

# CHEMISTRY MAJOR

A student who is majoring in chemistry at Saint Joseph's University is introduced to all of the major sub-disciplines: analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry. An important objective of the program is to develop in students the ability to solve problems by employing the techniques of the various sub-disciplines of chemistry. Throughout the program, emphasis is placed on chemistry as a laboratory science. Consequently, a student majoring in chemistry learns not only the basic theories of chemistry, but also how to use experimental techniques to solve chemical problems. Students hone their experimental skills through hands-on experience on modern research-grade instrumentation in our laboratory courses taught by faculty. In addition, chemistry majors are able to engage in faculty-directed independent research projects in the traditional sub-disciplines of chemistry and environmental chemistry during the academic year and/or in the summer. Students often have the opportunity to present the results of their research at local, regional, and national scientific meetings as well as co-author publications with graduate students and faculty. The curriculum for the chemistry major is designed to prepare students for continuing their educations in graduate and professional schools such as medicine, law, or business as well as employment in the chemical and pharmaceutical industries and government laboratories.

## Learning Goals and Outcomes

**Goal 1:** Students will develop an understanding of the theoretical methods and models that chemists use to understand the properties and behavior of matter.

**Outcome 1.1:** Students will demonstrate a mastery of the key concepts in the five major subdisciplines of chemistry: analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry.

**Outcome 1.2:** Students will apply appropriate theoretical models to explain experimental observations.

**Goal 2:** Students will employ the experimental methods used by chemists.

**Outcome 2.1:** Students will properly employ the instruments that are used to study problems in chemistry. The students will correctly interpret the data that they obtain from these instruments.

**Outcome 2.2:** Students will store, handle, and use chemicals safely and responsibly.

**Goal 3:** Students will effectively communicate scientific information.

**Outcome 3.1:** Students will present results from chemical investigations and the chemical literature both orally and in writing.

**Outcome 3.2:** Students will search and properly cite the chemical literature for published work relevant to a problem of contemporary interest.

## Requirements

The traditional undergraduate programs includes a minimum of 120 credits distributed across three components: A General Education component divided into Signature Courses, Variable Courses, and an Integrative Learning requirement; a Major and Divisional component; and Free Electives. In

addition to course requirements as specified in each area, students must complete one certified course in each of the following overlay areas<sup>1</sup>:

1. Diversity, Globalization or Non-western Area Studies,
2. Ethics Intensive
3. Writing Intensive, and
4. Diversity

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Overlay requirements are part of the 120 credit requirements

## General Education Signature Courses

See this page about Signature courses (<https://academiccatalog.sju.edu/curricula/#signature>).

## General Education Variable Courses

See this page about Variable courses (<https://academiccatalog.sju.edu/curricula/#variable>). Six to Nine courses

Code	Title	Hours
<b>Mathematics</b>		
MAT 161	Calculus I	4
<b>Natural Science</b>		
CHM 120 & 120L or CHM 121	General Chemistry I and General Chemistry Lab I General Chemistry Honors I	3-4

## General Education Overlays

See this page about Overlays (<https://academiccatalog.sju.edu/curricula/#overlay>).

## General Education Integrative Learning Component

See this page about Integrative Learning Component (<https://academiccatalog.sju.edu/curricula/#integrative-learning>). Three courses:

Code	Title	Hours
<b>Mathematics</b>		
MAT 162	Calculus II	4
<b>Physics</b>		
PHY 105 & PHY 106	University Physics I and University Physics II	6
PHY 105L & PHY 106L	University Physics Lab I and University Physics Lab II	2

## General Education Electives

Any eleven courses

## Major Requirements

### Foundation Course Requirements

Code	Title	Hours
CHM 118	Chemical Sciences Orientation	1
CHM 125 & CHM 215L or CHM 126	General Chemistry II and Organic Chemistry Lab II General Chemistry Honors II	3-4
CHM 204	Literature of Chemistry	1

CHM 210 & 210L	Organic Chemistry I and Organic Chemistry Lab I	4	SPE 205	Inclusive Classrooms w/ Field	3
CHM 215 & 215L	Organic Chemistry II and Organic Chemistry Lab II	4	SPE 320	Progress Monitoring w/ Field	3
CHM 300	Discussions in Chemistry	1	<b>Total Hours</b>		<b>36</b>
CHM 310 & 310L	Physical Chemistry I and Physical Chemistry Lab I	5			
CHM 315 & 315L	Physical Chemistry II and Physical Chemistry Lab II	5			
CHM 330 & 330L	Instrumental Analysis and Instrumental Analysis Lab	5			
CHM 340 & 340L	Biochemistry and Biochemistry Lab	5			
CHM 350 & 350L	Inorganic Chemistry and Inorganic Chemistry Lab	5			
CHM 360	Nanochemistry	3			
CHM 361 & 361L	Analytical Chemistry and Analytical Chemistry Laborator	4			
CHM 402	Seminar in Chemistry II	1			

## In-Depth Course Requirements

Code	Title	Hours
<b>Select one from the following:</b>		
CHM 400	Chemistry of the Earth	3
CHM 410	Biophysical Chemistry	3
CHM 420	Atmospheric Environmental Chem	3
CHM 430	Mechanisms in Organic Chem	3
CHM 435	Tech Applications of Chemistry	3
CHM 440	Organometallic Chemistry	3
CHM 460	Aqueous Environmental Chem	3
CHM 480	Inorganic Biochemistry	3
CHM 490	Spectroscopy	3

Enrollment in CHM 390 , is required each semester for junior and senior chemistry majors. In order to fulfill the requirements for an ACS certified degree, students must also take CHM 493 and CHM 494

## Chemistry/Secondary Education Secondary Education Double Major

Requirements for the B.A. in Chemistry In order to become certified to teach at the secondary education level (grades 7-12), students must complete a total of five Education and three Special Education courses, as well as student teaching. For further details, see the Teacher Education section of the catalog. Students interested in the dual major program should speak to their academic advisors and to Chair of the Department of Chemistry as early in their academic careers as possible.

Code	Title	Hours
EDU 150	Schools in Society w/ Field	3
EDU 157	Adolescent Development w/Field	3
EDU 246	Language and Culture w/ Field	3
EDU 247	Literacy in Cont Areas w/Field	3
EDU 418	Instr Techniq Science w/Field	3
EDU 491	Secondary Student Teaching	12
SPE 160	Intro to Special Education	3