CHEMISTRY (BS) - ACS CERTIFIED TRACK

Program Overview

This degree track is designed for students interested in graduate studies in chemistry or related fields. The track is certified by the American Chemical Society through its Committee on Professional Training. The track provides breadth and depth of experience to give graduates a wide choice of career options, and is especially suited for students desiring to study chemistry in a graduate school. The track also prepares students for entry level positions in industry and government laboratories. In addition to the general degree requirements, the ACS certified track requires satisfactory completion of courses in chemistry, mathematics, and physics. It also enables students to gain substantial research experience through independent study and senior seminar courses under the guidance and mentorship of faculty members. The track provides a sound foundation in the field of chemistry and permits flexibility for evolving and changing student interests. A broad range of upper-level elective courses are offered to expose students to modern techniques within the chemical sciences and to help students expand their college experience.

Career Opportunities

Students majoring in chemistry may pursue careers as teachers, entry level chemist, and medicine.

Program of Study

Code	Title	Credit Hours
Core IMPACTS Area : Institutional Priorities [1]		**4-5**
Choose one of the following communication options		3
COMM 1110	Public Speaking	
Foreign Language Course Options		
AMSL, ARAB, CHIN, FREN, GERM, GREK, ITAL, JAPN, KREN, LATIN, PORT, SPAN - 1001, 1002, 2001, 2002; SWAH - 1001, 1002.		
Take one of the following courses		1-2
ITDS 1779	Scholarship Across the Disciplines	
LEAD 1705	Introduction to Servant Leadership	
PERS 1506	Perspectives 1-hour	
PERS 1507	Perspectives 2-hour	
Core IMPACTS Area : Mathematics & Quantitative Skills [1]		**3-7**
DATA 1501	Introduction to Data Science	3
MATH 1001	Quantitative Skills and Reasoning	3
MATH 1101	Introduction to Mathematical Modeling	3
MATH 1111	College Algebra	3
MATH 1113	Pre-Calculus	4
MATH 1125	Applied Calculus	3
MATH 1131	Calculus with Analytic Geometry I	4
MATH 1132	Calculus with Analytic Geometry II	4
MATH 1165	Computer-Assisted Problem Solving	3
MATH 1401	Introduction to Statistics	3
MATH 1501	Calculus I	4
MATH 2125	Introduction to Discrete Mathematics	3
STAT 1401	Elementary Statistics	3
Core IMPACTS Area : Political Science and U.S. History		**6**
HIST 2111	U. S. History to 1865	3
or HIST 2112	U. S. History since 1865	
POLS 1101	American Government	3
Core IMPACTS Area : Arts, Humanities, and Ethics		**6**
Select one Fine Arts course		3
ARTH 1100	Art Appreciation	
ARTH 2125	Introduction to the History of Art I– Prehistoric through Gothic	
ARTH 2126	Introduction to the History of Art II– Renaissance through Modern	
MUSC 1100	Music Appreciation	
THEA 1100	Theatre Appreciation	
ITDS 1145	Comparative Arts [2]	
Select one Humanities course		3
ENGL 2111	World Literature I	
ENGL 2112	World Literature II	
ITDS 1155	The Western Intellectual Tradition	
ITDS 1774	Introduction to Digital Humanities	
PHIL 2010	Introduction to Philosophy	
ITDS 1145	Comparative Arts [2]	
Core IMPACTS Area : Communicating in Writing		**6**
ENGL 1101	English Composition I	3
ENGL 1102	English Composition II	3
Core IMPACTS Area : Technology, Mathematics, and Sciences [1,3]		**7-11**
ANTH 1145	Human Origins	3
ASTR 1105	Descriptive Astronomy: The Solar System	3
ASTR 1106	Descriptive Astronomy: Stars and Galaxies	3
ASTR 1305	Descriptive Astronomy Lab	1
ATSC 1112	Understanding the Weather	3
ATSC 1112L	Understanding the Weather Lab	1
BIOL 1125	Contemporary Issues in Biology Non-Lab	3
BIOL 1215K	Introductory Biology	4
BIOL 1225K	Contemporary Issues in Biology with Lab	4
CHEM 1151 & 1151L	Survey of Chemistry I and Survey of Chemistry I Lab	4
CHEM 1152 & 1152L	Survey of Chemistry II and Survey of Chemistry II Lab	4
CHEM 1211 & 1211L	Principles of Chemistry I and Principles of Chemistry I Lab	4
CHEM 1212 & 1212L	Principles of Chemistry II and Principles of Chemistry II Lab	4
CPSC 1105	Introduction to Computing Principles and Technology	3
CPSC 1301K	Computer Science I	4
ENVS 1105	Environmental Studies	3
ENVS 1105L	Environmental Studies Laboratory	1
ENVS 1205K	Sustainability and the Environment	4
GEOG 2215	Introduction to the Geographic Information Systems	3
GEOL 1110	Natural Disasters: Our Hazardous Environment	3
GEOL 1121	Introductory Geoscience I: Physical Geology	3
GEOL 1121L	Introductory Geoscience I: Physical Geology Lab	1

GEOL 1122	Introductory Geo-sciences II: Historical Geology	3
GEOL 1322	Introductory Geo-sciences II: Historical Geology Lab	1
GEOL 2225	The Fossil Record	4
PHYS 1111 & PHYS 1311	Introductory Physics I and Introductory Physics I Lab	4
PHYS 1112 & PHYS 1312	Introductory Physics II and Introductory Physics II Lab	4
PHYS 1125	Physics of Color and Sound	3
PHYS 1325	Physics of Color and Sound Lab	1
PHYS 2211 & PHYS 2311	Principles of Physics I and Principles of Physics I Lab	4
PHYS 2212 & PHYS 2312	Principles of Physics II and Principles of Physics II Lab	4
Core IMPACTS Area : Social Sciences		**6**
Select one Behavioral Science course		
ECON 2105	Principles of Macroeconomics	
ECON 2106	Principles of Microeconomics	
PHIL 2030	Moral Philosophy	
PSYC 1101	Introduction to General Psychology	
SOCI 1101	Introduction to Sociology	
Select one World Cultures course		3
ANTH 1107	Discovering Archaeology	
ANTH 1105	Cultural Anthropology	
ANTH 2105	Ancient World Civilizations	
ANTH 2136	Language and Culture	
ENGL 2136	Language and Culture	
GEOG 1101	World Regional Geography	
HIST 1111	World History to 1500	
HIST 1112	World History since 1500	
ITDS 1156	Understanding Non-Western Cultures	
Core IMPACTS Total Hours		**42**
Health and Wellness		**3**
KINS 1106	Lifetime Wellness	2
or PHED 1205	Concepts of Fitness	
Select one of the following		1
Any PEDS course		
MUSC 1206	Body Mapping (Music Majors Only)	

[1] The hours applied in the Institutional Priorities; Mathematics & Quantitative Skills; and Technology, Mathematics, and Sciences areas must add to 18 credit hours.

[2] ITDS 1145 Comparative Arts, though listed under both Fine Arts and Humanities, may be taken only once.

[3] At least 4 of the credit hours in this area must be in a lab science course.

Major Requirements

Code	Title	Credit Hours
Core Requirements		
Complete the core requirements for this program		45
Field of Study Requirements		
Students must have a grade of C or better in the courses used to satisfy the major.		
Apply two hours of approved electives		2
STAT 1401	Elementary Statistics	3
CHEM 1715	Introductory Chemistry Seminar	1
CHEM 2115	Quantitative Chemical Analysis	3
CHEM 2315	Quantitative Chemical Analysis Lab	1
Complete a physics course sequence (Principles required for ACS Track).		8
Introductory Physics Sequence:		
PHYS 1111	Introductory Physics I	
PHYS 1311	Introductory Physics I Lab	
PHYS 1112	Introductory Physics II	
PHYS 1312	Introductory Physics II Lab	
Principles of Physics Sequence:		
PHYS 2211	Principles of Physics I	
PHYS 2311	Principles of Physics I Lab	
PHYS 2212	Principles of Physics II	
PHYS 2312	Principles of Physics II Lab	
Field of Study Requirements Total		18
Required for the Major		
Students must have a grade of C or better in the courses used to satisfy the major.		
MATH 1132	Calculus with Analytic Geometry II	4
CHEM 3111	Organic Chemistry I	3
CHEM 3112	Organic Chemistry II	3
CHEM 3135	Inorganic Chemistry	3
CHEM 3141	Biochemistry I	3
CHEM 3142	Biochemistry II	3
CHEM 3311	Organic Chemistry I Lab	1
CHEM 3312	Organic Chemistry II Lab	1
CHEM 3335	Inorganic Chemistry Lab	1
CHEM 3345	Biochemistry Lab I	1
CHEM 4115	Foundations of Physical Chemistry	3
CHEM 4116	Advanced Physical Chemistry	3
CHEM 4175	Instrumental Methods of Chemical Analysis	3
CHEM 4315	Foundations of Physical Chemistry Lab	1
CHEM 4375	Instrumental Methods of Chemical Analysis Lab	1
CHEM 4794	Capstone Seminar	1
CHEM 4899	Supervised Undergraduate Research	2
MATH 2135	Calculus with Analytic Geometry 3	4
Required for the Major Total		41
Major Electives		
Select 11 credits of chemistry electives. [1]		11
Students must have a grade of C or better in the courses used to satisfy the major.		
Major Electives Total		11
General Electives		
Choose 8 general elective credits. [1]		8
Total Credit Hours		**123**

[1] Students will need a total of 6 credit hours of coursework at the 3000 level or above in Major Electives or General Electives to satisfy the major.

Program Map

Course	Title	Credit Hours
First Year		
Fall		
CHEM 1211	Principles of Chemistry I (minimum grade of C) [1]	3
CHEM 1211L	Principles of Chemistry I Lab (minimum grade of C) [1]	1
MATH 1113	Pre-Calculus (minimum grade of C)	4
ENGL 1101	English Composition I (minimum grade of C)	3
CHEM 1715	Introductory Chemistry Seminar (Area H; minimum grade of C) [2]	1
POLS 1101	American Government	3
	Credit Hours	**15**
Spring		
CHEM 1212	Principles of Chemistry II (minimum grade of C) [1]	3
CHEM 1212L	Principles of Chemistry II Lab (minimum grade of C) [1]	1
MATH 1131	Calculus with Analytic Geometry I (minimum grade of C)	4
ENGL 1102	English Composition II (minimum grade of C)	3
Institutional Priorities	ITDS 1779 (2), LEAD 1705 (2), PERS 1506 (1; may be repeated with different topic), PERS 1507 (2)	1
Institutional Priorities	COMM 1110 Public Speaking or foreign language 1001, 1002, 2001, 2002	3
	Credit Hours	**15**
Second Year		
Fall		
CHEM 3111	Organic Chemistry I (minimum grade of C) [3]	3
CHEM 3311	Organic Chemistry I Lab (minimum grade of C) [3]	1
PHYS 2211	Principles of Physics I (minimum grade of C)	3
PHYS 2311	Principles of Physics I Lab (minimum grade of C)	1
MATH 1132	Calculus with Analytic Geometry II (minimum grade of C)	4
CHEM 4899	Supervised Undergraduate Research (minimum grade of C)	2
Health and Wellness	Select one PEDS course (https://catalog.columbusstate.edu/course-descriptions/peds/#peds)	1
	Credit Hours	**15**
Spring		
CHEM 3112	Organic Chemistry II (minimum grade of C) [4]	3
CHEM 3312	Organic Chemistry II Lab (minimum grade of C) [4]	1
PHYS 2212	Principles of Physics II (minimum grade of C)	3
PHYS 2312	Principles of Physics II Lab (minimum grade of C)	1
MATH 2135	Calculus with Analytic Geometry 3	4
KINS 1106 or PHED 1205	Lifetime Wellness or Concepts of Fitness	2
Program Electives	Program Elective (minimum grade of C) [7]	3
	Credit Hours	**17**
Third Year		
Fall		
CHEM 2115	Quantitative Chemical Analysis (minimum grade of C) [5]	3
CHEM 2315	Quantitative Chemical Analysis Lab (minimum grade of C) [5]	1
CHEM 3141	Biochemistry I (minimum grade of C)	3
CHEM 3345	Biochemistry Lab I (minimum grade of C)	1
Arts, Humanities, and Ethics	Humanities Elective (ENGL 2111, ENGL 2112, ITDS 1145, ITDS 1155, ITDS 1774, ITDS 2125, or PHIL 2010)	3
Program Electives	Program Electives (minimum grade of C) [7]	5
	Credit Hours	**16**
Spring		
CHEM 4175	Instrumental Methods of Chemical Analysis (minimum grade of C) [6]	3
CHEM 4375	Instrumental Methods of Chemical Analysis Lab (minimum grade of C) [6]	1
STAT 1401	Elementary Statistics	3
Arts, Humanities, and Ethics	Fine Arts (ARTH 1100, ARTH 2125, ARTH 2126, ITDS 1145, MUSC 1100, or THEA 1100)	3
Program Electives	Program Elective (minimum grade of C) [7]	3
General Electives	Elective	3
	Credit Hours	**16**
Fourth Year		
Fall		
CHEM 4115	Foundations of Physical Chemistry (minimum grade of C)	3
CHEM 4315	Foundations of Physical Chemistry Lab (minimum grade of C)	1
CHEM 4794	Capstone Seminar (minimum grade of C)	1
Social Sciences	Behavioral Science (ECON 2105, ECON 2106, PHIL 2030, PSYC 1101, SOCI 1101)	3
HIST 2111 or HIST 2112	U. S. History to 1865 or U. S. History since 1865	3

Program Electives	Program Elective (minimum grade of C) [7]	3
General Electives	Elective	2
	Credit Hours	**16**
Spring		
CHEM 4116	Advanced Physical Chemistry (minimum grade of C)	3
CHEM 3135	Inorganic Chemistry (minimum grade of C)	3
CHEM 3335	Inorganic Chemistry Lab (minimum grade of C)	1
Social Sciences	World Culture (ARTH 1105, ARTH 1107, ARTH 2105, ARTH 2136, ENGL 2136, GEOL 1101, HIST 1111, HIST 1112, or ITDS 1156)	3
General Electives	Elective	3
*EST Major Field Test		
	Credit Hours	**13**
	Total Credit Hours	**123**

1 The Principles of Chemistry sequence are offered each semester and summer. These must be completed by the summer.

2 Introductory Chemistry Seminar is only offered in the fall semester.

3 Organic Chemistry I and the co-requisite lab are only offered in the fall semester.

4 Organic Chemistry 2 and the co-requisite lab are only offered in the spring semester.

5 Quantitative Chemical Analysis and the co-requisite lab is only offered in the fall semester.

6 Instrumental Analysis and the co-requisite lab are only offered in the spring semester.

7 Program electives may include additional 3000 level courses in biology, physics, engineering,...etc.

- To graduate, a student must have 39 credits of upper-division courses (3000 level or higher). These courses may be in any discipline.
- A grade of "C" or higher is required for all chemistry courses.
- The prerequisite for Principles of Chemistry 1 (CHEM 1211 Principles of Chemistry I) and its co-requisite lab is College Algebra (MATH 1111 College Algebra) with a grade of "C" or higher or placement in MATH 1113 Pre-Calculus or higher.
- Principles of Physics 1 and 2 with the co-requisite labs are required for completion of the ACS Certified Track.
- The prerequisite for Principles of Physics 1 (PHYS 2211 Principles of Physics I) and its co-requisite lab (PHYS 2311 Principles of Physics I Lab) is Calculus 1 (MATH 1131 Calculus with Analytic Geometry I) with a grade of C or higher.
- The prerequisite for Organic Chemistry 2 (CHEM 3112 Organic Chemistry II) and its co-requisite lab (CHEM 3312 Organic Chemistry II Lab) are Organic Chemistry 1 (CHEM 3111 Organic Chemistry I) and its co-requisite lab (CHEM 3311 Organic Chemistry I Lab) with a "C" or higher in each.
- The prerequisite for Biochemistry 1 (CHEM 3141 Biochemistry I) and its co-requisite lab (CHEM 3345 Biochemistry Lab I) are Organic Chemistry 1 (CHEM 3111 Organic Chemistry I) and its co-requisite lab (CHEM 3311 Organic Chemistry I Lab) with a "C" or higher in each.
- The prerequisite for Inorganic Chemistry (CHEM 3135 Inorganic Chemistry) and its co-requisite lab (CHEM 3335 Inorganic Chemistry Lab) are Organic Chemistry 2 (CHEM 3112 Organic Chemistry II) and its co-requisite lab (CHEM 3312 Organic Chemistry II Lab) with a "C" or higher.
- Inorganic Chemistry and its co-requisite lab (CHEM 3135 Inorganic Chemistry and CHEM 3335 Inorganic Chemistry Lab) may be offered in the fall or spring semester.
- The prerequisite for Physical Chemistry 1 (CHEM 4111 Physical Chemistry I) and its co-requisite lab (CHEM 4311 Physical Chemistry I Lab) are Physics 2 (PHYS 2212 Principles of Physics II and PHYS 2312 Principles of Physics II Lab).
- Physical Chemistry 1 & 2 lecture and lab may be offered at night, i.e. 4:30 - 5:45 for the lecture and 6:00 - 8:50 for lab.
- Quantitative Analysis and its co-requisite lab (CHEM 2115 Quantitative Chemical Analysis and CHEM 2315 Quantitative Chemical Analysis Lab are only offered in the fall semester.
- Instrumental Methods of Chemical Analysis (CHEM 4175 Instrumental Methods of Chemical Analysis) and its co-requisite lab (CHEM 4375 Instrumental Methods of Chemical Analysis Lab) are only offered in the spring semester.
- Inorganic Chemistry and its co-requisite lab (CHEM 3135 Inorganic Chemistry and CHEM 3335 Inorganic Chemistry Lab) may be offered in the fall or spring semester.
- Organic Chemistry 1 and its co-requisite lab (CHEM 3111 Organic Chemistry I and CHEM 3311 Organic Chemistry I Lab) are only offered in the fall semester and Organic Chemistry 2 and its co-requisite lab (CHEM 3112 Organic Chemistry II and CHEM 3312 Organic Chemistry II Lab) are only offered in the spring semester.
- Biochemistry 1 and its co-requisite lab (CHEM 3141 Biochemistry I and CHEM 3345 Biochemistry Lab I) are only offered in the fall semester and Biochemistry 2 with its co-requisite lab (CHEM 3142 Biochemistry II and CHEM 3346 Biochemistry II Lab) are only offered in the spring semester.
- Supervised Undergraduate Research (CHEM 4899 Supervised Undergraduate Research) is offered as a 1, 2, or 3 credit hour course. The course may be repeated with a different topic up to 9 credits.
- Additional courses in astronomy, biology, chemistry, computer science, engineering, geology, or mathematics courses may be selected as program electives as approved by advisor and the department chair.

Admission Requirements

There are no program specific admission requirements.

Additional Program Requirements

There are no program specific academic regulations.