid, and gaseous components in soils; plant-soil-water relationships; biological interactions with soil; classification of soils; and the distribution of soils on the landscape. Not open to students who have taken GEOG 535. Prerequisite: GEOG 104 or GEOL 101 or consent of instructor; BIOL 100 and CHEM 130 or CHEM 190 recommended.

CHANGE: CREDIT COURSE IS CURRENTLY CROSSLISTED
GEOG 535 SOIL GEOGRAPHY 5 N
(OLD) A broad study of the principles and properties of soils and their distribution on the landscape. Topics covered include: pedology, clay mineralogy, soil physics, soil chemistry, management of soils, soil biology, taxonomy, and soil geomorphology. Laboratory section and a field project are required. Not open to students who have taken GEOG 335. Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 104 and CHEM 130 or 190 recommended.

GEOG 535 SOIL GEOGRAPHY 4 N
(NEW) A broad study of the principles and properties of soils and their distribution on the landscape. Topics covered include: pedology, clay mineralogy, soil physics, soil chemistry, management of soils, soil biology, taxonomy, and soil geomorphology. Laboratory section and a field project are required. Not open to students who have taken GEOG 335. Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 104 and CHEM 130 or 190 recommended.

CHANGE: PREREQUISITE COURSE IS CURRENTLY CROSSLISTED
GEOG 538 ENVIRONMENTAL SOIL PHYSICS AND CHEMISTRY 4 N
(OLD) This course examines the physical and chemical properties of soils and methods of evaluation. Physical topics include the movement of water, heat, gases, and solutes through soil. Chemistry topics include solid and solution speciation, mineral solubility, ion exchange, and oxidation-reduction reactions in soils. Prerequisite: GEOG 335 or GEOG 535; CHEM 188/189, MATH 121, and PHSX 114, or consent of instructor.

GEOG 538 ENVIRONMENTAL SOIL PHYSICS AND CHEMISTRY 4 N
(NEW) This course examines the physical and chemical properties of soils and methods of evaluation. Physical topics include the movement of water, heat, gases, and solutes through soil. Chemistry topics include solid and solution speciation, mineral solubility, ion exchange, and oxidation-reduction reactions in soils. Prerequisite: GEOG 335 or GEOG 535; CHEM 135/195, MATH 121, and PHSX 114, or consent of instructor.

GEOLOGY

CHANGE: PREREQUISITE
GEOL 311 MINERALOGY AND STRUCTURE OF THE EARTH 3 H
Basic identification and properties of rocks and minerals in the context of whole-earth structure and evolution. Includes basic chemical equilibria for rock and mineral systems and their bearing on processes involved with formation and evolution of Earth's crust, mantle, and core. Two lectures and one lab per week. Prerequisite: GEOL 101, CHEM 125 or CHEM 184, and eligibility for MATH 121 or MATH 115. LEC

GEOL 311 MINERALOGY AND STRUCTURE OF THE EARTH 3 H

Basic identification and properties of rocks and minerals in the context of whole-earth structure and evolution. Includes basic chemical equilibria for rock and mineral systems and their bearing on processes involved with formation and evolution of Earth's crust, mantle, and core. Two lectures and one lab per week. Prerequisite: GEOL 101, CHEM 125 or CHEM 130, and eligibility for MATH 121 or MATH 115. LEC

CHANGE: PREREQUISITE

GEOL 312 MINERAL STRUCTURES AND EQUILIBRIA LABORATORY 1 H

A laboratory to accompany GEOL 311. Presents more rigorous analysis of the structures, compositions, and chemical equilibria governing the formation and stability of common rock-forming mineral systems. Prerequisite: GEOL 311 (may be taken concurrently), CHEM 125 or CHEM 184, and eligibility for MATH 121 or MATH 115. LAB

PROPOSAL TO AWARD JUNIOR/SENIOR LEVEL ORGANIC CHEMISTRY CREDIT TO STUDENTS WHO TRANSFER IN CREDIT FROM A COMMUNITY COLLEGE:

Update to the proposed renumbering scheme for chemistry courses.

Background

In our original course re-numbering scheme, we proposed to change the numbers for our organic chemistry courses from the 600-level to the 200-level. The reason for this proposed change was to bring those courses into compliance with the Kansas Board of Regents Transfer and Articulation policy.

As brought to our attention by CUSA following consideration of that original proposal, removing Jr./Sr. status for the organic chemistry courses would leave both the chemistry BA major and the chemistry minor with fewer than the 12 Jr./Sr. hours required by CLAS. We would therefore need to rewrite the requirements for both. Our BA major is comparable to many others around the nation, and has adequately served our students’ needs for many years. We therefore see no reason to change it. An even larger number of credit hours would need to be added to our chemistry minor to restore 12 Jr./Sr. hours. In fact, the rewritten chemistry minor would require only two fewer credit hours than the rewritten chemistry BA degree. As a result it would be, by far, the most rigorous chemistry minor in the state, and possibly in the entire country. This is certainly not a desirable outcome, as few students would pursue such a minor and the college would lose credit hours.

We think it is important to emphasize that organic chemistry courses are taught at the Jr./Sr. level at all of the Regents’ Universities in the State of Kansas. Moreover, we have learned that our colleagues at K-State and Wichita State have not been informed of a need change their organic chemistry numbers.

The above factors have led us to conclude that we need to find an alternative way for organic chemistry courses taken at KU, or at community colleges and then transferred to KU, to receive equal credit.

Proposal

Part 1. Revise our original course renumbering scheme in the following manner: Move all of the organic chemistry courses from the 200 level to the 300 level, thereby restoring their Jr./Sr. status while keeping their numbers lower than courses for which they are prerequisites (see attached Table).

Part 2. Allow Community College transfer students the opportunity to receive Jr./Sr. credit for their organic chemistry courses by passing the American Chemical Society (ACS) exam in Organic Chemistry with a score in the 40th percentile or higher. The baseline score can be adjusted upward or downward in the future as needed.

Rationale for Part 2. For a number of years, the ACS has provided exams on an approximately biennial basis, covering all of the typical courses taken by chemistry majors (general chemistry, organic chemistry, analytical chemistry, physical chemistry, inorganic chemistry and biochemistry) (http://chemexams.chem.iastate.edu/). These exams are used as final exams at some colleges and
universities, as placement exams for first year graduate students, and to allow credit by examination. For example, at KU, we currently use the ACS exam in general chemistry to allow students to obtain credit for CHEM 184 or CHEM 188.

The ACS compiles data from institutions around the country that administer these exams, and reports national norms on the web. The norm chart for the 2008 organic chemistry exam (the most recent available) is attached. According to that chart, a student obtaining a score of 50% (35 correctly answered questions out of 70) is at the 40th percentile (which means doing better than 39% of students who took the exam). We believe that a student achieving such a score would likely have passed our two semester organic chemistry sequence (currently CHEM 624 and CHEM 626) with at least a grade of D-, which is the minimum grade required for a KU student to get Jr./Sr. credit for those courses.

We propose that students who achieve the benchmark score on the ACS exam will also receive Jr./Sr. credit for the corresponding laboratory courses (currently CHEM 625 and CHEM 627), if those were also taken at a Community College.

**Revised Organic Chemistry Course Renumbering Scheme**

<table>
<thead>
<tr>
<th>Current</th>
<th>Originally Proposed</th>
<th>Newly Proposed</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>622</td>
<td>210</td>
<td>310</td>
<td>Fundamentals of Organic Chemistry</td>
</tr>
<tr>
<td>624</td>
<td>230</td>
<td>330</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>625</td>
<td>231</td>
<td>331</td>
<td>Organic Chemistry I Laboratory</td>
</tr>
<tr>
<td>626</td>
<td>235</td>
<td>335</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>627</td>
<td>236</td>
<td>336</td>
<td>Organic Chemistry II Laboratory</td>
</tr>
<tr>
<td>628</td>
<td>280</td>
<td>380</td>
<td>Organic Chemistry I, Honors</td>
</tr>
<tr>
<td>630</td>
<td>285</td>
<td>385</td>
<td>Organic Chemistry II, Honors</td>
</tr>
</tbody>
</table>

2. Degree Requirements for Approval

**a. Change to Existing Major in Classical Languages**

Proposal: We wish to add four new courses to our major description.

CLSX 538 Herculaneum and Pompeii, counts toward the archaeology requirement
CLSX 515 – Gender and Sexuality in Greek Culture, counts toward elective hours
CLSX 516 – Gender and Sexuality in Roman Culture, counts toward elective hours
CLSX 550 Capstone in Classics – counts toward elective hours

Justification: These four courses are new courses designed to fill gaps in our curriculum and to respond to areas of faculty expertise. The Capstone is elective while we test its design and until we can be sure we can staff it consistently.

**b. Change to Existing Major and Minor in Dance**

Proposal: Delete DANC 170 Conditioning and Injury Prevention from the B.F.A. requirements in Dance. The course is being deleted (see submitted curricular change for deleting a course).

*(original proposal included also the BA and Minor, but 170 only appears specifically in the BFA requirements, KJL)*

**Justification:** DANC 170 has a credit hour value of 1.0 and repeats information already included in DANC 375. We have decided to increase the information provided in DANC 375 to avoid the repetition of information and streamline the degree requirements by 1 credit hour. A revised description of DANC 375 has been created to include the material from DANC 170.

**c. Change to Existing Major in Classical Antiquity**

- **New concentration within existing major**

Proposal: Attached are descriptions of the former Classical Antiquity major and the revised Classical Antiquity major. **Revised major has two tracks:** one that retains (but amends) the
former major’s emphasis on ancient literature and classical humanities more broadly, and one that fills the needs of students who wish to become classical archaeologists.

Justification: By adding a focus on classical archaeology, this revised major broadens the Classics foundation in the Humanities at KU and better uses the strengths of the faculty. Furthermore, the revised major is designed to appeal to a wider group of students. Many students enter our department mid-career, not knowing about it in high school or even as freshmen. The CHA major allows these students to complete a rigorous major within five or six semesters from finding the field, yet maintains a high standard, especially for students wishing to become classical archaeologists. We hope it will encourage some of our minors to complete a major instead, and will attract some new students to our department.

**PROPOSED MAJOR IN CLASSICAL ANTIQUITY WITH TWO TRACKS:**

The Classical Antiquity major consists of 30 hours of work in Classics and related courses, in addition to the coursework in Latin and/or Greek required for the major. The major is designed to encourage interdisciplinary understanding of ancient Greek and Roman cultures while maximizing student flexibility. Of the 30 hours that constitute the major, 15 must be in the Classics Department, i.e., CLSX, GRK, and LAT courses; and 15 must be Jr/Sr hours, i.e., at the 300 level or above. This revised major has two tracks: Classical Humanities, and Classical Art and Archaeology.

**Coursework in Latin and or Greek required for the major:**
4-semester proficiency in Latin or ancient Greek, or four semesters combined Greek and/or Latin, or the equivalent.

**Major Requirements:**

**TRACK 1: Classical Art and Archaeology:** 15 hours from list A, 6 hours from list B, and 9 hours from list C

**TRACK 2: Classical Humanities:** 15 hours from list B, 6 hours from list A, and 9 hours from list C

**List A – Classical Art and Archaeology**
- CLSX 151/351 – Introduction to Classical Archaeology
- CLSX 317 – Greek and Roman Art
- CLSX 525 – Aegean Archaeology and Art
- CLSX 526 – Greek Archaeology and Art
- CLSX 527 – Roman Archaeology and Art
- CLSX 538 – Pompeii and Herculaneum
- CLSX 529 – Archaeology and Art of the Ancient Near East
- CLSX 577 – Topics in the Archaeology and Art of the Ancient Mediterranean*
- HA 600 – Biography of a City
- ANTH 410 – Archaeological Myths and Realities
- ANTH 418 – Summer Archaeological Fieldwork

**List B – Classical Humanities**
- CLSX 148/149 – Greek and Roman Mythology
- CLSX 230/330 – Greek Literature and Civilization
- CLSX 240/340 – Roman Literature and Civilization
- CLSX 384 – The Rise of Greek Tragedy
- CLSX 388 – Poetry and Politics in Fifth-Century Athens
- CLSX 576 – Topics in Greek and Roman Literature*
- LAT/GRK courses beyond those used to satisfy the requirement
- PHIL 384 – Ancient Philosophy
- PHIL 508 – Early Greek Philosophy
- PHIL 605 – Plato
- PHIL 607 – Aristotle
- PHIL 608 – Hellenistic Philosophy
- HWC 304 – Masterpieces of World Literature

**List C – Electives**
OLD MAJOR: Classical Antiquity

The Classical Antiquity major consists of 30 hours of work in Classics and related courses, beyond the preliminary requirement of proficiency in either Latin or Greek. The major is designed to encourage interdisciplinary understanding of ancient Greek and Roman cultures while maximizing student flexibility. Of the hours taken to complete the major, 15 must be Jr/Sr hours, i.e., at the 300 level or above.

Beyond language proficiency (described below), the Classical Antiquity major itself consists of three components:

Concentration in ancient literature  3 courses = 9 hours total
Concentration in ancient art and archaeology  3 courses = 9 hours total
Electives  4 courses = 12 hours total
Total:  10 courses = 30 hours total

All CA majors must achieve language proficiency in either Latin or ancient Greek. This amounts to four semesters of the ancient language (LAT 104/5, 108/9, 112/3, and 200/1 or Greek 104/5, 108/9, and two 300-level Greek courses). All students are encouraged to go beyond this minimum requirement, especially if they plan on attending graduate school in Classics or Classical Archaeology. Those students aiming for graduate school in Classics or Classical Archaeology should take as many semesters of Latin and Greek as possible – at the very least, three years of one ancient language and two years of the other.

Concentration in ancient literature – 3 courses = 9 hours required

- CLSX 148/9  Greek and Roman Mythology
- CLSX 230/330  Greek Literature and Civilization
- CLSX 240/340  Roman Literature and Civilization
- CLSX 384  The Rise of Greek Tragedy
- CLSX 388  Poetry and Politics in 5th Century Athens
- CLSX 576  Topics in Greek and Roman Literature*
- HWC 304  Masterpieces of World Literature
- PHIL 288  Ancient Philosophy
- Any upper division Latin or Greek course not used to satisfy the language requirement

* Only 6 hours each of CLSX 575, 576, and 577 may count toward the major.
# Students wishing to use their LAT or GRK to satisfy the university’s language requirement must do four semesters of the same language.
**Concentration in ancient art and archaeology – 3 courses = 9 hours required**

- CLSX 151/2  Archaeological Discovery
- CLSX 525  Aegean Art and Archaeology
- CLSX 526  Greek Art and Archaeology
- CLSX 527  Roman Art and Archaeology
- CLSX 528  Greek and Roman Art and Archaeology
- CLSX 529  Near Eastern Art and Archaeology
- CLSX 577  Topics in the Archaeology and Art of the Ancient Mediterranean*
- HWC/HA 600  Biography of a City: any ancient Mediterranean city

**Electives – 4 courses = 12 hours required**

- Any course from the above menus not used to satisfy the literature or archaeology concentration*
- Any upper division Latin or Greek course not used to satisfy the language proficiency requirement or the literature requirement
- CLSX 232/332  Word Power
- CLSX 315  Women in Ancient Art And Society
- CLSX 350  Modern Themes, Ancient Models
- CLSX 575  Readings in __________________*
- CLSX 496  Honors Thesis
- CLSX 502  History and Development of Ancient Greece
- HIST 501  Heroic and Archaic Ages of Ancient Greece
- HIST 502  Golden Age of Greece
- HIST 503  Ancient History of the Near East
- HIST 505  Studies in Greek Civilization
- HIST 506  Roman Republic
- HIST 507  Roman Empire
- HIST 508  Late Roman Empire
- ANTH 110/310  Introduction to Archaeology
- REL 525  Jews and Christians in Greco-Roman Antiquity
- REL 526  Jewish History and Literature in the Greek and Roman Periods
- REL 530  Christian Origins, from the Beginning to Augustine
- LING 106  Introduction to Linguistics

* Only 6 hours each of CLSX 575, 576, and 577 may count toward the major.

d. Change to existing Major in Humanities
   - New concentration within existing major
   - Deletion of existing major TRACK

**CURRENT REQUIREMENTS**

The Humanities major requires a total of 30 credit hours. Students must take courses in at least three humanities departments or programs with a minimum of 6 and maximum of 15 hours from one department (excepting HWC in which students will take more than 15 hours). 18 of the 30 credit hours must be in courses numbered 300 or above. The following courses (9 credit hours) are required of all majors. Note: Sharing course work (credit hours) between any of the HWC major tracks and another major is restricted to 6 hours.

- HWC 110 / 111  Introduction to Humanities
- HWC 325  Theory & Method in Interdisciplinary Studies
  (New course description to follow)
- HWC 424  Senior Seminar (Senior essay project)

All other courses taken toward the major must be approved by the HWC undergraduate coordinator.

**Track #1**
**Civilizations in a Global Context.** This track studies aspects of the cultures of Western civilization and of one non-Western civilization (e.g. Africa, Asia, the Middle East, or Latin America). It is designed to provide the student with knowledge of diverse civilizations and with methods for investigating their differences and commonalities. 21 credit hours, to include the following:

- HWC 206, Contemporary Western Civilization
- HWC 430, European Civilization in World Context
- At least two additional courses in aspects of the cultures of Western Civilization, one of which must be an HWC course.
- At least three courses in aspects of the cultures of the non-Western civilization.
- The Senior Essay (HWC 424) is to be a comparative and integrative study of a topic that bridges the two civilizations studied.

**Track #2**  
**World Literatures.** Literary-critical studies of both Western and non-Western literatures, designed to provide the student with knowledge of diverse literary traditions and with methods for investigating their differences and commonalities. 21 credit hours to include the following:

- Two courses in the “Masterpieces of World Literature” series: HWC 304, 308, 312; plus one additional literature course chosen from among the following:
  - the third HWC Masterpiece of World Literature course
  - any other HWC literature course upon approval from an advisor
  - a course in American, British or Irish literature (or any other English language or literature course)
- Two courses in the literature of a non-English-language European culture in translation (France, Germany, Italy, Spain, etc.). Students possessing a reading knowledge of one of the European languages are strongly encouraged to take one of the literature courses in the original language.
- Two courses in the literature of a non-Western culture in translation. Students possessing a reading knowledge of a non-Western language are strongly encouraged to take one of the literature courses in the original language.
- The Senior Essay (HWC 424) is to be a comparative literary-critical study of a topic common to two different literary traditions.

**Track #3**  
**Foundations of Law in Society.** This track is designed to give students an interdisciplinary background in diverse civilizations while providing an opportunity to explore the origins of legal traditions and the study of law in a global humanistic context. It may help students identify an interest in studying the law, but does not provide a guarantee of admission to Law School. 21 credit hours to include the following:

- HWC 328  Introduction to Law and the Legal Profession (NEW)
- HWC 430  European Civilization in World Context
- At least two additional courses in aspects of the cultures of Western civilization, one of which must be an HWC course
- At least two courses in foundations of law and civilization selected from relevant disciplines with approval of the HWC major coordinator
- One course in non-Western culture at the 300-level or above
- The Senior Essay (HWC 424) is to be a comparative study of a topic or issue that integrates the humanities and the law.

**HWC MAJOR: NEW DESCRIPTION**

The Humanities major requires a total of 30 credit hours. Students must take courses in at least three humanities departments or programs with a maximum of 15 hours from one department (excepting HWC in which students will take more than 15 hours). 18 of the 30 credit hours must be in courses numbered 300 or above.
Note: Sharing course work (credit hours) between any of the HWC major tracks and another major is restricted to 6 hours. All other courses taken toward the major must be approved by the HWC undergraduate coordinator.

**Track #1**  
**Civilizations in a Global Context.** This track studies aspects of the cultures of Western civilization and of one non-Western civilization (e.g. Africa, Asia, the Middle East, or Latin America). It is designed to provide the student with knowledge of diverse civilizations and with methods for investigating their differences and commonalities. 30 credit hours, to include the following:

**9 hours of introductory and capstone coursework:**  
HWC 110/111 Introduction to Humanities  
HWC 325 Theory and Method in Interdisciplinary Studies  
HWC 424 Senior Seminar (The senior essay for this track is to be a comparative and integrative study of a topic that bridges the two civilizations studied.)

**21 additional hours to include:**  
HWC 206 Contemporary Western Civilization  
HWC 430 European Civilization in World Context  

**6 Hours** in aspects of the cultures of Western Civilization, one of which must be an HWC course.  
**9 Hours** in aspects of the cultures of non-Western civilization.

**Track #2**  
**World Literatures.** Literary-critical studies of both Western and non-Western literatures, designed to provide the student with knowledge of diverse literary traditions and with methods for investigating their differences and commonalities. 30 credit hours to include the following:

**9 hours of introductory and capstone coursework:**  
HWC 110/111 Introduction to Humanities  
HWC 325 Theory and Method in Interdisciplinary Studies  
HWC 424 Senior Seminar (The senior essay for this track is to be a comparative literary-critical study of a topic common to two different literary traditions.)

**21 additional hours to include:**  
**6 Hours** in the “Masterpieces of World Literature” series: HWC 304, 308, 312;  
**3 Hours** of additional literature coursework chosen from among the following:  
- the third HWC Masterpiece of World Literature course  
- any other HWC literature course upon approval from an advisor  
- a course in American, British or Irish literature (or any other English language or literature course)  
**6 Hours** in the literature of a non-English-language European culture in translation (France, Germany, Italy, Spain, etc.). Students possessing a reading knowledge of one of the European languages are strongly encouraged to take one of the literature courses in the original language.  
**6 Hours** in the literature of a non-Western culture in translation. Students possessing a reading knowledge of a Non-Western language are strongly encouraged to take one of the literature courses in the original language.

**Track #3 (NEW)**  
**Peace and Conflict Studies.** This track is designed to provide students with opportunities to study issues of violence and methods of peace-making from an interdisciplinary humanities perspective. 30 credit hours to include the following:
9 hours of required introductory and capstone coursework:
HWC 110 Introduction to Humanities
PCS 120 Introduction to Peace and Conflict Studies
PCS 650 Senior Seminar. (The senior seminar for this track requires students to explore a key research question through the application of theoretical concerns to the topic.)

21 additional hours to include:
6 hours PCS upper division courses (2 out of 3):
PCS 550 Classics of Peace Literature
PCS 555 Peace Education
PCS 565 Literature of Human Rights

6 hours of interdisciplinary core courses, for example:
ANTH 501 Anthropology of Violence
HIST 314 History of Globalization
POLS 674 International Ethics
POLS 684 or 685 International Law
REL 667 Religious Perspectives on War and Peace
REL/COMS 669 Human Conflict and Peace
SOC 650 Transnational Migration

9 hours of courses from one of the three designated areas:
Area 1: The pursuit of social, economic and environmental justice, for example:
HIST 314 History of Globalization
POLS 663 Protest and Revolution
SOC 351 Africa Today
SOC 521 Wealth, Power, and Inequality

Area 2: The role of nation-states and of international norms and institutions, for example:
HIST 334 The Great War: History of World War I
HIST 340 History of the Second World War
POLS 661 Politics of the Middle East
POLS 678 Chinese Foreign Policy
POLS 689 Topics in International Relations: Human Rights

Area 3: The impact of religious, philosophical, and cultural influences, for example:
ANTH 501 Anthropology of Violence
ENGL 536 Readings in the Holocaust
PCS 555 Classics of Peace Literature
REL 665 Religious Ethics
REL/COMS 669 Human Conflict and Peace
WGSS 665 Women, Health, and Healing in Latin America

JUSTIFICATION
1. Deletion of Law and Society Track:
   • Qualified faculty unavailable to teach the core requirement (HWC 328-Foundations of Law and Society) on a regular basis
   • Insufficient pre-professional advising support to enroll this track of the major

Addition of PCS Track:
Currently, the Peace and Conflict Studies Program, housed in the Humanities and Western Civilization Program, offers a minor and a graduate certificate. Adding a Peace and Conflict Studies track as part of the Humanities Major creates further opportunities for the growing interest in Peace and Conflict Studies by KU students. We measure this interest by the popularity of our 100-level Introduction to Peace and Conflict Studies Course (in the past two semesters we have offered four sections of the course with full enrollment), and by the increasing number of students who are pursuing the minor (22 students as of Spring 2012), and who express interest in a major track in this field. The Humanities Major offers a logical place to house the Peace and Conflict Studies track, since the field relies on the kinds of interdisciplinary methods and global perspectives
that characterize the already existing major tracks: World Literatures and Civilization in a Global Context. Finally, offering a Peace and Conflict Studies track within the Humanities Major reflects cutting-edge developments in humanities research that calls for exploring issues of violence and peace-making from a humanities perspective. For example, in March 2012, the National Humanities Center will initiate a series of annual conferences on the topic of “Human Rights and the Humanities” that will feature top scholars in the fields of human rights literature, history, and philosophy. In sum, adding a Peace and Conflict Studies track to the Humanities Major will respond to students’ interests and needs, represent a logical addition to the interdisciplinary, global scope of existing tracks, and create a space for the development of cutting-edge research in the humanities at the University of Kansas.

Changes to Chemistry

Chemistry Major and Minor Changes

e. Requirements for the B.A. Major (Current)

In addition to the common College requirements for the B.A., a minimum of 29 to 30 hours in chemistry (including 5 hours each of analytical, organic, and physical chemistry lecture and laboratory) and one year each of calculus and physics (prerequisites for physical chemistry) are required. These courses fulfill the requirements:

Chemistry Courses 29 hours
CHEM 184 (or CHEM 185) Foundations of Chemistry I (5)
CHEM 188 (or CHEM 189) Foundations of Chemistry II (5)
CHEM 295 Seminar I (0.5)
CHEM 622 Fundamentals of Organic Chemistry (3) or
CHEM 624 (or CHEM 628) Organic Chemistry I (3)
CHEM 625 Organic Chemistry I Laboratory (2)
CHEM 516 Analytical Chemistry (3)
CHEM 517 Analytical Chemistry Laboratory (2)
CHEM 640 Biological Physical Chemistry (3) and
CHEM 641 Biological Physical Chemistry Laboratory (2) or
CHEM 646 Physical Chemistry I (3) and
CHEM 647 Physical Chemistry I Laboratory (2)
CHEM 695 Seminar II (0.5)

Additional chemistry course (3)

Mathematics and Physics 14-18 hours
MATH 115 Calculus I (3) or
MATH 121 Calculus I (5)
MATH 116 Calculus II (3) or
MATH 122 Calculus II (5)
PHSX 114 College Physics I (4) or
PHSX 211 General Physics I (4)
PHSX 115 College Physics II (4) or
PHSX 212 General Physics II (4)

Courses that fulfill the additional 3 hours for the major are CHEM 626 (or CHEM 630) Organic Chemistry II, CHEM 635 and CHEM 636 Instrumental Methods of Analysis and Laboratory, CHEM 648 Physical Chemistry II, or CHEM 667 Systematic Inorganic Chemistry. Note that CHEM 648 has CHEM 646, MATH 223, and MATH 290 as prerequisites. Students in premedical programs should be aware that a year of organic chemistry lecture and laboratory (CHEM 624 or CHEM 628, CHEM 625, CHEM 626 or CHEM 630, and CHEM 627) is required for admission to virtually all medical schools. Students who need only 1 semester of organic chemistry should substitute CHEM 622 (the 1-semester organic chemistry lecture course) for CHEM 624, when possible.

Requirements for the B.A. Major (New)

In addition to the common College requirements for the B.A., a minimum of 29 to 30 hours in
chemistry (including 5 hours each of analytical, organic, and physical chemistry lecture and laboratory) and one year each of calculus and physics (prerequisites for physical chemistry) are required. These courses fulfill the requirements:

**Chemistry Courses** 29 hours

- CHEM 170 Chemistry for the Chemical Sciences I (5) or
- CHEM 130 General Chemistry I (5) or
- CHEM 190 Foundations of Chemistry I, Honors (5)
- CHEM 175 Chemistry for the Chemical Sciences II (5) or
- CHEM 135 General Chemistry II (5) or
- CHEM 195 Foundations of Chemistry II, Honors (5)
- CHEM 295 Seminar I (0.5)
- CHEM 310 Fundamentals of Organic Chemistry (3) or
- CHEM 330 Organic Chemistry I (3) or
- CHEM 380 Organic Chemistry I, Honors (3)
- CHEM 331 Organic Chemistry I Laboratory (2)
- CHEM 510 Biological Physical Chemistry (3) and
- CHEM 511 Biological Physical Chemistry Laboratory (2) or
- CHEM 530 Physical Chemistry I (3) and
- CHEM 531 Physical Chemistry I Laboratory (2)
- CHEM 620 Analytical Chemistry (3)
- CHEM 621 Analytical Chemistry Laboratory (2)
- CHEM 695 Seminar II (0.5)

Additional chemistry course (3 or 4)

**Mathematics and Physics** 14-18 hours

- MATH 115 Calculus I (3) or
- MATH 121 Calculus I (5)
- MATH 116 Calculus II (3) or
- MATH 122 Calculus II (5)
- PHSX 114 College Physics I (4) or
- PHSX 211 General Physics I (4)
- PHSX 115 College Physics II (4) or
- PHSX 212 General Physics II (4)

Courses that fulfill the additional 3 hours for the major are CHEM 335 (or CHEM 385) Organic Chemistry II, CHEM 635 and CHEM 636 Instrumental Methods of Analysis and Laboratory, CHEM 535 Physical Chemistry II, or CHEM 660 Systematic Inorganic Chemistry. Note that CHEM 535 has CHEM 530 and MATH 290 as prerequisites. Students in premedical programs should be aware that a year of organic chemistry lecture and laboratory (CHEM 330 or 380, CHEM 331, CHEM 335 or 385, and CHEM 336) is required for admission to virtually all medical schools. Students who need only 1 semester of organic chemistry should substitute CHEM 310 (the 1-semester organic chemistry lecture course) for CHEM 330 when possible.

**Justification:**

1) Change in titles for courses formerly numbered CHEM 184 and 188 (new numbers CHEM 130 and 135, respectively)
2) Addition of a proposed new two course freshman chemistry sequence, CHEM 170 and 175.
   a. Correction to a clerical error in the bottom section listing the courses that fulfill the additional 3 hours for the major: MATH 223 is no longer a prerequisite for CHEM 535.

**B.A. Major: Biological Chemistry Option (Current)**

This option is available to students interested in the biological applications of chemistry. The curriculum is compatible with many pre-health-professions programs and prepares the student for graduate study or career opportunities.

In addition to all of the requirements for the regular B.A. major, the following courses are required:

*CHEM 626 (or CHEM 630) Organic Chemistry II (3)
CHEM 627 Organic Chemistry II Laboratory (2)*
BIOL 636 Biochemistry I (3)
BIOL 638 Biochemistry II (3)
Plus 1 elective (3) (In consultation with a faculty major adviser, choose 1 course from those listed in the Biology Option Group in Requirements for the B.S. Degree in Chemistry: Biological Chemistry Option.)
*Select this course as the additional chemistry course.

**B.A. Major: Biological Chemistry Option (New)**
This option is available to students interested in the biological applications of chemistry. The curriculum is compatible with many pre-health-professions programs and prepares the student for graduate study or career opportunities.
In addition to all of the requirements for the regular B.A. major, the following courses are required:
*CHEM 335 (or CHEM 385) Organic Chemistry II (3)
CHEM 336 Organic Chemistry II Laboratory (2)
BIOL 636 Biochemistry I (3)
BIOL 638 Biochemistry II (3)
Plus 1 elective (3) (In consultation with a faculty major adviser, choose 1 course from those listed in the Biology Option Group in Requirements for the B.S. Degree in Chemistry: Biological Chemistry Option.)
*Select this course as the additional chemistry course.

**Justification:**
1) Renumbering of the courses

**B.A. Major: Environmental Chemistry Option (Current)**
This option is available to students who plan to use their chemistry background in environmentally related areas. The additional courses required provide background in other environmental sciences as well as further exposure to important methods used in environmental laboratories.
In addition to all of the requirements for the regular B.A. major, the following courses are required:
*CHEM 626 (or CHEM 630) Organic Chemistry II (3)
CHEM 627 Organic Chemistry II Laboratory (2)
CHEM 635 Instrumental Methods of Analysis (2)
CHEM 636 Instrumental Methods of Analysis Laboratory (2)
Plus 2 electives (6) (In consultation with a faculty major adviser, choose two courses from those listed in Environmental Chemistry Option Group I or Environmental Chemistry Option Group II below.)

**Environmental Chemistry Option Group I**
BIOL 100 Principles of Biology (3) or
BIOL 150 Principles of Molecular and Cellular Biology (4)
EVRN 148 Scientific Principles of Environmental Studies (3)
GEOG 304 Environmental Conservation (3)
GEOL 351 Environmental Geology (3)
BIOL 400 Fundamentals of Microbiology (3)
BIOL 414 Principles of Ecology (3)
BIOL 600 Introductory Biochemistry, Lectures (4)
ATMO 105 Introductory Meteorology (5)

**Environmental Chemistry Option Group II**
BIOL 660 Lake Ecology (with or without BIOL 662) Aquatic Ecology Laboratory) (3-5)
CE 477 Introduction to Environmental Engineering and Science (3)
GEOL 552 Introduction to Hydrogeology (3)
ATMO 525 Air Pollution Meteorology (3)
EVRN 611 Water Quality, Land Use, and Watershed Ecosystems (3)
CHEM 698 Undergraduate Research Problems (3)
*Select this course as the additional chemistry course.

**B.A. Major: Environmental Chemistry Option (New)**
This option is available to students who plan to use their chemistry background in environmentally related areas. The additional courses required provide background in other environmental sciences as well as further exposure to important methods used in environmental
In addition to all of the requirements for the regular B.A. major, the following courses are required:

*CHEM 335 (or CHEM 385) Organic Chemistry II (3)
CHEM 336 Organic Chemistry II Laboratory (2)
CHEM 635 Instrumental Methods of Analysis (2)
CHEM 636 Instrumental Methods of Analysis Laboratory (2)
Plus 2 electives (6) (In consultation with a faculty major adviser, choose two courses from those listed in Environmental Chemistry Option Group below

**Environmental Chemistry Option Group**

BIOL 100 Principles of Biology (3) or
BIOL 150 Principles of Molecular and Cellular Biology (4)
EVRN 148 Scientific Principles of Environmental Studies (3)
GEOG 304 Environmental Conservation (3)
GEOL 351 Environmental Geology (3)
BIOL 400 Fundamentals of Microbiology (3)
BIOL 414 Principles of Ecology (3)
BIOL 600 Introductory Biochemistry, Lectures (4)
ATMO 105 Introductory Meteorology (5)
BIOL 660 Lake Ecology 661 Ecology of Rivers and Lakes (with or without BIOL 662) (3-5)
Aquatic Ecology Laboratory
CE 477 Introduction to Environmental Engineering and Science (3)
GEOL 552 Introduction to Hydrogeology (3)
ATMO 525 Air Pollution Meteorology (3)
EVRN 611 Water Quality, Land Use, and Watershed Ecosystems (3)
CHEM 698 Undergraduate Research Problems (3)

*Select this course as the additional chemistry course.

**Justification:**

1) Renumbering of the courses.
2) Clarifying the number of Option I and Option II courses that are required.

f. **Requirements for the B.S. Degree (New)**

**Requirements for the B.S. Degree (New)**

The significant differences between the B.S. and B.A. lie in the distribution requirements and the required subjects. This outline lists all required courses and some suggested electives. The program satisfies College requirements as well as certification standards of the American Chemical Society.

**Chemistry Courses** 50 hours

CHEM 170 Chemistry for the Chemical Sciences I (5) or
CHEM 130 General Chemistry I (5) or
CHEM 190 Foundations of Chemistry I, Honors (5)
CHEM 175 Chemistry for the Chemical Sciences II (5) or
CHEM 135 General Chemistry II (5) or
CHEM 195 Foundations of Chemistry II, Honors (5)
CHEM 295 Seminar I (0.5)
CHEM 330 Organic Chemistry I (3) or
CHEM 380 Organic Chemistry I, Honors (3)
CHEM 331 Organic Chemistry I Laboratory (2)
CHEM 335 Organic Chemistry II (3) or
CHEM 385 Organic Chemistry II, Honors (3)
CHEM 336 Organic Chemistry II Laboratory (2)
CHEM 530 Physical Chemistry I (3)
CHEM 531 Physical Chemistry I Laboratory (2)
CHEM 535 Physical Chemistry II (4)
CHEM 536 Physical Chemistry II Laboratory (2)
CHEM 620 Analytical Chemistry (3)
CHEM 621 Analytical Chemistry Laboratory (2)
CHEM 635 Instrumental Methods of Analysis (2)
CHEM 636 Instrumental Methods of Analysis Laboratory (2)
CHEM 660 Systematic Inorganic Chemistry (3)
CHEM 661 Advanced Inorganic Laboratory (2)
CHEM 695 Seminar II (0.5)
Plus one or more of the following courses:
CHEM 698 (or CHEM 699) Undergraduate Research Problems or
700-level course (4)

**Mathematics, Physics and Biochemistry** 26-27 hours
- MATH 121 Calculus I (5)
- MATH 122 Calculus II (5)
- MATH 220 Applied Differential Equations (3) or
- MATH 320 Elementary Differential Equations (or honors equivalent) (3)
- MATH 290 Elementary Linear Algebra (2)
- PHSX 211 General Physics I (4)
- PHSX 212 General Physics II (4)
- BIOL 600 Introductory Biochemistry, Lectures (4) or BIOL 636 Biochemistry I (3)

**Other Requirements** 24 hours
- English (ENGL 101 and 102) (6)
- Western civilization (6)
- Humanities (6)
- Social Sciences (6)

Additional credit hours of general electives are needed to meet the minimum total hours required for graduation. An overall average grade of C must be earned in all upper-level KU courses in chemistry.

**Justification:**
1) Renumbering of the courses so that all courses have higher numbers than their prerequisites and to make the numbering system more systematic.
2) Change in titles for courses formerly numbered CHEM 184 and 188 (new numbers CHEM 130 and 135, respectively)
3) Addition of a proposed new two-semester freshman chemistry sequence, CHEM 170 and 175.
4) The “foreign language or other research skill” requirement for BS Chemistry majors is a vestige of an earlier requirement for foreign language study that existed in our department. Historically, many important chemistry-related journals and books were written in German, Russian, Chinese, French, and Japanese. Accessing the chemistry literature on the inclusive scale needed for successful research required the reading of foreign language publications. Today, international scientific organizations recognize English as the common language for all formal communications. Manuscripts that are not authored in English are usually published in English concurrently, or they are published as an English translation very soon after their initial appearance. Research skills addressed by the “foreign language or other research skill” requirement were, historically, taught in curriculum-driven courses. Because the skills needed for modern chemistry research are best learned in the context of participation in faculty-directed research, the KU Chemistry faculty voted unanimously that the “foreign language or other research skill” requirement be eliminated.

**Requirements for the Chemistry Minor (Current)**

g. **Requirements for the Minor:**
The minor allows students outside the department to obtain a strong, distributed background in the discipline. It is particularly useful for students anticipating careers in medicine, allied health, biological sciences, environmental sciences, chemical engineering, business, law, secondary education, or any career in which a basic understanding of the molecular sciences is helpful. A total of 23 credit hours is required. Students should see a chemistry department adviser early in the junior year. Some of the required courses are only offered once per year.

**Required Courses** (15 hours)
- CHEM 184 (or CHEM 185) Foundations of Chemistry I (5)
- CHEM 188 (or CHEM 189) Foundations of Chemistry II (5)
- CHEM 622 Fundamentals of Organic Chemistry (3) or CHEM 624 Organic Chemistry I (3) or
- CHEM 628 Organic Chemistry I (3)
- CHEM 625 Organic Chemistry I Laboratory (2)

**Elective Group I** (5 hours)
Choose 1 of the following:
CHEM 640 Biological Physical Chemistry (3) and
CHEM 641 Biological Physical Chemistry Laboratory (2) or CHEM 646 Physical Chemistry I (3)
and
CHEM 647 Physical Chemistry Laboratory I (2)
CHEM 516 Analytical Chemistry (3) and
CHEM 517 Analytical Chemistry Laboratory (2)

Elective Group II (3 hours)
Choose 1 of the following:
CHEM 640 Biological Physical Chemistry (3) or CHEM 646 Physical Chemistry I (3)
CHEM 667 Systematic Inorganic Chemistry (3)

Requirements for the Chemistry Minor (New)

Requirements for the Minor:
The minor allows students outside the department to obtain a strong, distributed background in the
discipline. It is particularly useful for students anticipating careers in medicine, allied health,
biological sciences, environmental sciences, chemical engineering, business, law, secondary
education, or any career in which a basic understanding of the molecular sciences is helpful. A
total of 23 credit hours is required. Students should see a chemistry department adviser early in the
junior year. Some of the required courses are only offered once per year.

Required Courses (15 hours)
CHEM 170 Chemistry for the Chemical Sciences I (5) or
CHEM 130 General Chemistry I (5) or
CHEM 190 Foundations of Chemistry I, Honors (5)
CHEM 175 Chemistry for the Chemical Sciences II (5) or
CHEM 135 General Chemistry II (5) or
CHEM 195 Foundations of Chemistry II, Honors (5)
CHEM 310 Fundamentals of Organic Chemistry (3) or CHEM 330 Organic Chemistry I (3) or
CHEM 380 Organic Chemistry I (3)
CHEM 331 Organic Chemistry I Laboratory (2)

Elective Group I (5 hours)
Choose 1 of the following:
CHEM 510 Biological Physical Chemistry (3) and
CHEM 511 Biological Physical Chemistry Laboratory (2) or CHEM 530 Physical Chemistry I (3)
and
CHEM 531 Physical Chemistry Laboratory I (2)
CHEM 620 Analytical Chemistry (3) and
CHEM 621 Analytical Chemistry Laboratory (2)

Elective Group II (3 hours)
Choose 1 of the following:
CHEM 510 Biological Physical Chemistry (3) or CHEM 530 Physical Chemistry I (3)
CHEM 660 Systematic Inorganic Chemistry (3)

Change to Existing Chemistry Related Changes to other Majors and Minors

CHEMISTRY RELATED DEGREE REQUIREMENT CHANGES

h. Requirements for the B.A. Major in Astronomy
In addition to general education requirements for B.A. degrees in the College, 39.5 hours of
astronomy, physics, mathematics, and chemistry are required.
Foundational Physics, Mathematics, and Basic Science 23.5 hours
PHSX 150 Seminar in Physics, Astronomy, and Engineering Physics (0.5)
PHSX 211 (or PHSX 213) General Physics I (4) and PHSX 212 (or PHSX 214) General Physics
II (4)
MATH 121 Calculus I (5) and MATH 122 Calculus II (5)
CHEM 484 130 Foundations of General Chemistry I (5)
Astronomy Requirements 16 hours
ASTR 196 Introductory Astronomy Laboratory (1) or ASTR 596 Observational Astrophysics (1)
ASTR 391 Physical Astronomy, Honors (3)
ASTR 390 Undergraduate Problems (3)
ASTR 591 Stellar Astronomy (3)
ASTR 592 Galactic and Extragalactic Astronomy (3)
PHSX 693 Gravitation and Cosmology (3) or ASTR 691 Astrophysics I (3) or GEOL 572 Geophysics (3)

Requirements for the B.S. Degree in Astronomy

**Foundational Physics, Mathematics, and Basic Science 23.5 hours**
PHSX 150 Seminar in Physics, Astronomy, and Engineering Physics (0.5)
PHSX 211 (or PHSX 213) General Physics I (4) and PHSX 212 (or PHSX 214) General Physics II (4)
MATH 121 Calculus I (5) and MATH 122 Calculus II (5)
CHEM 184-130 Foundations of General Chemistry I (5)

**Astronomy Requirements 20 hours**
ASTR 391 Physical Astronomy, Honors (3)
ASTR 596 Observational Astrophysics (1)
ASTR 591 Stellar Astronomy (3)
ASTR 592 Galactic and Extragalactic Astronomy (3)
PHSX 693 Gravitation and Cosmology (3)
ASTR 691 Astrophysics I (3)
ASTR 692 Astrophysics II (3)
ASTR 503 Undergraduate Research (1)

**Physics Requirements 23 hours**
PHSX 313 General Physics III (3) and PHSX 316 Intermediate Physics Laboratory I (1)
PHSX 511 Introductory Quantum Mechanics (3)
PHSX 521 Mechanics I (3)
PHSX 531 Electricity and Magnetism (3)
PHSX 536 Electronic Circuit Measurement and Design (4) or PHSX 516 Physical Measurements (4)
PHSX 671 Thermal Physics (3)
Advanced physics elective (3) (any lecture or laboratory course numbered 500 or higher, including ASTR 795/PHSX 795 Space Plasma Physics and GEOL 572 Geophysics)

**Advanced Mathematics Requirements 11 hours**
MATH 223 Vector Calculus (3) and MATH 290 Elementary Linear Algebra (2)
MATH 320 Elementary Differential Equations (3)
MATH elective (3) (This may be chosen from PHSX 518, PHSX 718, MATH 526, MATH 530, MATH 558, MATH 581, MATH 590, MATH 628, MATH 646, MATH 647, MATH 648, MATH 660, MATH 661, or any 700-level MATH lecture course except MATH 701 and MATH 715.)

**Other Requirements**

*English:* satisfaction of the B.A. requirements. If requirements can be met in fewer than 9 hours, the remaining hours become free electives (ENGL 362 Foundations of Technical Writing is accepted as the third English course) (9)

*Humanities:* 2 courses, including at least 1 principal course (6)

*Social sciences:* 2 courses, including at least 1 principal course (6)

*Western civilization:* EECS 138 Introduction to Computing: FORTRAN or C++ (3) or EECS 168 Programming I (4) Additional credit hours of free electives in courses outside the major are needed to complete the required 120 credit hours

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i. **Requirements for the B.S. Degree in Atmospheric Science**

4 specialized options are available for students who plan professional careers in meteorology or atmospheric science. The **general meteorology** option satisfies all the traditional professional meteorology requirements for employment with the National Weather Service, airlines, or other agencies. The **air pollution meteorology** option meets the need for trained specialists. The **hydrometeorology** option may lead to a career as a meteorologist in one of the many water-related activities in private and governmental agencies. The **news media forecasting** option can lead to a career forecasting the weather on television or radio. The B.S. degree with any of these specialties also prepares students to begin graduate programs in meteorology or atmospheric science.

**General Requirements for All Options 94-95 hours**
ATMO 105 Introductory Meteorology (5)
ATMO 321/GEOG 321 Climate and Climate Change (3)
ATMO 505 Weather Forecasting (3)
ATMO 521/GEOG 521 Microclimatology (3)
ATMO 630 Synoptic Meteorology (3)
ATMO 640 Dynamic Meteorology (3)
ATMO 642 Remote Sensing (3)
ATMO 660 Advanced Dynamic Meteorology (3)
ATMO 680 Physical Meteorology (3)
ATMO 697 Seminar for Seniors (1)
CHEM 484-130 Foundations of General Chemistry I (5)
COMS 130 Speaker-Audience Communication (3) or COMS 150 Personal Communication (3)
and COMS 330 Effective Business Communication (3)
EECS 138 Introduction to Computing: FORTRAN (3)
ENGL 101, ENGL 102, and any 200-level English course or ENGL 362 Foundations of Technical Writing (9)
EVRN 148 Scientific Principles of Environmental Studies (3)
MATH 581 Numerical Methods (3)
MATH 121, MATH 122, MATH 223, MATH 290, MATH 320 or MATH 220, MATH 526
Applied Mathematical Statistics I or DSCI 301 Statistics (21-22)
PHSX 211 General Physics I (4)
PHSX 212 General Physics II (4)
Humanities and social sciences (one course each) (6)

**General Meteorology Option**
ATMO 525 Air Pollution Meteorology (3)
ATMO 605 Operational Forecasting (2)
ATMO 650 Advanced Synoptic Meteorology (3)
Additional credit hours of general electives are needed to meet the minimum total hours required for graduation.

**Air Pollution Meteorology Option**
ATMO 525 Air Pollution Meteorology (3)
CHEM 488 135 Foundations of General Chemistry II (5)
CE 477 Introduction to Environmental Engineering and Science (3)
Additional credit hours of general electives are needed to meet the minimum total hours required for graduation.

**Hydrometeorology Option**
ATMO 525 Air Pollution Meteorology (3)
ATMO 605 Operational Forecasting (2)
CE 301 Statics and Dynamics (5)
CE 330 Fluid Mechanics (4)
CE 455 Hydrology (3)
Additional credit hours of general electives are needed to meet the minimum total hours required for graduation.

**News Media Forecasting Option**
ATMO 605 Operational Forecasting (2)
ATMO 650 Advanced Synoptic Meteorology (3)
JOUR 301 Research and Writing (3)
JOUR 415 Multimedia Reporting (3)
JOUR 512 Principles of Broadcasting, Cable, and New Technologies (3)
Additional credit hours of general electives are needed to meet the minimum total hours required for graduation.

**j. Requirements for the B.A. Biochemistry**

B.A. Biochemistry
General Science Requirements 35-39 hours
CHEM 184 Foundations of Chemistry I (5)
CHEM 170 Chemistry for the Chemical Sciences I (or CHEM 190 Honors) (5)
CHEM 185 Foundations of Chemistry II (5)
CHEM 175 Chemistry for the Chemical Sciences II (or CHEM 195 Honors) (5)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
CHEM 640 510 Biological Physical Chemistry (3)
*MATH 121 Calculus I (5) and *MATH 122 Calculus II (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3) *Students who plan to attend graduate school should enroll in MATH 121 and MATH 122.
k. Requirements for the B.S. Biochemistry Degree

B.S. Biochemistry

General Science Requirements 45 hours

CHEM 184 Foundations of Chemistry I (5)
CHEM 170 Chemistry for the Chemical Sciences I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5)
CHEM 175 Chemistry for the Chemical Sciences II (or CHEM 195 Honors) (5)
CHEM 546 620 Analytical Chemistry (3)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
CHEM 627 336 Organic Chemistry II Laboratory (2)
CHEM 640 510 Biological Physical Chemistry (3) or CHEM 646 530 Physical Chemistry I (3)
MATH 121 Calculus I (5)
MATH 122 Calculus II (5)
PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4) or PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4)

l. Requirements for the B.A. Biology Major

B.A. Biology

General Science Requirements 28-29 hours

CHEM 184 Foundations of Chemistry I (5)
CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5)
CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

m. Requirements for the B.S. Biology Degree – all emphases

B.S. Biology/Cell Biology

General Science Requirements 31-32 hours

CHEM 184 Foundations of Chemistry I (5)
CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5)
CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3) (required for cell biology) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

B.S. Biology/Ecology & Evolutionary Biology

General Science Requirements 25-28 hours

CHEM 184 Foundations of Chemistry I (5)
CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5)
CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)
B.S. Biology/Genetics
General Science Requirements 28-29 hours
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (5)
* CHEM 625 331 Organic Chemistry I Laboratory (2) *Students who plan to attend graduate school (particularly those interested in applying molecular techniques) or medical school should also enroll in CHEM 626 335 and CHEM 627 336.
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

B.S. Biology/Neurobiology
General Science Requirements 31-32 hours
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

B.S. Biology/Organismal Biology
General Science Requirements 28-29 hours
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

B.S. Biology/Teaching Biology
General Science Requirements 28-29 hours
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 622-310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625-331 Organic Chemistry I Laboratory (2)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

n. Requirements for the B.A. Human Biology Major
B.A. Human Biology, all five subplans
General Science Requirements 33 hours minimum
ANTH 304 Fundamentals of Physical Anthropology (3-4)
BIOL 150 (or BIOL 151 Honors) Principles of Molecular and Cellular Biology (4)
BIOL 152 (or BIOL 153 Honors) Principles of Organismal Biology (4)  
MATH 115 Calculus I (3) and MATH 116 Calculus II (3) or MATH 121 Calculus I (5)  
CHEM 181 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)  
CHEM 182 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)  
PHSX 114 College Physics I (4) or PHSX 211 General Physics I (4)  
*BIOL 570 Introduction to Biostatistics (3) or PSYC 210 Statistics in Psychological Research (3)  
or MATH 365 Elementary Statistics (3)  
B.A. Human Biology/Anthropology  
Anthropology Concentration 30 hours minimum  
Organic Chemistry: CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)  
CHEM 625 331 Organic Chemistry I Laboratory (2)  
Cell Biology: BIOL 416 Cell Structure and Function (3)  
Genetics: BIOL 350 Principles of Genetics (3)  
Seminar: BIOL 599 Senior Seminar: Human Biology (must be taken in senior year) (1)  

B.A. Human Biology/Biology  
Biology Concentration 31 hours minimum  
Organic Chemistry: CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)  
CHEM 625 331 Organic Chemistry I Laboratory (2)  
Physics: PHSX 115 College Physics II (4) or PHSX 212 General Physics II (4)  
Genetics: BIOL 350 Principles of Genetics (3)  
Seminar: BIOL 599 Senior Seminar: Human Biology (must be taken in senior year) (1)  

B.A. Human Biology/Psychology  
Psychology Concentration 30 hours minimum  
Organic Chemistry: CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)  
CHEM 625 331 Organic Chemistry I Laboratory (2)  
Genetics: BIOL 350 Principles of Genetics (3)  
Research Methods: PSYC 200 Research Methods in Psychology (3)  
Seminar: BIOL 599 Senior Seminar: Human Biology (must be taken in senior year) (1)  

o. Requirements for the B.A. Microbiology Major  
B.A. Microbiology  
General Science Requirements 34-35 hours  
BIOL 150 (or BIOL 151 Honors) Principles of Molecular and Cellular Biology (4)  
BIOL 350 Principles of Genetics (3)  
CHEM 181 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)  
CHEM 182 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)  
CHEM 622 310 Fundamentals of Organic Chemistry (3) or CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)  
CHEM 625 331 Organic Chemistry I Laboratory (2)  
MATH 115 Calculus I (3) and MATH 116 Calculus II (3) or MATH 121 Calculus I (5)  
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)  

p. Requirements for the B.S. Microbiology Degree  
B.S. Microbiology  
General Science Requirements 49-50 hours  
BIOL 150 (or BIOL 151 Honors) Principles of Molecular and Cellular Biology (4)  
BIOL 350 Principles of Genetics (3)  
CHEM 181 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
CHEM 627 336 Organic Chemistry II Laboratory (2)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
BIOL 570 Introduction to Biostatistics (3) or MATH 365 Elementary Statistics (3) or PSYC 210 Statistics in Psychological Research (3)
BIOL 636 Biochemistry I (3)
BIOL 638 Biochemistry II (3)

q. Requirements for the B.S. Molecular Biosciences Degree
B.S. Molecular Biosciences
General Science Requirements 36-37 hours minimum
CHEM 184 Foundations of Chemistry I (5) CHEM 130 General Chemistry I (or CHEM 190 Honors) (5)
CHEM 188 Foundations of Chemistry II (5) CHEM 135 General Chemistry II (or CHEM 195 Honors) (5)
CHEM 624 330 Organic Chemistry I (or CHEM 380 Honors) (3)
CHEM 625 331 Organic Chemistry I Laboratory (2)
CHEM 626 335 Organic Chemistry II (or CHEM 385 Honors) (3)
CHEM 627 336 Organic Chemistry II Laboratory (2)
PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4) or PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)
MATH 121 Calculus I (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
BIOL 570 Introduction to Biostatistics (3) or MATH 365 Elementary Statistics (3) or PSYC 210 Statistics in Psychological Research (3)

r. Requirements for the B.S. Degree Environmental Studies
B.S. Major Courses
64 to 70 hours are required.
Introduce to Science and Culture 6-10 hours
EVRN 140 Global Environment I: The Discovery of Environmental Change (3) and EVRN 141 Global Environment I: Interdisciplinary Laboratory (2) or EVRN 148/GEOG 148 Scientific Principles of Environmental Studies (3) or EVRN 149/GEOG 149 Scientific Principles of Environmental Studies Honors (3)

And choose one of the following: EVRN 142 Global Environment II: The Ecology of Human Civilization (3) and EVRN 143 Global Environment II: Interdisciplinary Laboratory (2) or EVRN 103/HIST 103 Environment and History or EVRN 347/HIST 347 Environmental History of North America (3) or EVRN 150/GEOG 150 Environment, Culture, and Society (3)

Mathematics 5-6 hours
MATH 115 Calculus (3) and MATH 116 Calculus II (3) or MATH 121 Calculus I (5)

Statistics 3-4 hours
Choose one of the following:
MATH 365 Elementary Statistics (3)
GEOG 316 Methods of Analyzing Geographical Data (4)
BIOL 570 Introduction to Biostatistics (3)

Core Courses 12 hours
EVRN 320 Environmental Policy Analysis (3)
EVRN 332 Environmental Law (3)
EVRN 460 Field Ecology (3)
EVRN 615 Capstone Project (3)
**Biology and Ecology 11 hours**
BIOL 150 Principles of Molecular and Cellular Biology (4) or BIOL 151 Principles of Molecular And Cellular Biology, Honors (4)
BIOL 152 Principles of Organismal Biology (4) or BIOL 153 Principles of Organismal Biology, Honors (4)
BIOL 414 Principles of Ecology (3)

**Chemistry 10 hours**
CHEM 184 130 Foundations of General Chemistry I (5) or CHEM 185 135 Foundations of General Chemistry I, Honors (5)
CHEM 188 190 Foundations of Chemistry II (5) or CHEM 189 195 Foundations of Chemistry II, Honors (5)

**Additional Laboratory Science 5 hours**
GEOG 104 Principles of Physical Geography (3) and GEOG 105 Introductory Laboratory in Physical Geography (2)
GEOL 101 Introduction to Geology (3) and GEOL 103 Geological Fundamentals Laboratory (2)
GEOL 102 Introduction to Geology, Honors (3) and GEOL 103 Geological Fundamentals Laboratory (2)
CHEM 622 310 Fundamentals of Organic Chemistry (3) and CHEM 625 331 Organic Chemistry I Laboratory (2)

**Electives 12 hours minimum**
A minimum of 12 hours is required at the 300-level and above, with at least one course with the EVRN prefix.

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### Requirements for the B.S. Degree Geography

B.S. students must select 1 of the options below (physical geography or geographical information and analysis). A total of 120 credit hours is required, of which 45 must be junior/senior hours, 30 must be KU residence hours, no more than 64 may be community college transfer hours, no more than 6 may be music organization hours, and no more than 4 may be physical education hours. An overall grade-point average of 2.0 is required, with an average of 2.0 in geography junior/senior courses.

#### Physical Geography Option

**General Requirements**

- English (ENGL 101 or exemption) (0-3)
- ENGL 102 (or ENGL 105 or exemption) (0-3)
- 200/300-level English course or above (e.g., ENGL 362 recommended) (3)
- COMS 130 (COMS 230, PHIL 148, PHIL 310, or exemption) (0-3)
- History or philosophy of science (3) (Choose 1 of the following or consult undergraduate committee for approval of alternatives: HIST 103, HIST 136, HIST 305, HIST 306, HIST 311, HIST 347, HIST 360, HIST 407, PHIL 365, PHIL 370, PHIL 375, PHIL 380, PHIL 620, PHIL 622, GEOG 357)
- 2 principal courses in the humanities (6)
- 2 principal courses in the social sciences (6)

**Preparation for the Major**

- MATH 121 Calculus I (5) and MATH 122 Calculus II (recommended) (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3)
- PHSX 211 General Physics I and PHSX 212 General Physics II (8) (recommended) or PHSX 114 College Physics I and PHSX 115 College Physics II (6-8)
- BIOL 150 Principles of Molecular and Cellular Biology (4)
- BIOL 152 Principles of Organismal Biology (4)
- CHEM 184 130 Foundations of General Chemistry I (5)
- CHEM 188 135 Foundations of General Chemistry II (5)
- EECS 128 Foundations of Information Technology: _____ or equivalent (3)
Geography Requirements

Overview Courses
GEOG 104 Principles of Physical Geography (3) or GEOG 107 Principles of Physical Geography, Honors (3)
GEOG 105 Introductory Laboratory in Physical Geography (2)
GEOG 100 (or GEOG 101) World Regional Geography (3) or GEOG 102 (or GEOG 103) Principles of Human Geography (3)

Foundation Courses
1. Physical: Choose 3 of the following: (9-10) GEOG 304 Environmental Conservation GEOG 321 Climate and Climate Change GEOG 331 Regional Geomorphology of the United States GEOG 338 Introduction to River Systems GEOG 335 Introduction to Soil Geography or GEOG 535 Soil Geography
2. Techniques: The following are required: (12) GEOG 316 Methods of Analyzing Geographical Data GEOG 358 Principles of Geographic Information Systems GEOG 526 Remote Sensing of Environment I
3. Field Experience: Choose 1 of the following: (3-4) EVRN 460 Field Ecology GEOG 433 Biogeography Field and Laboratory Techniques GEOG 714 Field Experience

Elective Courses
6 additional hours from the physical geography course list (300 level or above) (6)
6 additional hours of geography (any group, 300 level or above) (6)
6 additional hours in an allied field (e.g., ATMO, BIOL, EVRN, or GEOL) approved by geography adviser (6)

t. Requirements for the B.A. Geology Major

Requirements for the B.A. Major
In addition to College requirements, these courses are required:
MATH 115 Calculus I (3) or MATH 121 Calculus I (5)
CHEM 125 College Chemistry (5)
PHSX 111 Introductory Physics (3) or PHSX 114 College Physics I (4) or PHSX 211 General Physics I (4)
BIOL 100 Principles of Biology (3)
EECS 128 Foundations of Information Technology: _____ (3) or EECS 138 Introduction to Computing: _____ (3)

Geology Core 24 hours
GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2)
GEOL 311 Mineralogy and Structure of the Earth (3)
GEOL 331 Sedimentology and Surface Processes (4)
GEOL 360 Field Investigation (2)
GEOL 521 Paleontology (3)
GEOL 560 Introductory Field Geology (3)
GEOL 562 Structural Geology (4)

u. Requirements for the B.S. Geology Degree – all emphases

General Geology Option
Satisfaction of the College English requirement (6-9)
COMS 130 Speaker-Audience Communication (3) or COMS 150 Personal Communication (3) (or exemption)
2 courses in the humanities (6-10)
2 courses in the social sciences (an introductory course in economics is recommended) (6-8)
MATH 121 Calculus I (5) and MATH 122 Calculus II (5) (recommended) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3) plus MATH 122 Calculus II (5)
PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)
CHEM 184 Foundations of Chemistry I (5) and CHEM 188 Foundations of Chemistry II (5)

PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)

Geology 49 hours
GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2)
GEOL 312 Mineral Structures and Equilibria Laboratory (1)
GEOL 331 Sedimentology and Surface Processes (4)
GEOL 360 Field Investigation (2)
GEOL 512 Igneous and Metamorphic Petrology (3)
GEOL 513 Petrology Laboratory (1)
GEOL 521 Paleontology (3)
GEOL 523 Paleontology Laboratory (1)
GEOL 532 Stratigraphy (4)
GEOL 560 Introductory Field Geology (3)
GEOL 561 Field Geology (3)
GEOL 562 Structural Geology (4)
GEOL 572 Geophysics (3) or GEOL 573 Geodynamics and Plate Tectonics (3)

At least 9 hours in geology courses numbered 500 or above (9) This can include 3 hours of GEOL 399, GEOL 105, GEOL 304, or GEOL 121 can also count if taken before the student has completed 60 hours. Electives may include an upper-division course in statistics (MATH 365 or BIOL 570).

Engineering Geology Option
ENGL 101, ENGL 102, and ENGL 362 (9)
COMS 130 Speaker-Audience Communication (3) or COMS 150 Personal Communication (3) (or exemption)
2 courses in the humanities (6-10)
ECON 104 Introductory Economics (4)
1 additional course in the social sciences (3)
MATH 121, MATH 122, MATH 220, and MATH 290 (15)

Geology 45-51 hours
GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2) or
GEOL 105 History of the Earth (3)
GEOL 312 Mineral Structures and Equilibria Laboratory (1)
GEOL 331 Sedimentology and Surface Processes (4)
GEOL 351 Environmental Geology (3)
GEOL 360 Field Investigation (2)
GEOL 512 Igneous and Metamorphic Petrology (3)
GEOL 513 Petrology Laboratory (1)
GEOL 541 Geomorphology (4)
GEOL 560 Introductory Field Geology (3)
GEOL 561 Field Geology (3)
GEOL 562 Structural Geology (4)
GEOL 572 Geophysics (3) or GEOL 573 Geodynamics and Plate Tectonics (3)
3 additional geology or civil engineering courses, at least 2 of which must be from the following:
(8-12) GEOL 521 Paleontology (3) GEOL 532 Stratigraphy (4) GEOL 535 Petroleum and Subsurface Geology (4) GEOL 715 Geochemistry (3) GEOL 751 Physical and Transport Hydrogeology (4) CE 770 Concepts of Environmental Chemistry (2) and CE 771 Environmental Chemical Analysis (1) Electives may include an upper-division course in statistics (MATH 365 or BIOL 570).

Note: Total credit hours may exceed the university's minimum requirement for graduation.

Environmental Geology Option
Satisfaction of the College English requirement (6-9)
COMS 130 Speaker-Audience Communication (3) or COMS 150 Personal Communication (3) (or exemption)
2 courses in the humanities (6-10)
2 courses in the social sciences (an introductory course in economics is recommended) (6-8)
MATH 121 Calculus I (5) and MATH 122 Calculus II (5) (recommended) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3) plus MATH 122 Calculus II (5)
PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4) (recommended) or PHSX 114 College Physics I (4) and PHSX 115 College Physics II (4)
CHEM 131 Foundations of Chemistry I 130 Foundations of General Chemistry I (5) and CHEM 138 Foundations of Chemistry II 135 Foundations of General Chemistry II (5)
BIOL 150 Principles of Molecular and Cellular Biology (4) and BIOL 152 Principles of Organismal Biology (4)
EECS 128 Foundations of Information Technology: _____ (3) or EECS 138 Introduction to Computing: _____ (3) or C&PE 121 Introduction to Computers in Engineering (3)

Geology 50 hours
GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2)
GEOL 311 Mineralogy and Structure of the Earth (3)
GEOL 351 Environmental Geology (3)
GEOL 360 Field Investigation (2)
GEOL 521 Paleontology (3)
GEOL 532 Stratigraphy (4)
GEOL 541 Geomorphology (4)
GEOL 552 Introduction to Hydrogeology (3)
GEOL 560 Introductory Field Geology (3)
GEOL 562 Structural Geology (4)
GEOL 572 Geophysics (3)
Additional courses to total at least 9 hours numbered 500 or above or other courses approved by adviser. Recommended: (9) GEOL 391 Special Studies in Geology: Water Resources (3) GEOL 535 Petroleum and Subsurface Geology (4) GEOL 715 Geochemistry (3) GEOL 751 Physical and Transport Hydrogeology (4) CE 770 Concepts of Environmental Chemistry (2) and CE 771 Environmental Chemical Analysis (1) GEOG 535 Soil Geography (5) GEOG 558 Intermediate Geographical Information Systems (4) GEOL 753 Chemical and Microbial Hydrogeology (4) BIOL 400 Fundamentals of Microbiology (3) C&PE 517 Reservoir Engineering I (4)

Environmental Hydrogeology Track
Besides the general program above, a specialized track in hydrogeology satisfies degree requirements. In addition to College, supporting science, and geology courses, the environmental hydrogeology track requires the following mathematics and civil engineering/physics courses: MATH 220 Applied Differential Equations (3) and MATH 290 Elementary Linear Algebra (2) CE 330 Fluid Mechanics (4) or PHSX 623 Physics of Fluids (3)

**Technical Electives** (9 hours). These normally are chosen from courses numbered 500 or above in geology, physics, mathematics, chemistry, engineering or computer science. Courses numbered below 500 must be approved by a geology adviser.

**Geophysics Option**
College English and Principal Course Requirements 21 hours
ENGL 101, ENGL 102, and a third course as specified by the College of Liberal Arts and Sciences (9)
Courses in humanities and social sciences (12) (At least 3 hours must be taken in each area. View the principal course list. An introductory course in economics is recommended.)

**Chemistry, Mathematics, Computer Science, Engineering 28-31 hours**
EECS 138 Introduction to Computing: _____ (3) or demonstrate equivalent programming skills (0-3)
CHEM 184 Foundations of Chemistry I 130 Foundations of General Chemistry I (5) and CHEM 188 Foundations of Chemistry II 135 Foundations of General Chemistry II (5)

MATH 121 Calculus I (5) and MATH 122 Calculus II (5)

MATH 223 Vector Calculus (3) and MATH 290 Elementary Linear Algebra (2)

MATH 320 Elementary Differential Equations (3)

**Physics 17 hours**
PHSX 211 General Physics I (4) and PHSX 212 General Physics II (4)
PHSX 313 General Physics III (3)
PHSX 521 Mechanics I (3)
PHSX 531 Electricity and Magnetism (3)

**Geology 33 hours**
GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2)
GEOL 311 Mineralogy and Structure of the Earth (3)
GEOL 331 Sedimentology and Surface Processes (4)
GEOL 360 Field Investigation (2)
GEOL 512 Igneous and Metamorphic Petrology (3)
GEOL 560 Introductory Field Geology (3)
GEOL 562 Structural Geology (4)
GEOL 572 Geophysics (3) or GEOL 573 Geodynamics and Plate Tectonics (3)

2 of these 4 courses in addition to geology courses above: (6) GEOL 572 Geophysics (3) GEOL 573 Geodynamics and Plate Tectonics (3) GEOL 575 Seismic Exploration (3) GEOL 577 Environmental Geophysics (3) (3)

**Technical Electives** (9 hours). These normally are chosen from courses numbered 500 or above in geology, physics, mathematics, chemistry, engineering, or computer science. Courses numbered below 500 must be approved by a geophysics adviser.

**Electives.** Additional credit hours of general electives are needed to meet the minimum total hours required for graduation.

**Graduation Requirements.** Students must earn a grade-point average of 2.0 in both physics and geology courses.

**Earth and Space Science Licensure Option**
This program fulfills the requirements for a Bachelor of Science degree in geology. The program also meets course requirements necessary to gain state licensure eligibility in earth and space science to become a secondary teacher in Kansas, but completion of the program does not guarantee the student’s licensure. This list is a guideline. Contact the geology department for further information about meeting degree and additional licensure requirements. You may also contact the UKanTeach Office for information about similar tracks resulting in eligibility for licensure in this and other science and mathematics fields.

**General Requirements 21 hours**
These courses must be taken on a letter-grade basis.

*English:* ENGL 101 Composition (3) and ENGL 102 Critical Reading and Writing (3) (or equivalent)

*Communication/Logic:* COMS 130 Speaker-Audience Communication (3) or COMS 150 Personal Communication (3) (or exemption/examination)

*Humanities:* 1 principal course and HIST 136 or HIST 137 (or equivalent approved by geology department) (6)

*Social Science:* 2 courses, preferably from the principal course list (6)

**Major/General Science Requirements 84 hours**
A minimum grade of C is required in all courses counted toward the major.

*Mathematics:* MATH 121 Calculus I (5) and MATH 122 Calculus II (5) or MATH 115 Calculus I (3) and MATH 116 Calculus II (3) and MATH 122 Calculus II (5)

*Physics:* PHSX 211 General Physics I (4) and

PHSX 212 General Physics II (4)

*Chemistry:* CHEM 484 130 (or CHEM 485 190 ) Foundations of General Chemistry I (5) and CHEM 488 135 (or CHEM 489 195) Foundations of General Chemistry II (5)

*Biology:* BIOL 150 (or BIOL 151 Honors) Principles of Molecular and Cellular Biology (4) and BIOL 152 (or BIOL 153 Honors) Principles of Organismal Biology (4)

*Geology Core Requirements* (32 hours): GEOL 101 Introduction to Geology (3) and GEOL 103 Geology Fundamentals Laboratory (2)

GEOL 311 Mineralogy and Structure of the Earth (3)

GEOL 331 Sedimentology and Surface Processes (4)

GEOL 360 Field investigation (2)

GEOL 521 Paleontology (3) and GEOL 523 Paleontology Laboratory (1)

GEOL 532 Stratigraphy (4)

GEOL 552 Introduction to Hydrogeology (3)

GEOL 560 Introductory Field Geology (3)

GEOL 562 Structural Geology (4)

*Space Science Core Requirements* (9 hours): ATMO 105 Introductory Meteorology (5) ASTR 191 Contemporary Astronomy (3) ASTR 196 Introductory Astronomy Laboratory (1)
Earth and Space Electives: 4 hours in a geology course numbered 300 or above (4) or 4 hours in astronomy courses numbered 300 or above. This can include 3 hours of ASTR 390 or GEOL 399, GEOL 105, GEOL 304, or GEOL 121 also can count if taken before the student has completed 60 hours (4)

Research Methods: CHEM 598 Research Methods (3) (or equivalent course approved by geology in major field of study)

Professional Development Course Work Requirements 21 hours
A minimum grade of C is required in all courses.

Liberal Arts and Sciences: LA&S 290 Approaches to Teaching Science and Mathematics I (1) and LA&S 291 Approaches to Teaching Science and Mathematics II (1)

Curriculum and Teaching (19 hours): C&T 448 Reading and Writing across the Curriculum (3) and 16 hours of courses approved by UKanTeach in curriculum and teaching. These should include courses such as Classroom Interactions (3), Knowing and Learning (3), Project Based Instruction (3), Student Teaching (6), and Special Topics Seminar (1)

Requirements for the B.S. Degree Mathematics
First- and Second-Year Preparation 18 hours
MATH 121 Calculus I (5) or MATH 141 Calculus I, Honors (5)
MATH 122 Calculus II (5) or MATH 142 Calculus II, Honors (5)

MATH 223 Vector Calculus (3) or MATH 243 Vector Calculus, Honors (3)
MATH 290 Elementary Linear Algebra (2) or MATH 291 Elementary Linear Algebra, Honors (2)
MATH 320 Elementary Differential Equations (3) or MATH 220 Applied Differential Equations (3)

Core Requirements 12-13 hours
Linear Algebra: MATH 590 Linear Algebra (3) or MATH 790 Linear Algebra II (3)
Analysis: MATH 500 Intermediate Analysis (3) or MATH 765 Mathematical Analysis I (3)
Algebra: MATH 558 Introductory Modern Algebra (3) or MATH 791 Modern Algebra (3)
Statistics: MATH 526 Applied Mathematical Statistics I (3) or MATH 628 Mathematical Theory of Statistics (3) or MATH 728 Statistical Theory (3) or DSCI 301 Statistics (4)

Mathematics Concentration/Sequence Requirements 6-12 hours
One 2-course sequence from List A and a second 2-course sequence from either List A or List B

Electives 0-6 hours
Up to 2 additional 3-credit-hour courses to complete a total of 24 credit hours of mathematics courses numbered MATH 450 and above. Students who satisfy the core statistics requirement with DSCI 301 must choose an additional 3-credit-hour elective.

Applied Concentration 8 hours
3 courses, totaling at least 8 credit hours, that make significant use of mathematics. At least 2 courses must be in the same area. Courses from List C have been approved for this requirement. Other upper-division courses making significant use of mathematics can be used for the applied concentration with the approval of a mathematics department adviser.

Note: Many of these courses have prerequisites that do not count toward the mathematics major.
Minimum Major Requirements 42 hours
Applied Concentration 8 hours

General Education Requirements 49-49 hours
English, Argument and Reason, and Western Civilization (18) (These are the same as the requirements for the B.A. degree.)

Computer Science: EECS 138 (3) or EECS 168 (4)
Natural Science: 1 course with laboratory (4-5 hours) and one additional course (3-5 hours) in biological science (NB), earth science (NE), or physical science (NP) (7-10)
**Humanities and Foreign Language:** 4 courses in humanities and foreign language, at least two (6 hours) of which must be in humanities (designated H). Students are encouraged to complete at least two courses in a foreign language (12).

**Social Sciences:** 2 courses designated S (6)

**List A Sequences**
- MATH 627 Probability (3) and MATH 628 Mathematical Theory of Statistics (3)
- MATH 660 Geometry I (3) and MATH 661 Geometry II (3)
- MATH 765 Mathematical Analysis I (3) and MATH 766 Mathematical Analysis II (3)
- MATH 781 Numerical Analysis I (3) and MATH 782 Numerical Analysis II (3)
- MATH 790 Linear Algebra II (3) and MATH 791 Modern Algebra (3)

**List B Sequences**
- MATH 500 Intermediate Analysis (3) and MATH 646 Complex Variable and Applications (3)
- MATH 526 Applied Mathematical Statistics I (3) and MATH 605 Applied Regression Analysis (3)
- MATH 530 Mathematical Models I (3) and MATH 531 Mathematical Models II (3)
- MATH 540 Elementary Number Theory (3) and MATH 558 Introductory Modern Algebra (3)
- MATH 581 Numerical Methods (3) and MATH 591 Applied Numerical Linear Algebra (3)
- MATH 590 Linear Algebra (3) and MATH 790 Linear Algebra II (3)
- MATH 646 Complex Variable and Applications (3) and MATH 647 Applied Partial Differential Equations (3)
- MATH 647 Applied Partial Differential Equations (3) and MATH 648 Calculus of Variations and Integral Equations (3)
- MATH 724 Combinatorial Mathematics (3) and MATH 725 Graph Theory (3)

**List C Applied Concentration Courses**

**Statistics:** MATH 605, MATH 611, MATH 624, ECON 817, ECON 818

**Management Science and Operations Management:** SCM 310, DSCI 410

**Finance:** FIN 310, FIN 410, FIN 415, FIN 420, FIN 425, MATH 630

**Economics:** ECON 526, ECON 590, ECON 700, ECON 701, ECON 715, ECON 716

**Biolog:** BIOL 350, BIOL 412, BINF 701, BINF 702, BIOL 743, BIOL 747

**Physics and Astronomy:** PHSX 313, PHSX 521, PHSX 531, ASTR 591, ASTR 592, PHSX 621, PHSX 631, PHSX 655, PHSX 671, ASTR 691, PHSX 741

**Chemistry:** CHEM 516, CHEM 646, CHEM 648 CHEM 530, CHEM 535, CHEM 620

**Bioinformatics:** BINF 701, BINF 702

**Aerospace Engineering:** AE 345, AE 445, AE 507, AE 545, AE 550, AE 551, AE 750

**Chemical and Petroleum Engineering:** C&PE 211, C&PE 511, C&PE 521, C&PE 523

**Civil Engineering:** CE 201, CE 300, CE 301, CE 310, CE 311, CE 461, CE 704

**Electrical Engineering and Computer Science:** EECS 211, EECS 220, EECS 360, EECS 420, EECS 444, EECS 510, EECS 560, EECS 562, EECS 638, EECS 649, EECS 660, EECS 662, EECS 672, EECS 718, EECS 730, EECS 744

**Mechanical Engineering:** ME 201, ME 311, ME 312, ME 321, ME 508, ME 520, ME 612, ME 682, ME 740

**Note:** Some courses satisfying the sequence requirements are taught infrequently. More advanced courses can be substituted for lower level courses in many cases. Consult the mathematics department for expected course offerings and substitutions. Courses used to satisfy the core requirements can also be used to complete List A and List B sequences. However, courses used for the Applied Concentration requirement cannot also be counted toward the 24 credit hours of advanced mathematics courses for the B.S. degree.

**w. Requirements for the B.A. Major in Physics**

**Foundational Physics and Mathematics 1805 hours**

- PHSX 150 Seminar in Physics, Astronomy, and Engineering Physics (0.5)
- PHSX 211 (or PHSX 213) General Physics I (4)
- PHSX 212 (or PHSX 214) General Physics II (4)
- MATH 121 Calculus I (5) *and* MATH 122 Calculus II (5)
CHEM 184 130 is recommended. Some courses require MATH 223 and MATH 290 and MATH 220 or MATH 320 as prerequisites. Other requirements follow the general education requirements for B.A. degrees in the College of Liberal Arts and Sciences.

**Advanced Physics Courses 20 hours**

- PHSX 313 General Physics III (3) and PHSX 316 Intermediate Physics Laboratory I (1)
- PHSX 511 Introductory Quantum Mechanics (3)
- PHSX 521 Mechanics I (3)
- PHSX 531 Electricity and Magnetism (3)
- PHSX 536 Electronic Circuit Measurement and Design (4)

Advanced physics elective (any lecture or laboratory course numbered 500 or higher) (3)

**Concentration in Computational Physics**

Requirements include 31.5 hours in physics:

- PHSX 150 Seminar in Physics, Astronomy, and Engineering Physics (0.5)
- PHSX 211 (or PHSX 213) General Physics I (4)
- PHSX 212 (or PHSX 214) General Physics II (4)
- PHSX 313 General Physics III (3) and PHSX 316 Intermediate Physics Laboratory (1)
- PHSX 521 Mechanics I (3)
- PHSX 531 Electricity and Magnetism (3)
- PHSX 536 Electronic Circuit Measurement and Design (4)
- PHSX 500 (or PHSX 501) Special Problems (6)
- PHSX 615 Numerical and Computational Methods in Physics (3)

Also required are 8 hours of computer science (EECS 168, EECS 268), MATH 290 and either MATH 220 or MATH 320, CHEM 184 130 (5 hours), PHIL 310 (3 hours), ECON 142 or ECON 144 (3 hours), and BIOL 100 (3 hours). CHEM 184 130, PHIL 310, ECON 142 or ECON 144, and BIOL 100 should be taken to fulfill B.A. general education requirements.

**Requirements for the B.S. Degree in Physics**

2 different options are available for the physics B.S. curriculum. The pre-professional emphasis offers a rigorous curriculum suitable for students planning on graduate study in physics or a closely related field; the interdisciplinary option provides more flexibility for students interested in developing some expertise in an allied science discipline.

**General Requirements**

- EECS 138 Introduction to Computing: FORTRAN or C++ (3) or EECS 168 Programming I (4)

*English:* Satisfaction of B.A. requirements. If requirements can be satisfied in fewer than 9 hours, the remaining hours become free electives. (ENGL 362 Foundations of Technical Writing is accepted as the third English course.) (9)

Western civilization (6)

*Humanities:* 2 courses including at least one principal course (6)

*Social sciences:* 2 courses including at least one principal course (6)

Additional credit hours of general electives are needed to meet the minimum total hours required for graduation. Approximately 5 free elective hours must be taken at the junior/senior level to fulfill the requirement of 45 junior/senior hours.

**Foundational Physics and Mathematics 23.5 hours**

- PHSX 150 Seminar in Physics, Astronomy, and Engineering Physics (0.5)
- PHSX 211 (or PHSX 213) General Physics I (4)
- PHSX 212 (or PHSX 214) General Physics II (4)
- MATH 121 Calculus I (5) and MATH 122 Calculus II (5)
CHEM 484 130 Foundations of General Chemistry I (5)

**Advanced Mathematics 11 hours**
MATH 223 Vector Calculus (3) and MATH 290 Elementary Linear Algebra (2)
MATH 320 Elementary Differential Equations (3)
MATH elective (3) (This may be chosen from PHSX 518, PHSX 718, MATH 526, MATH 530, MATH 558, MATH 581, MATH 590, MATH 628, MATH 646, MATH 647, MATH 648, MATH 660, MATH 661, or any 700-level MATH lecture course except MATH 701 and MATH 715.)

**Advanced Physics Core for Both B.S. Emphases 24 hours**
PHSX 313 General Physics III (3) and PHSX 316 Intermediate Physics Laboratory I (1)
PHSX 511 Introductory Quantum Mechanics (3)
PHSX 516 Physical Measurements (4) or PHSX 536 Electronic Circuit Measurement and Design (4)
PHSX 521 Mechanics I (3)
PHSX 531 Electricity and Magnetism (3)
PHSX 671 Thermal Physics (3)
PHSX 503 Undergraduate Research (1) or PHSX 501 Honors Research (1)
PHSX elective (3) (any PHSX lecture or laboratory course numbered 500 or higher and not part of the other specific requirements for the major)

**Preprofessional Emphasis**
Students also take 13 credit hours in physics as follows:
PHSX 621 Mechanics II (3)
PHSX 631 Electromagnetic Theory (3)
PHSX 711 Quantum Mechanics (3)
PHSX 516 Physical Measurements (4) or PHSX 536 Electronic Circuit Measurement and Design (4) (Preprofessional emphasis students take both advanced laboratory courses)

**Interdisciplinary Option**
Students also take 12 to 15 credit hours in physics and allied sciences as follows: 2 of the following: (6-7)
PHSX 621 Mechanics II (3)
PHSX 631 Electromagnetic Theory (3)
PHSX 711 Quantum Mechanics (3)
PHSX 516 Physical Measurements (4) or PHSX 536 Electronic Circuit Measurement and Design (4) (Interdisciplinary option students may take the second advanced laboratory courses)

Plus 2 semesters of advanced course work in 1 allied science field chosen from the following: (6-8)
BIOL 350 Principles of Genetics (3)
BIOL 400 Fundamentals of Microbiology (3)
BIOL 408 Physiology of Organisms (3)
BIOL 412 Evolutionary Biology (3)
BIOL 416 Cell Structure and Function (3)
BIOL 600 Introductory Biochemistry, Lectures (3)
BIOL 636 Biochemistry I (3)
BIOL 638 Biochemistry II (3)
CHEM 598 Research Methods (3) (UKanTeach students only)
CHEM 622 310 Fundamentals of Organic Chemistry (3)
CHEM 646 530 Physical Chemistry I (3)
GEOL 360 Field Investigation (2)
GEOL 562 Structural Geology (4)
GEOL 572 Geophysics (3)
GEOL 575 Seismic Exploration (3)
Requirements for the B.S. Behavioral Neuroscience Degree

Behavioral Neuroscience

Nonpsychology General Education Courses
A total of 84 hours with classes in these 4 areas and additional electives:

**Humanities 24 hours**
*English*: ENGL 101 and ENGL 102 (6) and ENGL 203, ENGL 205, ENGL 209, ENGL 210, or ENGL 211 (3)
*Argument and Reason*: COMS 130 or PHIL 148 (3)
*Western Civilization*: HWC 204-HWC 205 (6)
*Humanities*: 2 electives (6)

**Natural Sciences 14 hours minimum**
2 of the following 4 sequences, an extension of 1, or an approved alternative.
*Biology*: BIOL 150 and BIOL 152 (8)
*Chemistry*: CHEM 184 130 and CHEM 188 135 (10)
*Physics*: PHSX 114 and PHSX 115 (8)
*Biological Anthropology*: ANTH 104/ANTH 304 and ANTH 340, ANTH 341, ANTH 350, ANTH 442, or ANTH 447 (6)

**Mathematics 12 hours minimum**
6 hours must be calculus or calculus based.
MATH 103 (2)
MATH 115 and MATH 116 (6)
One additional MATH course (3)

**Computing 6 hours minimum**
EECS 138 Introduction to Computing: _____ (3)
The second 3 hours could either be a second semester of EECS 138 (focused on a second programming language) or be from an additional approved course that provides an opportunity to gain computing experience. This second course could be PSYC 480 or PSYC 481 if this Independent Study requires independent, original application of the student’s computing skills such as computer simulation of cognitive processes, or experience with computationally complex neuroscience techniques, such as brain imaging and mapping, or physiological data collection and analysis. (3)

Behavioral Neuroscience: Required Psychology Courses. A total of at least 40 hours with classes in these 4 areas (28 hours), and additional junior/senior-level psychology electives or approved neuroscience-related courses (12 hours).

**Behavioral Neuroscience Courses 6 hours total**
PSYC 370/PSYC 371 Brain and Behavior (3)
PSYC 380/PSYC 381 Brain and Pathology (3)
PSYC 644 Behavioral Pharmacology (3)

**Laboratory Courses 9 hours total**
PSYC 200/PSYC 201 Research Methods in Psychology (3)
PSYC 625 Experimental Psychology: Methods in Neuropsychology and Psychophysiology (6)

**Quantitative Courses 9 hours minimum**
PSYC 210/PSYC 211 Statistics in Psychological Research (3)
PSYC 500 Intermediate Statistics in Psychological Research (3)
PSYC 650 Statistical Methods in Behavioral and Social Science Research I (4)
PSYC 651 Anova and Other Factorial Designs (4)
PSYC 679 Applied Nonparametric Statistical Methods (4)
PSYC 687 Factor Analysis (4)
PSYC 692 Test Theory (4)
PSYC 693 Multivariate Analysis (4)
PSYC 694 Multilevel Modeling I (4)
PSYC 695 Categorical Data Analysis (4)
PSYC 696 Structural Equation Modeling I (4)

Applied Research Experience 4 hours minimum
PSYC 449 Laboratory/Field Work in Human Biology
PSYC 460 Honors in Psychology
PSYC 480 Independent Study
PSYC 481 Research Practicum

Elective Courses in Psychology or Other Disciplines 12 hours minimum (other electives may be accepted with permission of the B.S. director)
PSYC 418 Introduction to Cognitive Science (3)
PSYC 432 Human Behavioral Genetics (3)
PSYC 482 Sensation and Perception (3)
PSYC 555 Evolutionary Psychology (3)
PSYC 605 Health Psychology (3)
PSYC 630 Clinical Psychology (3)
PSYC 646 Mental Health and Aging (3)
PSYC 678 Drugs and Behavior (3)
LING 438 Neurolinguistics (3)
SPLH 320 Introduction to the Neuroscience of Human Communication (2)

z. Requirements for the Minor in Astrobiology
Preparatory course work should include calculus (MATH 121 or MATH 116, with MATH 121 preferred) and CHEM 184/130. Additional credit hours in astronomy, biology, chemistry, geology, or physics (ABCGP) are required as follows:
BIOL 150 Principles of Molecular and Cellular Biology (4)
GEOL 101 Introduction to Geology (3) or GEOL 105 History of the Earth (3) or GEOL 121 Prehistoric Life: DNA to Dinosaurs (3)
ASTR 391 Physical Astronomy, Honors (3)
ASTR 394 The Quest for Extraterrestrial Life (3) or 3 credit hours of undergraduate research in astrobiology (3)