

# First-Year Chemistry Graduate Students Course Planning Handout

2024–2025 Academic Year

Individual Advising Appointments: August 2024

ChAMP and Materials Chemistry Area Advisor: Prof. Joseph Patterson

Chemical Biology Area Advisor: Prof. James Nowick

Inorganic Area Advisor: Prof. Michael T. Green

Organic Area Advisor: Prof. Scott Rychnovsky

Physical, Theoretical, Nuclear, Analytical & Atmospheric Area Advisor: Prof. Eric Potma

## Course Requirements of the Ph.D. Program

1. Complete seven four-unit courses that support your area of research (with approval from area advisor)
2. Complete Chem 200: Conduct of Research (does not count as one of the seven required courses)
3. Enroll in 12–16 units per quarter
4. Earn “B” or better in all courses (a “B-” is a failing grade per Graduate Division, but a single “B-” can be petitioned to count towards your degree)
5. Maintain a GPA above 3.1 to qualify for TAs
6. Serve (at least) four quarters as a teaching assistant  
or (at least) three quarters for ChAMP students

## Research Requirements of the Ph.D. Program

1. Attend faculty research talks during orientation
2. Complete four three-week research lab rotations during Fall 2024 and Winter 2025
3. Join a research lab before the end of Spring 2025
4. Complete an annual IDP and discuss it with your research advisor
5. Satisfactorily complete second-year examination
6. Satisfactorily complete advancement to candidacy examination (“orals”)
7. Satisfactorily complete and defend a doctoral thesis

## Other responsibilities for Chemistry graduate students:

1. Attend weekly research seminars. It is often prudent to attend seminars in complementary fields.
  - a. Organic Seminar (Wednesdays at 4 PM)
  - b. Physical Seminar (Tuesdays at 3:30 PM)
  - c. Inorganic Seminar (Thursdays at 3:30 PM)
2. Attend Departmental Colloquia, special lectureships (i.e., Taft Lecture, Lee Lecture, etc.), special symposia, and special seminars as appropriate.

## Course Selection Tools

- A list of Chemistry graduate courses offered in 2024–2025 is available on the Pre-Advising Course Schedule and at <https://www.chem.uci.edu/graduate/courses>
- For a complete list of all courses offered by Chemistry visit the current UCI General Catalogue at <http://catalogue.uci.edu/schoolofphysicalsciences/departmentofchemistry/#courseinventory>
- The UCI Web Schedule of Classes (WebSOC) allows you to find available classes, times, locations, enrollment, etc. <https://www.reg.uci.edu/perl/WebSoc>
- Course registration must go through the campus Registrar. Access WebREG at <https://www.reg.uci.edu/registrar/soc/webreg.html>

## Full-time Course Registration

### Fall 2024

- 3 main (4-unit) courses to support your research (12 units)
- Chem 200: Conduct of Research (2 units)
- Chem 290: Seminar (1 unit—mandatory)
  - Organic: 41790 with Griffin
  - Physical: 41791 with Sheldon
  - Inorganic: 41792 with Arguilla
- Chem 292: Graduate Symposium (41950; 2 units; *for organic-leaning students*)

### Winter 2025

- 3 main (4-unit) courses to support your research (12 units)
- Chem 290: Seminar (1 unit—mandatory)
- Chem 292: Graduate Symposium (2 units; *for organic-leaning students*)

### Spring 2025

- 1 main (4-unit) course to support your research (4 units)
- Chem 200: Conduct of Research (2 units)
- Chem 280: Graduate Research (1–6 units; *for your research group*)
- Chem 290: Seminar (1 unit—mandatory)
- Chem 291: Research Seminar (4 units; *for your research group—this is group meeting*)
- Chem 292: Graduate Symposium (2 units; *for organic-leaning students*)

### Fall 2025 and beyond

- Chem 280: Graduate Research (4–11 units; *for your research group*)
- Chem 290: Seminar (1 unit)
- Chem 291: Research Seminar (4 units; *for your research group*)
- Chem 292: Graduate Symposium (2 units; *for organic-leaning students*)

## Notes about selecting courses

- In addition to the graduate-level Chemistry courses, students working in interdisciplinary areas may choose to take approved graduate courses in other departments such as

Molecular Biology and Biochemistry, Pharmaceutical Sciences, Physics, Earth Systems Science, Chemical and Biomolecular Engineering, Materials Science and Engineering, etc.

- In special cases, an upper-division undergraduate chemistry course may be used as one of the seven required regular courses.
- If you end up with more than 16 units in a quarter, contact Bailey Spelman <bspelman@uci.edu> in Chemistry Student Affairs to ask for an exception. These requests are easily approved, and having more than 16 units is quite common, especially in the fall quarter of your first year.
- Please complete the attached Pre-Advising Course Schedule and have it ready for your virtual individual advising appointment for approval by your area advisor.
- You might have trouble choosing between two different course options. In that case, it is not inappropriate to sign up for both classes, start attending them, and then make a decision to drop one by the deadline (end of week 2). Or, you might find you like them both and you can handle the extra class, in which case that is one more out of the way!

## Sample Analytical Chemistry Coursework Plan for Year 1

### Fall 2024

- 2 Chem 200: Conduct of Research
- 4 Chem 213: Chemical Kinetics
- 4 Chem 231A: Fundamentals of Quantum Mechanics  
[likely one of the following 4-unit courses]
- 4 Chem 229A: Computational Methods
- 4 Chem 233: Nuclear and Radiochemistry
- 4 Chem 239: Machine Learning
- 4 Chem 252: Special Topics in Physical Chemistry
- 1 Chem 290: Seminar (Physical)

### Winter 2025

- 4 Chem 231B: Applications of Quantum Mechanics
- 4 Chem 243: Advanced Instrumental Analysis
- 4 Chem 263: Materials Chemistry
- 1 Chem 290: Seminar (Physical)

### Spring 2025

- 2 Chem 200: Conduct of Research  
[likely one of the two 4-unit courses listed below]
- 4 Chem 231C: Molecular Spectroscopy
- 4 Chem 232B: Advanced Topics in Statistical Mechanics
- 2 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar (Physical)

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Atmospheric Chemistry Coursework Plan for Year 1

### Fall 2024

2	Chem 200: Conduct of Research
4	Chem 213: Chemical Kinetics
4	Chem 231A: Fundamentals of Quantum Mechanics
4	Chem 245A: Gas-Phase Atmospheric Chemistry
1	Chem 290: Seminar (Physical)

### Winter 2025

4	Chem 232A: Thermodynamics and Introduction to Statistical Mechanics
4	Chem 243: Advanced Instrumental Analysis
[likely one of the two 4-unit courses listed below]	
4	Chem 231B: Applications of Quantum Mechanics
4	Chem 232A: Thermodynamics and Introduction to Statistical Mechanics
1	Chem 290: Seminar (Physical)

### Spring 2025

2	Chem 200: Conduct of Research
4	Chem 241: Air, Climate and Energy
4	Chem 280: Graduate Research (w/ your advisor)**
4	Chem 291: Research Seminar (w/ your advisor)
1	Chem 290: Seminar (Physical)

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Chemical Biology Coursework Plan for Year 1

### Fall 2024

- 2 Chem 200: Conduct of Research
- 4 Chem 201: Organic Reaction Mechanisms I\*
- 4 Chem 203: Organic Spectroscopy
- 4 Chem 223: Biomacromolecules
- 1 Chem 290: Seminar (Organic)
- 2 Chem 292: Graduate Symposium

### Winter 2025

- 4 Chem 204: Organic Synthesis I\*
- 4 Chem 219: Chemical and Structural Biology I\*
- [likely one of the two 4-unit courses listed below]
- 4 Chem 202: Organic Reaction Mechanisms II
- 4 Chem 225: Polymer Chemistry: Synthesis and Characterization of Polymers
- 1 Chem 290: Seminar (Organic)
- 2 Chem 292: Graduate Symposium

### Spring 2025

- 2 Chem 200: Conduct of Research
- 4 Chem 220: Chemical and Structural Biology II
- or possibly instead:
- 4 Chem 218: Metallobiochemistry
- 1 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar
- 2 Chem 292: Graduate Symposium

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*These are considered essential 4-unit classes for the chemical biology curriculum.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Inorganic Coursework Plan for Year 1

### Fall 2024

- 2 Chem 200: Conduct of Research
- 4 Chem 201: Organic Reaction Mechanisms I (or Chem 125 or 231A)
- 4 Chem 215: Inorganic Chemistry\*
- 4 Chem 216: Organometallic Chemistry\*
- 1 Chem 290: Seminar (Inorganic)

### Winter 2025

- 4 Chem 217: Physical Inorganic Chemistry\*
- 4 Chem 263: Materials Chemistry
- [likely one of the two 4-unit courses listed below]
- 4 Chem 225: Polymer Chemistry: Synthesis and Characterization of Polymers
- 4 Chem 243: Advanced Instrumental Analysis
- 1 Chem 290: Seminar (Inorganic)

### Spring 2025

- 2 Chem 200: Conduct of Research
- 4 Chem 218: Metallobiochemistry\*
- 2 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar (Inorganic)

Adding one more class to this plan of study, in consultation with your area advisor, will allow you to finish all seven required courses in your first year of study (talk to your area advisor about which one might be best). While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\* These are considered essential 4-unit classes for the inorganic curriculum.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Materials Chemistry (not ChAMP) Coursework Plan for Year 1

### Fall 2024

2	Chem 200: Conduct of Research
4	Chem 201: Organic Reaction Mechanism I (or Chem 231A: Quantum Mechanics)
4	Chem 213: Chemical Kinetics
4	Chem 216: Organometallic Chemistry (or Chem 248: Electrochemistry)
1	Chem 290: Seminar

### Winter 2025

4	Chem 204: Organic Synthesis I (or Chem 263: Materials Chemistry)
4	Chem 217: Physical Inorganic Chem (or Chem 232A: Thermo & Intro Stat Mech)
4	Chem 225: Polymer Chemistry
1	Chem 290: Seminar

### Spring 2025

2	Chem 200: Conduct of Research
4	Chem 205: Organic Synthesis II (or Chem 231C or Chem 232B)
2	Chem 280: Graduate Research (w/ your advisor)**
4	Chem 291: Research Seminar (w/ your advisor)
1	Chem 290: Seminar

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.



## Sample Materials Chemistry (ChAMP) Coursework Plan for Year 1

### Summer 2024 (*sign up in Fall 2024*)

- 4 Chem 206: Advanced Data Acquisition and Analysis
- 4 Chem 207: Chemistry for Physicists (optional)
- 4 Chem 208: Math Methods

### Fall 2024

- 2 Chem 200: Conduct of Research
- 4 Computation/Machine Learning Category (Chem 229A or Chem 239)
- 4 Quantum Mechanics Category (Chem 231A: Fundamentals of Quantum Mech)
- 4 Chem 233: Nuclear and Radiochemistry (or Chem 213)
- 1 Chem 290: Seminar

### Winter 2025

- 4 ChAMP Chemistry Category (Chem 231B, Chem 263, or Chem 225)
- 4 Statistical Mechanics/Thermo Category (Chem 232A: Thermo & Intro Stat Mech)
- 4 Classical Mechanics/Electromagnetism Category (Chem 228: Electromagnetism)
- 2 Communication Category (Chem 273: Technical Communication Skills)
- 1 Chem 290: Seminar

### Spring 2025

- 2 Chem 200: Conduct of Research
- 4 Electives (Chem 231B or Chem 232B, etc.)
- 1 Chem 266: Current Topics in Chemical, Applied, and Materials Physics (*typically offered every other year*)
- 1 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar

Note that the requirements for the ChAMP program are eleven 4-unit courses - which includes one course from each of six core categories and two core courses (each underlined) - and therefore, while the core category requirements can be completed in the first year of study, it is impossible to complete the higher total course-load demands in the first year of study. It is also common and/or expected that ChAMP students will take graduate courses from outside of the Chemistry Department. *Your area advisor will help you tailor your course plan.* Other options are indicated here: <https://champ.uci.edu/students/academic-plan/>.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Organic Coursework Plan for Year 1

### Fall 2024

- 2 Chem 200: Conduct of Research
  - 4 Chem 201: Organic Reaction Mechanisms I\*
  - 4 Chem 203: Organic Spectroscopy\*
  - 4 Chem 216: Organometallic Chemistry
  - 1 Chem 290: Seminar (Organic)
  - 2 Chem 292: Graduate Symposium
- (>16 units needs approval from Bailey Spelman, Graduate Affairs Coordinator)

### Winter 2025

- 4 Chem 202: Organic Reaction Mechanisms II\*
- 4 Chem 204: Organic Synthesis I\*
- 4 Chem 219: Chemical and Structural Biology (or Chem 225: Polymer Chemistry)
- 1 Chem 290: Seminar (Organic)
- 2 Chem 292: Graduate Symposium

### Spring 2025

- 2 Chem 200: Conduct of Research
- 4 Chem 205: Organic Synthesis II
- 4 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar (Organic)
- 2 Chem 292: Graduate Symposium

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*These are considered essential 4-unit classes for a traditional organic curriculum.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## Sample Physical Chemistry Coursework Plan for Year 1

### Fall 2024

- 2 Chem 200: Conduct of Research
- 4 Chem 213: Chemical Kinetics\*
- 4 Chem 231A: Fundamentals of Quantum Mechanics\*  
[likely one of the following 4-unit courses]
- 4 Chem 233: Nuclear and Radiochemistry
- 4 Chem 239: Machine Learning
- 4 Chem 252: Special Topics in Physical Chemistry
- 1 Chem 290: Seminar (Physical)

### Winter 2025

- 4 Chem 228: Electromagnetism
- 4 Chem 231B: Applications of Quantum Mechanics
- 4 Chem 232A: Thermodynamics and Introduction to Statistical Mechanics\*
- 1 Chem 290: Seminar (Physical)

### Spring 2025

- 2 Chem 200: Conduct of Research
- 4 Chem 231C: Molecular Spectroscopy
- 4 Chem 232B: Advanced Topics in Statistical Mechanics
- 2 Chem 280: Graduate Research (w/ your advisor)\*\*
- 4 Chem 291: Research Seminar (w/ your advisor)
- 1 Chem 290: Seminar (Physical)

This plan of study will allow you to finish all seven required courses in your first year of study. While it is possible to put one course off until your second year, it is generally not preferred, because you'll want to devote as much time as possible to research in preparation for your candidacy exam. Front-loading your schedule by taking more courses during Fall and Winter quarter will free up your schedule for more research time during Spring quarter of your first year.

\*These are considered essential 4-unit classes for the physical chemistry curriculum.

\*\*Use this course to adjust the total number of units to fall within the 12–16 credits range.

## First-Year Graduate Student Rotations in Chemistry

First-year graduate students are required to complete four three-week rotations in different research groups: three rotations during Fall Quarter and one rotation in early Winter Quarter. This year's rotations will take place according to the following schedule:

- Rotation 1: October 7 – October 25, 2024
- Rotation 2: October 28 – November 15, 2024
- Rotation 3: November 18 – December 13, 2024
- Rotation 4: January 6 – January 24, 2025

During Orientation, Chemistry faculty will be giving short (10–15 min) presentations on their research. Your attendance at these presentations is expected.

As beginning graduate students, you are expected to get to know many of the different research groups, advisors, and projects in the Department. Rotations in different laboratories are an important part of the process. Research groups will establish their own rotation procedures, which will generally include:

- Meeting with the PI to discuss research opportunities in the group. It is a good idea to do your homework before this meeting. Read some papers. Talk to students in the group about their projects. Think of some questions you might ask the PI.
- Most groups will be conducting in-person rotations, and you will likely be assigned a desk in the laboratory. In the event of a virtual rotation, an independent project or other mechanism for gaining experience with the lab and its culture may be pursued.
- Attend the weekly research group meetings (in person or via Zoom), as well as any subgroup meetings as appropriate.
- Be sure to ask the PI what their expectations are for a rotation student as there will be variations from one faculty member to the next.

Rotations are meant to facilitate your introduction to a few groups in the Chemistry Department and to get you started on a path to choosing a research group. *You are strongly encouraged—and frankly expected—to go beyond your four rotations to learn about the research groups and opportunities in the Department.*

Near the end of orientation, you will receive an email asking you to fill out a web-based form naming your top five choices for lab rotations. We will make every effort to assign your four rotations from these five choices. *You are able to choose a group in which you did not rotate; however, for that to have a good chance of working out, you will need to ensure that you've spent time with that group and interacted with the PI.*

## Typical Doctoral Study Timeline

### Year 1

#### *Fall 2024*

Coursework (2–3 four-unit courses), teaching (12–18 hours/week), and rotations. The first quarter of graduate school brings new opportunities and new challenges, but it is also the quarter that most resembles your career as an undergraduate.

#### *Winter 2025*

Coursework (2–3 four-unit courses), teaching (12–18 hours/week), rotations and a NEW LAB! The start of winter quarter will be more of the same but by mid-quarter you should be a member of a research group. Become part of the group. Get your feet wet in the lab. Learn where equipment is located and how it is operated. Get trained on instruments. Read everything you can find about the science going on in your new lab. Take on group jobs. Perform experiments.

#### *Spring 2025*

Coursework (1–3 four-unit courses), teaching (12–18 hours/week) and research. Start ramping up work productivity. Define your project and background sufficiently well so that you can accomplish lots in the summer when you are done with your classes.

#### *Summer 2025*

Research, research, research! It's time to get things done so you'll be ready for...

### Years 2–3, Pre-Candidacy

#### *Fall 2025–Winter 2026*

Research, and lots of it! First-year exams/reports will happen between late Summer 2025 and early Winter 2026. The form of the exam varies slightly depending on your field of study; however, the expectations are the same for everyone: show that you are on a path to become an effective scientist and researcher. It is likely that you will teach at least one more quarter in this period.

#### *Spring 2026–Fall 2027*

More research and Advancement to Candidacy Exams. This is where the rubber meets the road. Prove to a faculty committee that you have what it takes to pursue a PhD in chemistry. The Candidacy Exam (i.e., "Orals") is a comprehensive exam in chemistry. More details to follow.

### Years 3 and Beyond, Post-Candidacy

Research! At this point you should be a well-oiled machine in the lab. Churn out the papers! Take your project in new directions! Participate in and take the lead on extra-curricular projects in the Department and beyond. Figure out what you want to do with your life! Go to conferences, interview for jobs! Write and defend your thesis, graduate, and then conquer the world (but in a good way)!