

Chemistry Major

Including Options for Teaching and Premedical/Pre dental; and Emphases in Chemical Education, Biochemistry, Environmental Chemistry, Professional Chemistry, and Life Science

Published March 2008

Effective for students beginning degree Summer Sem. 2008 thru Spring Sem. 2009

Admission Requirements For This Major

1. New freshmen admitted to USU in good standing qualify for admission to this major.
2. Transfer students from other institutions need a 2.2 transfer GPA and students transferring from other USU majors need a 2.0 total GPA for admission to this major in good standing.

The Program

Chemistry is a subject addressing the properties of materials and the transformations that they undergo. Especially important are aspects of energy and structure related to chemical reactivity. Consequently, students of many disciplines take courses in chemistry to learn about the behavior of the substances they will use or reference. The Department of Chemistry and Biochemistry offers a wide variety of courses for those whose majors and/or anticipated careers require a knowledge of chemistry. These include nutrition, engineering, biology, agriculture, natural resources, medicine, law, and education, to name a few. Many students also choose chemistry as an elective course to better prepare themselves as citizens in a technological world.

The **Bachelor of Science (BS) Degree** entails considerable specialization in chemistry and related areas. The BS emphases require a common core of courses, but allow for a different concentration of advanced work according to the interests and career objectives of the student. The **Professional Chemistry** emphasis, the **Biochemistry** emphasis, and the **Environmental Chemistry** emphasis meet the requirements for certification by the American Chemical Society (ACS). The **Life Science** emphasis is popular for students wishing to go on to medical or dental graduate programs. The **Chemistry Teaching Major** and the **Composite Teaching Major in the Physical Sciences** are available to those who want a career in secondary education. ACS certification in **Chemical Education** is available to students who complete either of the ACS-certified BS emphases and the Teacher Education program. The certified degree emphases provide excellent preparation for immediate entry into the job market or for graduate school in chemistry, biochemistry, chemical engineering, molecular biology, nutrition, food science, materials science, and a wide variety of other fields. The life science emphasis is particularly appropriate for **premedical** and **predental** students who want a strong base for understanding the nature of chemical reactions in the body and the behavior of the drugs they will prescribe, or who want an attractive alternative should they decide ultimately not to pursue medical or dental school. The **Bachelor of Arts (BA)** degree is an excellent choice for students with an interest in studying **law** or **business** and who have an interest in science.

The core of the program utilizes year-long sequences of classes. The first-year sequence introduces the basic principles of chemistry, as well as most of the major concepts of the science. The second year explores in greater depth the characteristics of carbon-based compounds that serve as the backbone for the chemistry of life; for most drugs and medicines; for petroleum; for most fibers, paints, and plastics; and for many other commercial products. The third year examines in greater depth the models, theories, and mathematical interpretation of the structures, rates of change, energetics, and other properties of chemicals. In addition, three one-semester courses examining the chemistry of life processes, the behavior of inorganic substances, and the analysis of the composition of substances are required. Many of the sequences have associated laboratory courses where students get hands-on practice. Here they synthesize compounds, measure physical properties, analyze samples, and determine structural features of compounds, using modern techniques and instrumentation.

The requirements of the BS and BA degrees in chemistry, along with University and University Studies requirements, are summarized in this program sheet. The specific requirements for the teaching major and for the composite teaching major in the physical sciences are also included. Students are encouraged to keep this program guide and to use it to record progress toward the completion of their degree requirements. Students are also urged to study this requirement sheet and to visit with their advisors on a regular basis about progress toward the completion of their degrees or for any questions regarding complementary courses, career goals, etc.

Career Opportunities

Chemistry degree holders work in a wide variety of professions, from physicians, lawyers, and professors, to research/development, sales, or production in the chemical, oil, pharmaceutical, metals, electronic, and biochemical industries. Government at all levels employs chemists, including the federal Departments of Defense, Health and Human Services, Agriculture, and Interior. Graduates with a bachelor's degree often begin work in chemical analysis or sales or may assist senior chemists in research and development. Graduates with a teaching major or chemistry education emphasis may teach in public schools. A graduate degree is usually needed to direct research or teach at the university level. Degree holders from the Department of Chemistry and Biochemistry have had excellent success in obtaining support for graduate studies, often at very prestigious institutions, and in obtaining employment directly following graduation. For further information, students should contact their advisor.

Recommended High School Courses

Students interested in studying chemistry should take high school mathematics courses that will enable them to start calculus during their first semester at USU. High school coursework in chemistry and physics is also desirable. AP credit in chemistry may be counted toward the degree.

Degrees and Programs Offered Through This Department

Chemistry:

Master of Science (MS) and Doctor of Philosophy (PhD)

Bachelor of Science (BS)

Emphases: Professional Chemistry, Biochemistry, Environmental
Chemistry, Chemical Education, Life Science

Bachelor of Arts (BA)

Chemistry Teaching: BS

Composite Teaching—Physical Science (Chem): BS

Biochemistry: BS, MS, and PhD

Academic Advisement

All students should contact their academic advisor for assistance with course selection, program planning, and meeting graduation requirements. If they do not know who their advisor is, students should contact their department, college, or the Office of University Advising.

Graduation Requirements: BS and BA* Degrees in Chemistry

*A BA degree requires foreign language training. For further information, see the *General Catalog*.

Minimum University Requirements**

Total credits	120
Grade point average (most majors require higher GPA)	2.00 GPA
Credits of C- or better	100
Credits of upper-division courses (#3000 or above)	40
USU credits	30
(20 of which must be upper division, including 10 required by major)	
Completion of approved major program of study	See department
Credits in minor (if required by department)	12
Credits in American Institutions (ECON 1500; HIST 1700, 2700, or 2710; POLS 1100; or USU 1300)	3
University Studies requirements	See below

**Colleges and departments may require more credits or a higher GPA. See requirements on this sheet.

University Studies Requirements for Chemistry Major

Note: Approved University Studies courses and requirements are listed in the back section of each semester's *Schedule of Classes*.

General Education Requirements (30-34 credits)

Competency Requirements (9-10 credits)

Communications Literacy (CL1 and CL2) (6 credits)

ENGL 1010 (CL1) (3 credits) or satisfactory AP, CLEP, IBO, ACT, or SAT score

AND

ENGL 2010 (CL2) (3 credits) or satisfactory IBO score

Quantitative Literacy (QL) (3-4 credits)

MATH 1030 or 1050 or STAT 1040 (3-4 credits)

OR

One MATH or STAT course requiring MATH 1050 as a prerequisite

OR

Satisfactory AP, CLEP, IBO, ACT, or SAT score

Computer and Information Literacy (0 credits)

Passing grade on six computer and information literacy related examinations.

Breadth Requirements (18-20 credits)

Select at least one approved course from each of the following six categories: **American Institutions (BAI)**, **Creative Arts (BCA)**, **Humanities (BHU)**, **Life Sciences (BLS)**, **Physical Sciences (BPS)**, and **Social Sciences (BSS)**. At least two of the six breadth courses must be University Studies courses with a **USU prefix** (excluding USU 1000, 1010, 1100, 3330, 4900, and 6900). (CLEP or AP credit may be used.) CHEM 1220 will fulfill the Physical Sciences requirement for students in the Chemistry Major.

Exploration Requirement (3-4 credits)

Choose an additional class from one of the following General Education categories: QL, BAI, BCA, BHU, BLS, BPS, or BSS. PHYS 2220 (BPS/QI) will fulfill the Exploration Requirement for students in the Chemistry Major.

Depth Education Requirements

Communications Intensive (CI) (2 courses)

For most students, courses taken for the major will meet this requirement.

Quantitative Intensive (QI) (1 course)

For most students, a course taken for the major will meet this requirement.

Depth Course Requirements (4 credits minimum, including 2 credits minimum completed in each of two courses)

Complete at least 2 credits in approved 3000-level or above courses from each of the following two categories: **Humanities and Creative Arts (DHA)** and **Social Sciences (DSS)**.

Minimum College of Science Requirements for BS Degree

Students in the chemistry degree programs will meet the College of Science requirements by taking MATH 1210, 1220 (8 credits) and the PHYS 2210, 2220 sequence (8 credits).

Chemistry Limitations

No CHEM prefix course may be applied toward graduation with any major or minor in chemistry with an earned grade of less than C-. No CHEM prefix course may be taken on a *Pass/Fail* basis. No CHEM prefix course may be repeated more than one time to improve the grade to a C- or better. A student dropped from the chemistry program for failure to meet this standard may appeal to the Curriculum Committee for readmission. Exceptions to this rule are not generally made. However, a student may petition for permission to take a course a third time, which will normally be granted *only* in the event of documented extenuating circumstances, such as documented medical issues.

Changes in Graduation/Catalog Requirements

Students who can complete a baccalaureate degree within seven years of enrollment at USU can qualify for graduation by meeting (1) the General Education/University Studies requirements in effect when they initially enrolled and (2) the major requirements in effect when they officially declared their major, even though there may have been changes in General Education/University Studies and major requirements since that time.

Students who have not completed the baccalaureate requirements within seven years of their initial enrollment at USU must have their General Education/University Studies and major requirements evaluated and approved by their department head and dean.

Undergraduate Course Expiration Policy

Coursework (including transfer credit) that is more than 10 years old and that is required by the major may be disallowed by the student's department. Students are given an opportunity to revalidate coursework that has been disallowed.

Chemistry Major Core Requirements (66-67 credits)

The core curriculum is required for all BS and BA degrees in this department, with the exception of the Composite Teaching major. Ideally, the core should be completed in the first three years of study, except for CHEM 4990 (Undergraduate Seminar), because physical chemistry serves as a prerequisite for many advanced courses. To complete the degree in 8 semesters (four academic years), students must register for an average of 15-16 credits per semester.

Effective Summer Semester 2006, some course numbers changed, due to House Bill 320 (Common Course Numbering). Course numbers used *prior* to Summer Semester 2006 are shown in parentheses, following *formerly*.

Note: Students may satisfy the CHEM 1210 requirement with an AP score of 3 or 4. *Both* CHEM 1210 *and* 1220 may be satisfied with an AP score of 5.

A. First Year (30-32 credits)

1. Fall Semester (15-16 credits)

Credits

- CHEM 1210 Principles of Chemistry I 4
- CHEM 1215 Chemical Principles Laboratory I 1
- (formerly CHEM 1230)
- MATH 1210 (QL) Calculus I 4
- University Studies courses 6-7

2. Spring Semester (15-16 credits)

- CHEM 1220 (BPS) Principles of Chemistry II 4
- CHEM 1225 Chemical Principles Laboratory II 1
- (formerly CHEM 1240)
- MATH 1220 (QL) Calculus II 4
- University Studies courses 6-7

B. Second Year (32-33 credits)

1. Fall Semester (16 credits)

- CHEM 2310² Organic Chemistry I 4
- CHEM 2315² Organic Chemistry Laboratory I 1
- (formerly CHEM 2330)
- CHEM 3000² (QI) Quantitative Analysis 3
- (formerly CHEM 3600)
- CHEM 3005² Quantitative Analysis Laboratory 1
- (formerly CHEM 3610)
- PHYS 2210 (QI) General Physics—Science and Engineering I 4
- MATH 2210 (QI) Multivariable Calculus 3

2. Spring Semester (16-17 credits)	Credits
<input type="checkbox"/> CHEM 2320 ³ Organic Chemistry II	4
<input type="checkbox"/> CHEM 2325 ³ Organic Chemistry Laboratory II	1
(formerly CHEM 2340)	
<input type="checkbox"/> CHEM 3510 ³ Intermediate Inorganic Chemistry	2
<input type="checkbox"/> CHEM 3520 ³ Inorganic Chemistry Laboratory	1
<input type="checkbox"/> PHYS 2220 (BPS/QI) General Physics—	
Science and Engineering II	4
<input type="checkbox"/> University Studies courses	4-5

C. Third Year (29-31 credits)

1. Fall Semester (14-16 credits)	
<input type="checkbox"/> CHEM 3060 (QI) ² Physical Chemistry	3
<input type="checkbox"/> CHEM 3080 (CI) ² Physical Chemistry Laboratory I	1
<input type="checkbox"/> CHEM 5700 ² General Biochemistry I	3
<input type="checkbox"/> MATH 2250 (QI) ¹ Linear Algebra and Differential Equations (4 cr) or	
<input type="checkbox"/> STAT 3000 (QI) ¹ Statistics for Scientists (3 cr)	3 or 4
<input type="checkbox"/> University Studies or elective courses	4-5

2. Spring Semester (15 credits)	
<input type="checkbox"/> CHEM 3070 (QI) ³ Physical Chemistry	3
<input type="checkbox"/> CHEM 3090 (CI) ³ Physical Chemistry Laboratory II	1
<input type="checkbox"/> CHEM 5640 ³ Instrumental Analysis	3
<input type="checkbox"/> CHEM 5650 ³ Instrumental Analysis Laboratory	2
<input type="checkbox"/> University Studies or elective courses for specific degree emphasis	6

D. Fourth Year (31-32 credits)	
<input type="checkbox"/> CHEM 4990 (CI) Undergraduate Seminar	2
<input type="checkbox"/> Upper-division and advanced elective courses for specific degree emphasis	29-30

¹The completion of MATH 2250 or STAT 3000 is optional for the Teaching Major.

Chemistry Degree Emphases

Each of the following emphases describes courses required in addition to the Chemistry Major Core Requirements above.

**American Chemical Society
Certified BS Degree Programs**

Each of the following four emphases leads to listing as a certified graduate by the American Chemical Society when completed with a GPA of 2.25 or greater. These are the preferred emphases for those planning to seek a graduate degree in chemistry or biochemistry, for those wishing to teach chemistry and advanced placement chemistry in high school, or for those who will enter employment emphasizing professional training in chemistry or biochemistry. There is also an Honors plan for students desiring a BS degree with Honors in Chemistry.

A. Professional Chemistry Emphasis (10 credits in addition to Chemistry core)	Credits
<input type="checkbox"/> CHEM 5520 ² Advanced Inorganic Chemistry (F)	2
<input type="checkbox"/> CHEM 5530 ³ Advanced Synthesis Laboratory (Sp)	2
<input type="checkbox"/> Advanced electives, as approved by department	6

B. Biochemistry Emphasis (13 credits in addition to Chemistry core)	Credits
<input type="checkbox"/> CHEM 5710 ³ General Biochemistry II (Sp)	3
<input type="checkbox"/> CHEM 5720 ³ General Biochemistry Laboratory (Sp)	2
<input type="checkbox"/> BIOL 1610 ² Biology I (F)	4
(formerly BIOL 1210)	
<input type="checkbox"/> Advanced Biology electives, as approved by department	4

C. Environmental Chemistry Emphasis (14-15 credits in addition to Chemistry core)	Credits
<input type="checkbox"/> CHEM 5670 ³ Intermediate Environmental Chemistry (Sp)	3
<input type="checkbox"/> CHEM 5680 ³ Environmental Chemistry Laboratory (Sp)	2
<input type="checkbox"/> Introductory environmental electives as approved by department	6-7
<input type="checkbox"/> Advanced environmental electives as approved by department	3

D. Chemical Education Emphasis (47-51 credits in addition to Chemistry core)	Credits
Note: Beginning in 2006, all USU teacher education candidates will be required to take and pass the content exam approved by the Utah State Office of Education in their major content area prior to student teaching.	
<input type="checkbox"/> Required Courses for the Secondary Teacher Education Program (STEP) (see details on page 4)	35
<input type="checkbox"/> Teaching minor (outside the Department of Chemistry and Biochemistry)	12-16

²Offered fall semester only.
³Offered spring semester only.

E. BS Degree with Honors
A BS degree with honors can be earned by completing any ACS certified program and by meeting the following requirements:

1. Minimum GPA of 3.50 in chemistry courses
2. Overall GPA of 3.30
3. Completion of 15 credits of honors work, as follows:

<input type="checkbox"/> CHEM 4800H (CI) Research Problems (F,Sp,Su)	3-6
<input type="checkbox"/> CHEM 4990H (CI) Undergraduate Seminar (F,Sp)	2
<input type="checkbox"/> 3-6 credits selected from Honors courses numbered 3000 or above in chemistry or related subjects, as appropriate. Three credits may be selected from chemistry courses numbered 6000 or above.	3-6

- In addition, select two courses from the following:
- | | |
|--|---|
| <input type="checkbox"/> CHEM 2320H Organic Chemistry II (Sp) | 4 |
| <input type="checkbox"/> CHEM 3070H (QI) Physical Chemistry (Sp) | 3 |
| <input type="checkbox"/> CHEM 5640H Instrumental Analysis (Sp) | 3 |
| <input type="checkbox"/> CHEM 5700H General Biochemistry I (F) | 3 |

**BS in Chemistry, Life Science Emphasis
(17 credits in addition to Chemistry core)**

This is an excellent choice for students who intend to apply to medical or dental school or who wish to seek employment where a sound knowledge of the fundamentals of both chemistry and biology is desirable. It is also appropriate for students seeking graduate education in fields requiring a strong chemistry background and is accepted as such by most graduate programs in chemistry or in biochemistry.

In addition to the Chemistry Core Requirements (with the exception of CHEM 5640, 5650), students must complete the following:

	Credits
<input type="checkbox"/> BIOL 1610 Biology I (F)	4
(formerly BIOL 1210)	
<input type="checkbox"/> BIOL 1620 (BLS) Biology II (Sp) (4 cr) or	
(formerly BIOL 1220)	
<input type="checkbox"/> BIOL 2420 Human Physiology (F,Sp,Su) (4 cr)	4
(formerly BIOL 2000)	
<input type="checkbox"/> BIOL 3060 (QI) Principles of Genetics (F,Sp,Su) (4 cr) or	
(formerly BIOL 3200)	
<input type="checkbox"/> BIOL 3300 General Microbiology (F,Sp) (4 cr)	4
<input type="checkbox"/> CHEM 5710 General Biochemistry II (Sp)	3
<input type="checkbox"/> CHEM 5720 General Biochemistry Laboratory (Sp)	2

**BA in Chemistry
(18-23 credits in addition to Chemistry core)**

This is an appropriate choice for students who wish to combine strong interest and preparation in chemistry with graduate study in law or business or who want to obtain a solid liberal arts and sciences education.

In addition to the Chemistry Core Requirements (with the exception of CHEM 5640, 5650), students must complete the following:

	Credits
<input type="checkbox"/> CHEM 5520 Advanced Inorganic Chemistry (F) (2 cr) or	
<input type="checkbox"/> CHEM 5640 Instrumental Analysis (Sp) (3 cr)	2 or 3
<input type="checkbox"/> Completion of one foreign language (16 cr) or	
<input type="checkbox"/> Completion of two foreign languages (20 cr)	16 or 20

Chemistry Teaching Major (49-53 credits in addition to Chemistry core)

This option is appropriate for students who wish to teach chemistry in high school, but who do not seek the depth of study required for ACS certification.

Note: Beginning in 2006, all USU teacher education candidates will be required to take and pass the content exam approved by the Utah State Office of Education in their major content area prior to student teaching.

In addition to the Chemistry Core Requirements (with the exception of MATH 2250 or STAT 3000, and CHEM 5640 and 5650), students must complete the following:

	Credits
<input type="checkbox"/> SCI 4300 Science in Society (F,Sp)	2
<input type="checkbox"/> Required Courses for the Secondary Teacher Education Program (STEP) (see details on this page)	35
<input type="checkbox"/> Teaching minor (outside the Department of Chemistry and Biochemistry).	12-16

Composite Teaching Major in the Physical Sciences (91-92 credits)

This degree is available through the Chemistry and Biochemistry Department or the Physics Department. Students with a Composite Teaching Major in the Physical Sciences should plan their programs carefully in order to meet the upper-division requirement for graduation. An overall 2.75 GPA in a minimum of 60 semester credits of approved University coursework is required for admission into the Secondary Teacher Education Program (STEP). A minimum overall GPA of 2.75 is required for graduation. Students who may wish to teach Integrated Science at the middle or junior high school level should talk to their advisor about completing the courses necessary for an Integrated Science endorsement.

Note: Beginning in 2006, all USU teacher education candidates will be required to take and pass the content exam approved by the Utah State Office of Education in their major content area prior to student teaching.

Specific for admission to this program, a student must have at least a 2.75 GPA in the following chemistry and physics courses: CHEM 1210, 1215, 1220, and 1225; PHYS 2110, 2120, or PHYS 2210, 2220 (preferred). *This program does not include many aspects of the Chemistry Core (see pages 2 and 3 on this requirement sheet).*

	Credits
A. Required Physics Courses (14 credits)	
<input type="checkbox"/> PHYS 1040 (BPS) Introductory Astronomy.	3
(formerly PHYX 1000)	
<input type="checkbox"/> PHYS 1080 (BPS) Intelligent Life in the Universe (3 cr) or	
(formerly PHYX 1030)	
<input type="checkbox"/> PHYS 3030 (QI) The Universe (3 cr)	3
<input type="checkbox"/> PHYS 2110 The Physics of Living Systems I	
(prereq: MATH 1100 or 1210) (4 cr) and	
<input type="checkbox"/> PHYS 2120 (BPS) The Physics of Living Systems II (4 cr).	8
OR	
<input type="checkbox"/> PHYS 2210 (QI) General Physics—Science and Engineering I	
(prereq: MATH 1210) (4 cr) and	
<input type="checkbox"/> PHYS 2220 (BPS/QI) General Physics—	
Science and Engineering II (4 cr)	8

B. Elective Physics Courses (5 credits)
Select 5 additional credits from PHYS courses at the 2500 level and above. May include research in physics education.

C. Required Mathematics and Statistics Courses (11 credits)	
<input type="checkbox"/> MATH 1210 (QL) Calculus I (F,Sp,Su).	4
<input type="checkbox"/> MATH 1220 (QL) Calculus II (F,Sp,Su)	4
<input type="checkbox"/> STAT 3000 (QI) Statistics for Scientists (F,Sp,Su).	3

D. Required Chemistry Courses (14-15 credits)	
<input type="checkbox"/> CHEM 1210 Principles of Chemistry I (F,Sp).	4
<input type="checkbox"/> CHEM 1215 Chemical Principles Laboratory I (F,Sp)	1
(formerly CHEM 1230)	
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su).	4

Credits

<input type="checkbox"/> CHEM 1225 Chemical Principles Laboratory II (F,Sp)	1
(formerly CHEM 1240)	
<input type="checkbox"/> CHEM 2300 Principles of Organic Chemistry (F) (3 cr) or	
<input type="checkbox"/> CHEM 2310 Organic Chemistry I (F) (4 cr)	3 or 4
<input type="checkbox"/> CHEM 2315 Organic Chemistry Laboratory I (F).	1
(formerly CHEM 2330)	

E. Required Science Courses (12 credits)	
<input type="checkbox"/> BIOL 1010 (BLS) Biology and the Citizen (F,Sp,Su).	3
<input type="checkbox"/> GEO 1110 (BPS) The Dynamic Earth: Physical Geology (F,Sp)	4
(formerly GEOL 1150)	
<input type="checkbox"/> CLIM 2000 (BPS) The Atmosphere and Weather (F,Sp).	3
<input type="checkbox"/> SCI 4300 Science in Society (F,Sp)	2

F. Secondary Teacher Education Program (STEP) (35 credits)
Enrollment in the Secondary Teacher Education Program (STEP) is *required* for the Composite Teaching Major in the Physical Sciences. (Details are shown below.)

G. Integrated Science Endorsement
For further information, students should contact their advisor.

Secondary Teacher Education Program (STEP) (35 credits)

Prior to enrolling in these courses, students must be approved for admission to the STEP by the College of Education and Human Services. The teaching major advisor can assist with this process.

An overall 2.75 GPA in a minimum of 60 semester credits of approved University coursework is required for admission into the STEP. A minimum overall GPA of 2.75 is required for graduation. Specific for admission to any Chemistry Teaching program, a student must have *at least* a 2.75 GPA in CHEM 1210, 1215, 1220, and 1225.

Beginning in 2006, all USU teacher education candidates will be required to take and pass the content exam approved by the Utah State Office of Education in their major content area prior to student teaching.

Students who may wish to teach Integrated Science at the middle or junior high school level should talk to their advisor about completing the courses necessary for an Integrated Science endorsement.

	Credits
Level 1 (11 credits)	
<input type="checkbox"/> INST 3500 Technology Tools for Secondary Teachers (F,Sp,Su).	1
<input type="checkbox"/> SCED 3100 Motivation and Classroom Management (F,Sp)	3
<input type="checkbox"/> SCED 3210 (CI/DSS) Educational and Multicultural Foundations (F,Sp).	3
<input type="checkbox"/> SCED 3300 Clinical Experience I (40 hours minimum) (F,Sp)	1
<input type="checkbox"/> SCED 3400⁴ Teaching Science I (F,Sp)	3

Level 2 (12 credits)	
<input type="checkbox"/> SPED 4000 Education of Exceptional Individuals	
(may be taken anytime) (F,Sp,Su)	2
<input type="checkbox"/> SCED 4200 (CI) Reading, Writing, and Technology (F,Sp)	3
<input type="checkbox"/> SCED 4210 Cognition and Evaluation of Student Learning (F,Sp)	3
<input type="checkbox"/> SCED 4300 Clinical Experience II (40 hours minimum) (F,Sp)	1
<input type="checkbox"/> SCED 4400⁴ Teaching Science II (F,Sp)	3

Level 3 (12 credits)	
<input type="checkbox"/> SCED 5500 Student Teaching Seminar (2 weeks) (F,Sp)	2
<input type="checkbox"/> SCED 5630 Student Teaching in Secondary Schools	
(13 weeks, full-time) (F,Sp).	10

Note: The courses in nonscience majors may differ from those listed here.

⁴Students should complete SCED 3400 before enrolling in SCED 4400. Depending upon the student's home campus, some sections may only be available during one semester. For details, students should consult their advisor.

Chemistry Minor (20 credits)

	Credits
A. Required Courses (10 credits)	
<input type="checkbox"/> CHEM 1210 Principles of Chemistry I (F,Sp).	4
<input type="checkbox"/> CHEM 1215 Chemical Principles Laboratory I (F,Sp)	1
(formerly CHEM 1230)	
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su).	4
<input type="checkbox"/> CHEM 1225 Chemical Principles Laboratory II (F,Sp).	1
(formerly CHEM 1240)	

B. Electives (10 credits)

Select 10 credits from the following (as approved by department):

	Credits
<input type="checkbox"/> CHEM 2300 Principles of Organic Chemistry (F) (3 cr) or	
<input type="checkbox"/> CHEM 2310 Organic Chemistry I (F) (4 cr)	3 or 4
<input type="checkbox"/> CHEM 2315 Organic Chemistry Laboratory I (F).	1
(formerly CHEM 2330)	
<input type="checkbox"/> CHEM 2320 Organic Chemistry II (Sp).	4
<input type="checkbox"/> CHEM 2325 Organic Chemistry Laboratory II (Sp)	1
(formerly CHEM 2340)	
<input type="checkbox"/> CHEM 3000 (QI) Quantitative Analysis (F)	3
(formerly CHEM 3600)	
<input type="checkbox"/> CHEM 3005 Quantitative Analysis Laboratory (F)	1
(formerly CHEM 3610)	
<input type="checkbox"/> CHEM 3060 (QI) Physical Chemistry (F).	3
<input type="checkbox"/> CHEM 3070 (QI) Physical Chemistry (Sp)	3
<input type="checkbox"/> CHEM 3510 Intermediate Inorganic Chemistry (Sp)	2
<input type="checkbox"/> CHEM 3520 Inorganic Chemistry Laboratory (Sp)	1
<input type="checkbox"/> CHEM 3650 Environmental Chemistry (Sp)	3
<input type="checkbox"/> CHEM 3700 Introductory Biochemistry (Sp)	3
<input type="checkbox"/> CHEM 3710 Introductory Biochemistry Laboratory (Sp).	1
<input type="checkbox"/> CHEM 5700 General Biochemistry I (F)	3
<input type="checkbox"/> CHEM 5710 General Biochemistry II (Sp)	3
<input type="checkbox"/> CHEM 5720 General Biochemistry Laboratory (Sp)	2

Chemistry Teaching Minor

(17-19 credits)

A. Required Courses (14-15 credits)

	Credits
<input type="checkbox"/> CHEM 1210 Principles of Chemistry I (F,Sp).	4
<input type="checkbox"/> CHEM 1215 Chemical Principles Laboratory I (F,Sp)	1
(formerly CHEM 1230)	
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su).	4
<input type="checkbox"/> CHEM 1225 Chemical Principles Laboratory II (F,Sp).	1
(formerly CHEM 1240)	
<input type="checkbox"/> CHEM 2300 Principles of Organic Chemistry (F) (3 cr) or	
<input type="checkbox"/> CHEM 2310 Organic Chemistry I (F) (4 cr)	3 or 4
<input type="checkbox"/> CHEM 2315 Organic Chemistry Laboratory I (F)	1
(formerly CHEM 2330)	

B. Electives (3-4 credits)

Select one three- or four-credit course from below:

	Credits
<input type="checkbox"/> CHEM 2320 Organic Chemistry II (Sp)	
(if CHEM 2310 selected from above)	4
<input type="checkbox"/> CHEM 3000 (QI) Quantitative Analysis (F)	3
(formerly CHEM 3600)	
<input type="checkbox"/> CHEM 3060 (QI) Physical Chemistry (F).	3
<input type="checkbox"/> CHEM 3510 Intermediate Inorganic Chemistry (Sp) (2 cr) and	
<input type="checkbox"/> CHEM 3520 Inorganic Chemistry Laboratory (Sp) (1 cr).	3
<input type="checkbox"/> CHEM 3650 Environmental Chemistry (Sp) (3 cr) or	
<input type="checkbox"/> CHEM 3700 Introductory Biochemistry (Sp) (3 cr).	3

C. Secondary Teacher Education Program (STEP) (35 credits)

Enrollment in the Secondary Teacher Education Program (STEP) is *required* for the Chemistry Teaching Minor. (See details on page 4).

Final Examination

Graduating seniors are required to take a final examination covering the content of their major. **The exam will not affect the graduation status of the student in any way, but will be used as an assessment tool.** The combined results of all the examinations will be used by the department to judge the effectiveness of the departmental curriculum, *not* the student.

Requirement Changes

Graduation requirements shown on this sheet are subject to change. Students should check with their assigned advisor concerning possible changes.

Materials for Persons with Disabilities

This requirement sheet is available in digital format, recordings, or large print upon request to the USU Disability Resource Center.

For information contact

Chemistry and Biochemistry Department; Maeser Lab 140;
Utah State University; 0300 Old Main Hill; Logan UT 84322-0300;
tel. (435) 797-1619; e-mail chemist@cc.usu.edu; <http://www.chem.usu.edu/>

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