Term Information

Effective Term	Autumn 2026

General Information

Course Bulletin Listing/Subject Area	Chemistry
Fiscal Unit/Academic Org	Chemistry - D0628
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	4200
Course Title	Physical Chemistry for Chemical Science I
Transcript Abbreviation	P-Chem Science 1
Course Description	This course covers quantum mechanics and spectroscopy, beginning with an overview of classical mechanics and the historical origins of quantum theory. Basic quantum mechanics problems including the particle in a box, rigid rotor, harmonic oscillator, and hydrogen atom will be discussed, leading to a description of chemical bonding and modern computational molecular orbital theory (Hartree-Fock)
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture, Recitation
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Chem 2210, 2510, 2610, 2910H, or equivalent and Physics 1201 or 1251; and Math 1152 or 1172
Exclusions	Not open to students with credit for Chem 4300 or Biochem 5721
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	40.0501
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- A qualitative understanding for how the postulates of quantum mechanics modify classical mechanics
- The ability to compute properties from quantum-mechanical wave functions
- General knowledge of molecular spectroscopy (vibrational, rotational, and NMR)
- An understanding of the origins and applications of molecular orbital theory for explaining chemical bonding.

Content Topic List

- Historical origins of quantum theory
- Postulates and fundamentals of quantum mechanics
- Particle in a box and elementary wave mechanics
- Model systems: Rigid rotor and harmonic oscillator
- Angular momentum and the hydrogen atom
- Approximation methods
- Many-electron atoms
- Chemical bonding
- Hartree-Fock theory
- Molecular spectroscopy
- Magnetic resonance

Sought Concurrence

No

Attachments

- CHEM 4200 accessible syllabus Jan 2026_final.pdf: Course Syllabus -Accessible

  (Syllabus. Owner: Ramirez,Ana G)
- Justification_final.pdf: Justification

  (Other Supporting Documentation. Owner: Ramirez,Ana G)
- Chem BA Sample Curriculum with Chem 4200 and 4210.pdf: Curriculum Map

  (Other Supporting Documentation. Owner: Ramirez,Ana G)
- CHEM BA learning goals_4200 4210.pdf: Learning Goad

  (Other Supporting Documentation. Owner: Ramirez,Ana G)

Comments

- missing major goals document *(by Jackman,Jane E on 01/20/2026 05:27 PM)*
- If this course will be able to count in the Chemistry major (even as an elective), please upload an updated curriculum map that includes the course and at what level it will fulfill which major goal(s)/learning outcome(s). *(by Vankeerbergen,Bernadette Chantal on 01/19/2026 03:13 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Ramirez,Ana G	01/16/2026 10:41 AM	Submitted for Approval
Approved	Jackman,Jane E	01/17/2026 09:15 AM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	01/19/2026 03:13 PM	College Approval
Submitted	Ramirez,Ana G	01/20/2026 04:57 PM	Submitted for Approval
Revision Requested	Jackman,Jane E	01/20/2026 05:27 PM	Unit Approval
Submitted	Ramirez,Ana G	01/21/2026 08:29 AM	Submitted for Approval
Approved	Jackman,Jane E	01/21/2026 08:32 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	02/02/2026 01:20 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Neff,Jennifer Vankeerbergen,Bernadette Chantal Wade,Macy Joy Steele,Rachel Lea	02/02/2026 01:20 PM	ASCCAO Approval

Justification for CHEM 4200/4210 Courses

Overview: CHEM 4200/4210 will constitute a two-semester Physical Chemistry course sequence for B.A. Chemistry majors. It will parallel the existing course CHEM 4300/4310 sequence for B.S. majors, with important differences in prerequisites and the level of the material, especially with regard to the mathematical content. For those reasons, a separate course sequence is needed, as detailed below.

History: Prior to semester conversion and the concurrent merger of the Chemistry and Biochemistry departments, the legacy Chemistry department maintained separate Physical Chemistry course sequences for B.A. and B.S. Chemistry majors. (These were CHEM 52x for the B.A. majors and CHEM 53x for the B.S. majors.) Beginning in 2012 when the two departments merged, the B.S. courses were essentially preserved (becoming CHEM 4300/4310) while the B.A. Chemistry majors were routed into the Physical Biochemistry course sequence, BIOCHEM 5721/5722. In hindsight, this was never an ideal fit. For example, Biochemistry majors are required to take calculus-based Physics (PHYS 1250/1251) whereas B.A. Chemistry majors are required only to take the algebra-based version (PHYS 1200/1201). This means that the BIOCHEM 572x course must be taught to the lower common prerequisite of algebra-based physics despite Biochemistry's requirement for its majors. Furthermore, since 2012 the number of B.A. Chemistry majors has grown somewhat and the number of Biochemistry majors has grown significantly, such that BIOCHEM 572x routinely has an enrollment of ~125. This is quite large for an upper-level course and precludes some of the activities (such as small-group exercises reading research papers from the literature) that are highly desirable in an upper-level course for majors. Presently, the number of B.A. Chemistry majors is ~50 per academic year, which is enough to justify a separate course that will reduce the size of BIOCHEM 572x by the same amount. Given current trends, we expect that enrollment in the new CHEM 42xx courses will be comparable to, or slightly larger than, enrollment in our existing CHEM 4310 course.

Structure: The new CHEM 42xx courses will consist of three hours of lecture (with a faculty member) and one hour of recitation (with a graduate teaching assistant) per week; this parallels the format of CHEM 43xx. For the latter, we have found that a recitation section is crucial given the very high homework demands of this course. Physical Chemistry represents the first time that majors use their calculus skills since completing their math requirements (typically in their second year), and many students struggle with learning to use mathematics in a physical science setting. The recitation also provides an opportunity for weekly quizzes and small group work, even if the lectures are taught in didactic format.

Distinction from CHEM 43xx: B.A. and B.S. Chemistry majors have different requirements for math and physics courses. The B.A. majors are required only to take algebra-based PHYS 1200/1201 whereas the B.S. majors must take calculus-based PHYS 1250/1251. Furthermore, the B.A. majors have a reduced mathematics requirement as only MATH 1151/1152 are required, or alternatively MATH 1151/1172. In either case, this omits a requirement of a third course in multivariable calculus that is required for B.S. Chemistry majors. The content of the Physical Chemistry courses will reflect the reduced math and physics prerequisites. The selected textbook

reflects this. We will use the Engel and Reid Physical Chemistry text for 42xx, which is specifically designed to reduce the calculus burden and for which the most recent edition is also available through Carmenbooks. In contrast, the CHEM 43xx courses have long used McQuarrie & Simon, a much more mathematically intensive textbook.

THE OHIO STATE UNIVERSITY

CHEMISTRY 4200 – Physical Chemistry for Chemical Science I
Spring 2026

Lecture: 3 x 55 min, time and location TBD

Recitation: 55 min, time and location TBD
3 credit hours

Prerequisites:

- CHEM 2210, 2510, 2610, 2910H or equivalent
- PHYS 1201 or 1251
- MATH 1152 or 1172
- Not open to students with credit for CHEM 4300 or BIOCHEM 5721

Course overview

Instructor

Course Instructor: Dr. XXX

Instructor credentials: Professor of Chemistry and Biochemistry

Email address: xxx@osu.edu

Phone number: xxx-xxx-xxxx

Office hours: TBD

Course description

This course will cover quantum mechanics and spectroscopy, beginning with an overview of classical mechanics and the historical origins of quantum theory. Basic quantum mechanics problems including the particle in a box, rigid rotor, harmonic oscillator, and hydrogen atom will be discussed, leading to a description of chemical bonding and modern computational molecular orbital theory (Hartree-Fock theory).

Course learning outcomes

By the end of this course, students should successfully be able to demonstrate:

- a qualitative understanding for how the postulates of quantum mechanics modify classical mechanics;
- the ability to compute properties from quantum-mechanical wave functions;
- general knowledge of molecular spectroscopy (vibrational, rotational, and NMR);
- an understanding of the origins and applications of molecular orbital theory for explaining chemical bonding

Course materials and technologies

Textbook

Required

- *Physical Chemistry*, 4th edition (2018), Thomas Engel and Philip Reid (Pearson).
- The eText is available through Carmenbooks ($39.99 per semester)

Course technology

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at https://it.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** https://it.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Carmen access

You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Grading and faculty response

How your grade is calculated

ASSIGNMENT CATEGORY	POINTS
Midterm exams (3)	20 each (each exam is 20% of total course grade)
Weekly problem sets (14); scores will be averaged and scaled to a total of 10 points	10 (10% of total course grade)
Recitation quizzes (10); lowest two quiz scores will be dropped. Scores will be averaged and scaled to a total of 10 points	10 (10% of total course grade)
Final Exam (1) Cumulative covering all course topics	20 (20% of total course grade)
Note: Although homework and quizzes make a relatively small contribution to the overall grade, they are important for keeping you on track in this course. *Don't neglect the problem sets, and study your notes in advance of the quizzes!*	
Total	**100**

See course schedule below for due dates.

Late assignments

Late submissions will not be accepted. Please refer to Carmen for due dates.

Grading scale

This course does not use the standard OSU grade scale to assign overall grades. According to the University rule 3335-8-24, students should expect to spend approximately six hours per week outside of class (including the one hour recitation) to earn the average grade of "C" in this course.

The following grade scheme is expected to apply to your work in this course. This grade scheme may be adjusted in the student's favor, depending on class performance.

P = total points earned (out of 100) according to the grade calculation described above.

A	$P \geq 95$	**C**	$70 > P \geq 65$
A–	$95 > P \geq 90$	**C–**	$65 > P \geq 60$
B+	$90 > P \geq 85$	**D+**	$60 > P \geq 55$
B	$85 > P \geq 80$	**D**	$50 > P \geq 50$
B–	$80 > P \geq 75$	**E**	$P < 50$
C+	$75 > P \geq 70$		

Instructor feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.
- **Email:** I will reply to emails within **24 hours on days when class is in session at the university**.

Absence and Closing Policies

Absences

Lecture attendance is strongly encouraged and tends to correlate with higher grades. However, attendance will not be tracked and there is no need to notify the instructor if you will be absent. Students will be encouraged to obtain lecture notes from peers in the case of an unplanned absence.

Recitation attendance is required to complete weekly quizzes and exams.

If you experience injury, illness, or other emergency situation that will impact your ability to attend recitation or an exam, please contact the course instructor directly as soon as possible (and no later than the scheduled exam start time) to make alternative arrangements for taking the exam after providing appropriate documentation.

Faith-related Absences

In accordance with Ohio State policy, you may be absent from this class for **up to three days** to observe sincerely held religious beliefs and practices, or to participate in organized activities conducted under the auspices of a religious or spiritual organization. To request a faith-related absence in this course, you must notify me in writing no later than **Monday, January 26**. Please refer to the Syllabus statement on Religious Accommodations linked below for more details.

Weather or other short-term closing

Following **Policy 6.15** (Weather or Other Short-Term Closing):

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via Carmen.

Course schedule

Please pay attention to Carmen for up-to-date information about due dates and topics that will be covered. **Changes to due dates sometimes occur, but these will always be announced both in class and on Carmen.** You are responsible for knowing about any date changes, and dates listed on Carmen are correct, in the case of any discrepancy.

Week	Dates	Topics, Readings, Assignments, Deadlines
1		**Historical origins of quantum theory** Reading: Ch. 1 Recitation: No Quiz Problem Set 1 due: Friday at the start of class
2		**Postulates and fundamentals of quantum mechanics** Reading: Chs. 2–3 Recitation: Quiz on **Historical origins of quantum theory** Problem Set 2 due: Friday at the start of class
3		**Particle in a box and elementary wave mechanics** Reading: Chs. 4–5 Recitation: Quiz on **Postulates and fundamentals of quantum mechanics** Problem Set 3 due: Friday at the start of class
4		**Rigid rotor & harmonic oscillator** Reading: Ch. 7 Recitation: Quiz on **Particle in a box and elementary wave mechanics** Problem Set 4 due: Friday at the start of class
5		**Vibrational & rotational spectroscopy** Reading: Ch. 8 Recitation: **Midterm I** *(covers weeks 1-4)* Problem Set 5 due: Friday at the start of class
6		**Angular momentum & hydrogen atom** Reading: Ch. 9 Recitation: Quiz on **Vibrational & rotational spectroscopy** Problem Set 6 due: Friday at the start of class
7		**Approximation methods** Reading: LibreTexts entry on Perturbation Theory

Week	Dates	Topics, Readings, Assignments, Deadlines
		Recitation: Quiz on **Angular momentum & hydrogen atom** Problem Set 7 due: Friday at the start of class
8		**Many-electron atoms** Reading: Ch. 10–11 Recitation: Quiz on **Approximation methods** Problem Set 8 due: Friday at the start of class
9		**Chemical bonding** Reading: Ch. 12 Recitation: **Midterm II** *(covers weeks 5-8)* Problem Set 9 due: Friday at the start of class
10		**Molecular orbital theory** Reading: Ch. 13 Recitation: Quiz on **Chemical bonding** Problem Set 10 due: Friday at the start of class
11		**Computational chemistry** Reading: Ch. 15 Recitation: Quiz on **Molecular orbital theory** Problem Set 11 due: Friday at the start of class
12		**Electronic spectroscopy** Reading: Ch. 14 Recitation: Quiz on **Computational chemistry** Problem Set 12 due: Friday at the start of class
13		**Photochemistry & x-ray crystallography** Reading: None Recitation: **Midterm III** *(covers weeks 9-12)* Problem Set 13 due: Friday at the start of class
14		**Magnetic resonance** Reading: Ch. 17 Recitation: Quiz on **Photochemistry & x-ray crystallography** Problem Set 14 due: Friday at the start of class
Finals week		**Final Exam (comprehensive):** will be scheduled according to university exam schedule

Recitation

Recitation is a small-group class designed to give you a space to review and practice what you've covered in lecture.

To earn points for your recitation assignments, you will complete weekly quizzes. Quizzes will be administered at the beginning of recitation, covering material from the prior week. (This includes the weeks following a midterm exam, because we will still have two lectures in those weeks.)

Quizzes will consist largely of short questions covering areas such as definitions, terminology and simple equations. Quizzes are primarily intended for students to keep pace with course material and to review notes prior to attending recitation where these topics will be discussed in more detail.

Quizzes will be timed (5-10 minutes, depending on the nature of each week's questions).

Quizzes are closed-book, closed note and closed internet. Only a calculator (standard non-internet enabled graphing calculator) will be allowed.

Weekly Problem Sets

Weekly problem sets will be distributed electronically on the CarmenCanvas website and should be turned in electronically through a CarmenCanvas dropbox. Please format your solutions as a single PDF document.

Problem sets will be assigned weekly on Monday morning (available at 7am on Carmen) and will be due on Friday by the start of lecture.

Problems will cover each week's assigned topic and will supplement lecture material with experience working through long form more detailed questions that will help prepare students for in-class exams.

These problems should be worked on your own without assistance from others and without the use of AI. (See AI policy at the end of this document.)

Anticipate that a weekly problem set will require 3–4 hours of effort on your part.

Exams

Midterm and Final exams will take place in person during designated class sessions as indicated on the course schedule. Exams will be delivered on paper and will consist of problems from each content area of similar length and format to those used on the weekly problem sets.

Course policies

This course adheres to the University policies related to Academic Misconduct, Artificial Intelligence, Religious Accommodations, Disability Accommodations, Intellectual Diversity, Grievances and Solving Problems, and Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct. For more information about any of these policies, please visit the Office of Undergraduate Education Standard Syllabus Statements webpage.

Counseling and Consultation Services / Mental Health Statement

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Other course policies

Academic integrity policy

Policies for this course

- **Quizzes and exams**: You must complete the midterm and final exams yourself, without any external help or communication.
- **Weekly Problem Set assignments**: Your written assignments should be your own original work.
- **Reusing past work**: In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it.

GENERATIVE ARTIFICIAL INTELLIGENCE Tools

Policy on the Use of AI: The OSU Committee on Academic Misconduct has provided the following policy on the use of AI in academic courses:

> *All students have important obligations under the Code of Student Conduct to complete all academic and scholarly activities with fairness and honesty. Our professional students also have the responsibility to uphold the professional and ethical standards found in their respective academic honor codes. Specifically, students are not to use "unauthorized assistance in the laboratory, on field work, in scholarship or on a course assignment" unless such assistance has been authorized specifically by the course instructor. In addition, students are not to submit their work without acknowledging any word-for-word use and/or paraphrasing" of writing, ideas or other work that is not your own. These requirements apply to all students — undergraduate, graduate, and professional.*
>
> *To maintain a culture of integrity and respect, these generative AI tools should not be used in the completion of course assignments unless an instructor for a given course specifically authorizes their use. Some instructors may approve of using generative AI tools in the academic setting for specific goals. However, these tools should be used only with the explicit and clear permission of each individual instructor, and then only in the ways allowed by the instructor.*

In accordance with this policy, the use of AI is not permitted in any material that you are to turn in for credit. This primarily pertains to weekly problem sets; you should be capable of working these problems on your own, start-to-finish, with only a calculator. Similar problems are likely to be found on the exams (which are more important to your grade) so unauthorized use of AI is likely to hurt your exam scores if you cannot work the problems unassisted.

Any use of GenAI tools for work in this class may therefore be considered a violation of Ohio State's Academic Integrity(opens in new window) policy and Code of Student Conduct(opens in new window) because the work is not your own. If I suspect that you have used GenAI on an assignment for this course, I will ask you to explain your process for completing the assignment in question. The unauthorized use of GenAI tools will result in referral to the Committee on Academic Misconduct(opens in new window).

Curriculum map for the **B.A. and B.S. degrees in Chemistry**

Program outcomes *(B=beginning, I=intermediate, A=advanced)*

1. Students solve state-of-the-art chemistry problems, working both individually and in groups, and these problems will exemplify current disciplinary and interdisciplinary principles as well as modern pedagogical practice.
2. Students develop effective skills in oral and written communication of scientific knowledge.
3. Students plan experimental procedures, carry out chemical procedures, use laboratory equipment, analyze data and prepare laboratory reports that reinforce current chemical practices.
4. Students follow safe practices in the laboratory and demonstrate scientifically ethical practices.
5. Students retrieve information from the chemical literature, and become proficient in online database searching.
6. Students use modern computer software for graphing, manipulation of symbolic mathematical expressions, and quantum chemical calculations.

	Chemistry Program Goals					
Course	**1**	**2**	**3**	**4**	**5**	**6**
Chemistry 1210	B	B	B	B	B	B
Chemistry 1220	B	B	B	B	B	B
Chemistry 1610	I	I	I	B	I	I
Chemistry 1620	I	I	I	B	I	I
Chemistry 1910H	I	I	I	B	I	I
Chemistry 1920H	I	I	I	B	I	I
Chemistry 2210	I	I	I	I	I	I
Chemistry 2210H	I	I	I	I	I	I
Chemistry 2510	I	I	I		I	I
Chemistry 2520	I	I	I		I	I
Chemistry 2540	I	I	I	I	I	I
Chemistry 2540H	A	A	A	A	A	A
Chemistry 2550	I	I	I	I	I	I
Chemistry 2550H	A	A	A	A	A	A
Chemistry 2610	I	I	I		I	I
Chemistry 2620	I	I	I		I	I
Chemistry 2910H	A	A	A		A	A
Chemistry 2920H	A	A	A		A	A
Chemistry 3510	A	A	A		A	A
Chemistry 4200	A	A	A		A	A
Chemistry 4210	A	A	A		A	A
Chemistry 4300	A	A	A		A	A
Chemistry 4310	A	A	A		A	A
Chemistry 4410	A	A	A	A	A	A
Chemistry 4550	A	A	A	A	A	A
Chemistry 4870	A	A	A		A	A
Chemistry 4880	A	A	A	A	A	A
Biochemistry 4511	A	A	A		A	
Chemistry 5000 and above	A	A	A	A	A	A

The Bachelor of Arts Degree in Chemistry (B.A.)

The BA curriculum is intended for students who want a background in Chemistry as a basis for future work in other areas of science, such as the life sciences, or in professional areas such as medicine, pharmacy or veterinary science.

- General Chemistry 1610–1620 and Organic Chemistry 2610–2620 are the recommended sequences for chemistry and biochemistry majors, although qualified students are urged to take Honors sequences instead.
- The major is completed with **9 hours of Advanced Science Electives**, which must include at least **3 hours** of upper-level chemistry or biochemistry coursework.

Examples of Advanced Science Electives:

- Chem 3510 (Inorganic-3)
- Chem or Biochem 4998/4999 (Research)
- Chem 5230 (Neurotransmitter-3)
- Chem 5420 (Organic Spectroscopy-1.5)
- Chem 5430 (Carbohydrates-3)
- Chem 5440 (Computational-3)
- Chem 5520 (Nanochemistry-3)
- Biochemistry 4511 (4)
- Microbiology 4000 (4)
- Molecular Genetics 4500 (3)
- Most 2000-4000 level courses in Math
- Other non-required graded Chem and Biochem 4000-6000 level courses
- Approved 4000-6000 level courses in Microbiology, Molecular Genetics, Physics, Food Science, and EEOB

- Undergraduate Research (Chem or Biochem 4998/4999) is recommended. A maximum of six (6) hours of research may be used to fulfill the requirements of the major.

Autumn Semester (Year 1)		Spring Semester (Year 1)	
General Chemistry 1 (1910H[a], 1610[a], 1210)	5	General Chemistry 2 (1920H[b], 1620[b], 1220)	5
PLTL in Gen Chem (1612)[a]	1	PLTL in Gen Chem (1622)[b]	1
Calculus 1 (Math 1151)	5	Calculus 2 (Math 1152)	5
GE Elective	3-4	GE Elective	3-4
Freshman Survey[a]	1	Launch Seminar	1
	15-16		15-16
Autumn Semester (Year 2)		**Spring Semester (Year 2)**	
Analytical Chemistry 1 (2210)	5	Organic Chemistry 2 (2920H[b], 2620[b], 2520)	4
Organic Chemistry 1 (2910H[a], 2610[a], 2510)	4	Organic Chemistry Laboratory 2 (2550)	2
Organic Chemistry Laboratory 1 (2540)	2	Physics 2 (1201 or 1251)	5
Physics 1 (1200 or 1250)	5	GE Elective	3-4
	16		14-15
Autumn Semester (Year 3)		**Spring Semester (Year 3)**	
Physical Chemistry for Chemical Science 1 (4200)[a]	3	Physical Chemistry for Chemical Science 2 (4210)[b]	3
Advanced Science Elective	3-4	Physical Chemistry Laboratory (4410)	3
GE Elective	3	GE Elective	3
GE Elective	3	GE Elective	3
GE Elective	3	GE Elective	4
	15-17		16
Autumn Semester (Year 4)		**Spring Semester (Year 4)**	
Advanced Science Elective	3	Advanced Science Elective	3
Elective	3	Elective	3
Elective	3	Elective	3
GE Elective	3-4	GE Elective	3-4
		Reflection Seminar	1
	12-13		13-14

[a]Only offered in autumn semester
[b]Only offered in spring semester