

**Chemical Engineering** 

### 2024-2025

## CHEME PHD STUDENT HANDBOOK

This handbook should provide useful resources for your academic program in the Chemical Engineering department. This is a living document and is subject to change from year to year.



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## WELCOME MESSAGE



#### Prof. Scott Banta

**Department Chair** 

Dear Incoming Graduate Students,

#### Welcome to our Department!

This handbook will serve as a guide as you navigate your education and research experiences in the Chemical Engineering Department at Columbia University. Please read the handbook and refer to it regularly to make sure that you are aware of the policies, requirements, and expectations of you during your time in the department. This handbook is meant to complement the information that is available from Columbia Engineering and the Graduate School of Arts and Sciences (GSAS).

We hope that your time here in the department is enriching, enjoyable, and fulfilling. We look forward to working with you and helping you excel in your academic pursuits. If you need assistance or support while you are at Columbia, do not hesitate to reach out to me or other resources outlined in this handbook. Best of luck in your graduate studies!



## GENERAL INFORMATION

This handbook provides department-specific information about the MS/PhD program in Chemical Engineering. It is assumed that incoming students have obtained general information concerning housing, University-wide resources (e.g., library access, computer accounts, identification cards) from other sources during the orientation period for new graduate students. The administrative staff, faculty, and established graduate students within the Department will be happy to address these issues in more detail as needed. The following information is centered on the academic requirements and expectations of PhD students. But if you need any additional information, just ask!

Timely information is usually disseminated by email. Students are expected to establish their email accounts promptly and to monitor incoming mail. Each student is urged to visit the department reception area frequently and to observe posted announcements. Communication also happens in a departmental Slack workspace; students are invited to join the Slack during orientation. Students are generally assigned a desk in a central departmental area prior to joining a research group. After joining a research group, each group handles desk assignments internally. The Department is relatively small and some communication is informal. Students are encouraged to form good working relationships and to communicate with each other, staff, and faculty in a professional and courteous manner.

#### **Advising**

Advising is the responsibility of the graduate coordinator, who is also the chair of the Department's PhD Committee. The coordinator provides advice on courses for graduate students until they have been assigned to a research group. The graduate coordinator also provides general advice to all graduate students until they have joined a research group. Once assignment to a group is made, the research advisor assumes responsibility for the approval of courses. The current graduate coordinator is Prof. Allie Obermeyer (aco2134@columbia.edu)



A doctoral-track student is one who has been admitted to either the PhD program (if they already hold an MS degree) or to the MS/PhD program. All students that are supported by the department or research advisor receive equal payment with equal benefits. However, students holding fellowships may be compensated at a different rate. Student compensation and benefits are currently determined following guidance based on the most recent collective bargaining agreement (CBA).

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For a student to receive financial support, they must remain in **good academic standing** by fulfilling all doctoral-degree requirements in a timely manner according to the schedule outlined here and by demonstrating good progress toward the completion of his/her/their thesis (see <u>Student</u> <u>Evaluations</u>).

Financial support is available from the Department and from individual research advisors in return for satisfaction of obligations imposed by the funding source. First-year support for students enrolled in the MS/PhD program is provided by the department or fellowships.

Students doing research are generally supported with funds provided to their research advisors by research sponsors. These sponsors impose goals and expectations on faculty research directors. Research directors have a finite capacity to accept and guide students. While the Department solicits expressions of preference for particular research areas from students, and endeavors to satisfy these preferences, it is not always possible to match openings in particular research programs or with particular professors with student preferences. Thus, while each student who receives support and makes satisfactory progress will be supported on a project as near as possible to his or her preference, the department cannot guarantee assignment to a particular project or professor. The Department sponsors various events during the first semester to assist students in forming research preferences (see <u>Advisor Selection</u>).

To ensure that PhD studies are completed in a timely manner, students are not guaranteed financial support by the department or advisor for more than five years. A one-month exception will be included for scheduling of the thesis defense. Thus, full-time students must normally complete the doctoral degree not later than five years after entering Columbia.

Students may be responsible for paying the \$25 student activities fee each term.

POSITIONS **FA, RA, FELLOW** 

Students receive letters from the department every year with details on their appointment. Students will also get letters any semester there is a change in their appointment. There are a few main types of positions that PhD students may hold during their time at Columbia: teaching assistant (TA), graduate research assistant (GRA), and fellow. TAs and GRAs are classified as "on Appointment" and receive payments approximately twice a month in the Fall, Spring, and Summer, following the "semi-monthly other" schedule in the Columbia Morningside Payroll Calendar. The compensation for students "on Appointment" is slightly different from those "not on Appointment" as negotiated in the most recent CBA. Fellows are "not on Appointment" resulting in a different pay schedule and receive a stipend at the beginning of every semester (Fall, Spring, and Summer), typically no later than the second week of the semester. Students may additionally be appointed in other part time appointments (e.g. grader) that result in additional compensation (ad comp), which is typically paid by the end of the semester.

Additional information on current student benefits can be found <u>here</u>.



Credit: Ella Maru Studio for Columbia Engineering

## MS DEGREE **REQUIREMENTS**

#### **Course Requirements**

Students must complete the following **four core courses** in chemical engineering covering mathematics, thermodynamics, chemical kinetics, and transport phenomena worth a total of 12 points:

- 1. CHEN 4010 Mathematical Methods in Chemical Engineering
- 2.CHAP 4120 Statistical Mechanics & Computational Methods **OR** CHEN 4130 Adv. Chemical Engineering Thermodynamics
- 3. CHEN 4330 Advanced Chemical Kinetics OR CHEN 4235 Surface Reactions & Kinetics

4. CHEN 4110 Mechanisms of Transport Phenomena in Fluids **OR** CHEN 4112 Transport in Mixtures In addition, 18 points of 4000-level or above **elective courses** are required to earn the MS degree. A significant fraction of the elected courses must have a ChemE designation, with a maximum of 6 points outside of ChemE allowed. Up to 6 points of MS Research (CHEN 9400) may be used as part of the 18 point elective requirement.

While 30 course credits are required to earn the MS degree, to be a full time student to qualify for tuition remission and other student benefits you must register for exactly 12 credits a semester in each of the first three semesters (e.g. until you earn your MS degree). This means that you will have completed 36 credits upon fulfilling the requirements for the MS degree.

**Note:** As with all degrees at Columbia, one must apply for a degree to receive it. The degree is not automatically awarded once requirements are fulfilled. Students should apply for graduation through SSOL by the appropriate <u>deadline</u> for degree conferral. At this time, students may also change their registration status from "MS/PhD" to "PhD," as instructed by the departmental administrator or the research advisor.

#### **Scientist to Engineer Status**

A student who is admitted to the MS/PhD program without an undergraduate degree that is equivalent to an ABET accredited ChemE BS degree should consult with the graduate coordinator to discuss if additional coursework is recommended. For example, the department offers two courses that cover essentials from the entire undergraduate chemical engineering curriculum in an intensive, accelerated way in 6 credits. If taken, these 6 points of credit must be taken and passed in addition to the 30 points of graduate credit required for the MS itself.

## PHD DEGREE REQUIREMENTS

#### **Milestones**

**Y1** 

**Y2** 

**Y3** 

**Y4** 

**Y5** 

There are several milestones that must be completed in addition to course requirements. This includes a requirement to serve as a TA. Two major examinations, the <u>Qualifying Exam</u> and the <u>Research Proposal Exam</u>, are to be accomplished early in the student's residence. In the event that a student fails either of these examinations or the <u>Dissertation Defense</u>, they are not permitted to continue in the PhD program. The milestones are intended not only to examine students but also to monitor progress and to develop presentation skills. A timeline and further description of all requirements is given below:

#### **Timeline for Major PhD Requirements**

#### Class work, advisor matching, qualifying exam

- September: Take core courses, become familiar with research programs, serve as a TA
- October: Submit preferences for research groups, join a research group
- January: Continue research, continue course work, continue to serve as a TA
- May: Petition to take the Qualifying Exam
- Summer: continue research, start preparation for the Qualifying Exam

#### Research, MS Degree, Proposal Exam

- September: Take the <u>Qualifying Exam</u>, TA if you have not done so already
- Fall: Complete course requirements, continue research. Apply for MS degree. Upon receiving your MS you will transfer 30 credit hours for your PhD and receive 2 residence units.
- Spring: Register for doctoral research and residence unit
- May: Complete the Research Proposal Exam

#### Research, research, research

- Continue research
- Register for residence units and CHEN 9500 Doctoral Research and/or 6-15 credit hours of 4000+ level research / coursework

#### Research, Committee Meeting, MPhil Degree,

- Continue research
- Meet with your proposal committee to discuss your progress and plans toward graduation
- Earn your MPhil Degree

#### Wrap up research and graduate!

Defend <u>Dissertation</u> (should be completed by August)

All students are required to serve as a TA for a minimum of one semester, likely to be completed in Y1 or Y2

#### **Evaluations**

In addition to meeting the above milestones, all PhD-track students will receive a triannual <u>evaluation</u> from the faculty, guided by feedback from their research advisor(s). The letter will inform each student whether they are meeting the expectations of the program and suggest actions for improvement as needed.

#### **Course Requirements**

The following additional courses are required for the PhD degree:

- Chemical Engineering Colloquium (CHEN 9000, 0 points) is required in every semester.
- Four **residence units** beyond the MS degree must be accumulated. You must register for one residence unit each Fall and Spring semester for full-time enrollment. After you have completed 6 total residence units (2+4), register for an Extended Residence Unit.
- All full-time PhD students normally will register for a residence unit each semester until this requirement is fulfilled, unless instructed otherwise by their advisor. Registration for a <u>residence unit</u> allows (but does not require) the student to take up to 4 courses for up to 20 points per semester without additional charge.
- To find the course and call numbers for the residence units, use the <u>Columbia Course</u> <u>Directory</u> and search for "Richard Slusarczyk" in the instructor field
- You must complete an additional 30 points of courses beyond the MS (typically CHEN 9500 Doctoral Research with your advisor) to earn your MPhil.
- Some or all of the required courses can be CHEN 9500 Doctoral Research. The student, in consultation with their advisor, may take 4000+ level courses in support of their research.

#### **Teaching Assistant Duties**

All graduate students must satisfy the equivalent of at least one semester's experience in teaching (typically in Year 1 or Year 2). Most students will serve as a teaching assistant (TA) for two semesters, but may on occasion serve as a TA for additional semesters. The TA role may include supervising and assisting students in lecture or laboratory based courses to support the teaching mission of the department. It is essential that the TA maintains good academic standing and fulfills the following responsibilities.

#### Before the semester

- TAs should meet with the faculty mentor to review the course syllabus, expectations, grading policies, and specific duties within the course.
- TAs who conduct discussion sessions (e.g., for homework/exams or lecture discussion) should specify their office hours, including time and location, in the syllabus.

#### During the semester

- TAs should be reliable and punctual.
- TAs should be knowledgeable about the subject they teach, evaluate, or discuss. Therefore, they should regularly review the materials related to their class. If necessary, TAs should also attend faculty lecture sessions.
- TA should regularly meet with the faculty member to discuss relevant topics related to their class (e.g., going over solutions, discussing deadlines for entering assignment grades in the system).
- TAs may assist in preparing materials (e.g., homework and answer keys) and activities (e.g., projects) for their designated class or laboratory.
- TAs may grade assignments/exams and proctor exams.
- The TA should collaborate with the faculty to identify students' issues and recommend solutions.

The Center for Teaching and Learning provides additional <u>resources</u> for graduate student teaching assistants.



## PROPOSED COURSE SCHEDULE

#### **MS/PhD Students**

Year	Fall	Spring	Notes
1	12 credits of courses	6 credits of courses + 6 credits MS research	
2	6 credits of courses + 6 credits MS research	1 RU + 6 credits doctoral research	MS in Feb
3	1 RU + 6 credits doctoral research	1 RU + 6 credits doctoral research	
4	1 RU + 6 credits doctoral research	1 ERU + 6 credits doctoral research	MPhil in Feb
5	1 ERU + 6 credits doctoral research	1 ERU + 6 credits doctoral research	PhD

\* Students should also register for ChemE Colloquium (CHEN E9000) each Fall and Spring semester and for Full Time Engineering Research (RSRH E0001) each Summer semester.

#### **PhD Students**

Year	Fall	Spring	Notes
1	1 RU + 6 credits courses	1 RU + 3 credits courses	
2	1 RU + 6 credits doctoral research	1 RU + 6 credits doctoral research	
3	1 ERU + 6 credits doctoral research	1 ERU + 6 credits doctoral research	
4	1 ERU + 6 credits doctoral research	1 ERU + 6 credits doctoral research	MPhil in Oct
5	1 ERU + 6 credits doctoral research	1 ERU + 6 credits doctoral research	PhD

\* Students should also register for ChemE Colloquium (CHEN E9000) each Fall and Spring semester and for

Full Time Engineering Research (RSRH E0001) each Summer semester.

The requirements for the DES (Doctor of Engineering Science, also abbreviated as Eng.Sc.D.) are similar to those of the PhD (Doctor of Philosophy). The PhD is granted by GSAS (Graduate School of Arts and Sciences) and the DES by SEAS (School of Engineering and Applied Science). The requirements for the DES are described in the <u>SEAS bulletin</u>.

Most students choose to pursue the PhD. However, the DES may be appropriate for part-time students who are currently working for a company or elsewhere. Tuition is expected to be paid by the employer or other outside sources.

In addition to the course and dissertation requirements set by SEAS, DES students in the Department of Chemical Engineering are required to complete the same degree milestones as PhD students on the same timeline:

- 1. Qualifying Exam, start of 2nd year
- 2. Research Proposal Exam, end of 2nd year
- 3. 4th Year Talk, start of 4th year

Please contact the Department's graduate coordinator if you are interested in considering the DES program.



ES DEGREE EQUIREMENTS

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## ADVISOR SELECTION

#### **Selection Process**

Students are expected to secure a match with a PhD advisor during the first semester of graduate study. To learn about the research opportunities available in the department, students are required to attend the Faculty Research Presentations. During these short presentations, department faculty will introduce themselves and their research. Additionally, students are required to meet with at least **four** faculty members to discuss their research interests and available opportunities. Students should submit the <u>linked form</u> to the graduate coordinator to attest to meeting with four faculty members of their choosing. Near the end of October, students should submit their <u>top three choices</u> for PhD advisor ranked in the order of their preference. Every effort will be made to match students with their preferred advisors subject to the constraints of research funding.

In addition to these formal requirements (i.e., attending presentations, meeting with faculty, submitting preferences), students are strongly encouraged to engage informally with their favored research groups—for example, by meeting with current group members, visiting the lab / office, and participating in group activities such as weekly group meetings.

#### **Changing Advisors**

Changing PhD advisors after the advisor selection process is **strongly discouraged** as it can delay completion of the PhD and may jeopardize students' financial support in the event they do not match with a new advisor.

If a student seeks to change PhD advisors, they should contact the **graduate coordinator** for chemical engineering to discuss the reasons for the change. The coordinator will meet separately with the current PhD advisor to better understand the situation. If the student and their advisor agree to part ways, the advisor will provide financial support for **one term**\*, during which time the student must match with a new advisor or risk dismissal from the PhD program.

To match with a new advisor, the graduate coordinator will ask the student to identify potential advisors from among the faculty. The coordinator will contact the potential advisors and explain the situation, highlighting the mutual decision of the student and the current advisor in seeking the change. Typically, the potential advisor(s) will meet with the student to determine if there is a good fit. If there is a match, the student will transition to the new advisor. If the student does not match with a new advisor during the one semester transition period, the student is no longer in good standing and is subject to dismissal from the PhD program.

\* Fall, Spring, and Summer terms refer to September-December, January-April, and May-August, respectively.

## STUDENT EVALUATIONS

Students receive **evaluations of their academic progress** (coursework, research, and related activities) from the faculty, guided by feedback from their PhD advisor(s), three times a year following the end of each term (Fall, Spring, and Summer). These evaluations are inclusive of any pertinent PhD milestones during or near that term (e.g. Summer evaluations will include qualifying exam performance). These ratings are provided in addition to the grades students receive on SSOL and any direct feedback provided by research advisor(s). In assessing students' progress, the following ratings are possible:

- Satisfactory student meets or exceeds minimum expectations for progress towards the PhD.
- Warning student needs improvement to meet minimum expectations for progress towards the PhD.
- Probation student progress towards the PhD is unacceptable; progress toward the PhD is consistently and/or substantially below expectations.
- **Dismissal** student is terminated from the PhD program.

In selecting ratings, many relevant factors are considered, including, but not limited to, grades in coursework, performance on PhD milestones, research productivity, task completion, meeting participation, communication ability, and workplace attendance. Unsatisfactory ratings (Warning or Probation) are accompanied by a brief description of identified deficiencies and a corrective action plan. All students are encouraged to discuss their ratings with their PhD advisor(s) to better understand expectations, current strengths, and areas for development.

Students may be placed on academic probation if improvements are not made following a warning letter or when given a **rating of probation**. These probationary cases are reviewed by the graduate coordinator in consultation with the PhD advisor(s). Given evidence of poor academic progress, the student will be placed on **academic probation** and notified of the reasons for their probation. The student and advisor(s) will develop a plan of action to resolve identified deficiencies. Students on academic probation are given **one term**\* to improve; students who fail to improve may be subject to **dismissal** from the PhD program.

For students who exceed 5 years in the program, the PhD advisor(s), in coordination with the student, is required to provide detailed plans for completion of the thesis, the composition of the thesis committee, and a prospective defense date.

\* Fall, Spring, and Summer terms refer to September-December, January-April, and May-August, respectively.

## QUALIFYING EXAM

#### Summary

The purpose of this exam is to evaluate whether a PhD student is prepared to pursue doctoral research in Chemical Engineering. To pass the qualifying exam a student should: (i) formulate a research problem, including motivation, objectives, and methods, (ii) attempt to obtain preliminary results, (iii) demonstrate understanding of the results and the significance of this research in the context of its field, (iv) clearly communicate the above in written and oral forms, and (v) demonstrate mastery of Chemical Engineering fundamentals and how the student's research relates to these fundamentals.

#### Eligibility

Students take the Qualifying Exam at the beginning of their 2nd year of graduate study. Students must maintain a GPA of 3.2 or higher during their first year of study to be eligible for the Exam. Ineligible students may petition the graduate committee to request an exemption with the support of their PhD advisor. All students must petition the graduate committee to take the qualifying exam. Petitions are due by May 31 prior to the Exam using the linked form.

#### **Timing of the Exam**

The Oral Presentation takes place on the **first Friday of the Fall Semester**. Students should submit the Written Report **one week** before the Oral Presentation using this <u>form</u>. In rare circumstances students may enter the program late or experience unexpected delays, in which case the Qualifying Exam can be delayed by three months to the following December; those students should contact the graduate coordinator no later than the end of their second semester to schedule their exam.

#### **Exam Committee**

The exam committee is composed of **three or more faculty members from the chemE department** in addition to the student's PhD research advisor. The final outcome of the exam is discussed and approved by the entire chemical engineering faculty.

#### **Content of the Exam**

- A 10-page Written Report should summarize relevant literature and describe preliminary results and analysis. Additional guidance is provided below.
- A 15-minute **Oral Presentation** should clearly communicate the content of the report including the research objectives, relevant prior work, and preliminary results.
- A 20-minute **Question & Answer Period** should demonstrate the student's mastery of Chemical Engineering fundamentals and an understanding of the preliminary results.

## QUALIFYING Exam



#### **Outcome of the Exam**

- **Pass.** Students who pass the Qualifying Exam are considered to be in good academic standing and should continue their progress toward the PhD. Students who pass may be requested to address deficiencies in their exam performance identified by the exam committee.
- Fail. Students who fail the Qualifying Exam are not permitted to continue on the doctoral track and must exit the program. Exiting students are supported during the Fall term as they complete their MS degree (if applicable), wrap up their MS research, and plan for the next stage of their career.

#### **Evaluation Process**

In deciding the outcome of the exam, the exam committee considers student performance in the following areas:

- **Exam Performance.** The written report, the oral presentation, and the question & answer period are each evaluated by three or more members of the exam committee.
- Research Performance. The committee also solicits feedback from the PhD advisor to assess the student's research performance during the first year of study. Advisors consider factors such as research productivity, meeting participation, workplace attendance, task completion, and communication ability in making their assessments.

Following the completion of all Qualifying Exams, committee members meet, discuss, and decide the final outcome for each student. Significant deficiencies in either of the above areas are grounds for failing the exam. Students who fail the exam will receive written feedback on their exam and research performance summarizing the deficiencies identified by the exam committee.

### Advisor Involvement in the Qualifying Exam

- Advisors **are allowed** to listen to the Oral Presentation but are **not allowed** to ask or answer questions.
- Advisors **are allowed** to provide general comments on the overall contents and research directions of the Written Report but **should not** re-write the report for students.
- Advisors **should not** participate in the practice talks; students should be able to independently prepare a 15-minute presentation based on the Written Report.
- To ensure fairness to students from different research groups, Advisors should not help 1st year students in group seminars during **four weeks** prior to the Qualifying Exam.

#### Rationale

The spirit of the Qualifying Exam report is a journal paper, describing the student's research project in the group they joined 10 months previously (typically), including any results that may have been obtained, even if preliminary. Students must submit a 10-page written report (excluding cover page and bibliography). No specific format is enforced, but a journal paper format is recommended, including, typically, Introduction, Results, Methods, and Discussion sections. A 15-minute oral presentation will communicate the contents and significance of the report, and in a 20-minute question & answer period the student should demonstrate mastery of the report material and of fundamental principles of Chemical Engineering. The qualifying exam is designed to spur the student to transition from the relatively passive role of classroom student to active researcher and knowledge creator.

#### Written report

Students must submit a written report of no more than 10 pages, excluding cover page, bibliography, and any appendices. The report should **motivate and describe the student's research project in the research group that they joined, and describe any research accomplished so far**, presented in a style similar to that of a journal article. The cover page and bibliography are required, while Introduction, Results, Methods and Discussion sections are recommended. Typical reports include several figures (with captions) that might show experimental setups, or present results, explain mechanisms, etc. Tables may be included. Credit must be meticulously given to all information sources, and contributions to your work from others, if any, acknowledged. A report will typically include:

- **Cover page (required).** Must include title, author, research group affiliation and an *Abstract of no more than 250 words* summarizing the research objectives, accomplishments and significance documented in the report.
- **Introduction.** Introduce the research field, describe previous research in the field, identify key unanswered questions in the field. Introduce the objectives of the research that will be described in this report, explain its importance to the field and describe which of the key unanswered questions it addresses.
- Methods (or Materials and Methods). Describe experimental and/or mathematical modeling methods, and the materials used if relevant.
- **Results.** Present your results if you have obtained any, including preliminary findings.
- **Discussion.** Discuss the conclusions you draw from your results, and their significance to the research field. You might mention next logical steps in your research program.
- **Bibliography (required).** Your report will include many references. It ends with the bibliography, not included in the 10-page count.
- Appendix: Use of Generative AI. If generative AI was used in the preparation of your report you must include an appendix that contains a list of the tools used and an honest description of how they were used (e.g. to edit for grammatical correctness, to paraphrase text you wrote, etc.). This appendix does not count toward the page limit.

#### **Oral Presentation**

In addition to the written report, students will give a 15 minute oral presentation. The presentation should clearly communicate the contents of your report, including the research objectives, motivation for the research, relevant prior work in the field, your preliminary findings and their significance. The presentation should be comprehensible to faculty who are not experts in this field; for example, define field-specific terminology and concepts.

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#### **Question & Answer Period**

Following the oral presentation, students will field questions from the faculty for 20 minutes. Faculty will ask questions about the material in your written report and oral presentation, and about its relation to Chemical Engineering fundamentals. In your answers, you need to demonstrate knowledge of your research field and a clear understanding of your research results and their significance. You must also demonstrate a mastery of Chemical Engineering principles and an understanding of how your research objectives and results relate to these principles. You are advised to review material in your Chemical Engineering graduate core courses and to consider how your research relates to this material.

#### Comments on the use of generative AI

The qualifying exam report and presentation should be a reflection of your work and creativity. While generative AI tools have potential utility in aiding with your preparation for the qualifying exam, you are ultimately responsible for the work you submit and for accurately citing all sources of information that are used. Generative AI tools should be used with caution and their use should be clearly documented.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material. For example, text generated using ChatGPT-3 should include a citation such as : "Chat-GPT-3. (YYYY, Month DD of query). "Text of your query." Generated using OpenAI.



ADDITIONAL GUIDELINES QUALIFYING EXAN

## RESEARCH PROPOSAL EXAM

#### **Summary**

The goal of the Proposal Exam is to create a clear plan for the student's PhD research supported by thorough knowledge of the relevant literature and by preliminary results. The exam should be completed by the end of May of the student's second year, at which time they should have a clear perspective of their PhD research trajectory. A **15-page Written Proposal** on a topic chosen by the student in consultation with their PhD advisor should be modeled on a NSF or NIH style research proposal. The exam consists of a 20 minute oral presentation to a committee composed of the student's advisor plus two additional faculty members. Following the presentation, the committee will ask questions to assess the student's knowledge of their research and the relevant literature and offer constructive feedback on the proposed research plan. The outcome of the exam is pass or fail.

#### Eligibility

Only students who have successfully completed the Qualifying Exam can take the Proposal Exam.

#### **Timing of the Exam**

The Proposal Exam must be completed during the Spring semester of Year 2 and no later than May 31 of that year. Students should submit the Written Proposal to their exam committee no later than one week before the Proposal Presentation. For students who had delayed completion of the Qualifying Exam, the deadline for completing the Proposal exam is delayed three months to August 31.

#### **Exam Committee**

The exam committee is composed of **three faculty members** from the Department including the student's PhD research advisor. In consultation with their advisor, the student may choose to invite one or two external examiners with expertise relevant to the proposed research. Students are responsible for contacting potential exam committee members and asking them to serve on their committee. Once a committee has been assembled students are responsible for scheduling the exam, reserving a room for the exam, and completing this <u>form</u> such that the required <u>GSAS form</u> can be signed and submitted at the end of the exam.

#### **Comments on the use of generative AI**

As with the qualifying exam, the report and presentation should be a reflection of your work and creativity. While generative AI tools have potential utility in aiding with your preparation, you are ultimately responsible for the work you submit and for accurately citing all sources of information that are used. Generative AI tools should be used with caution and their use should be clearly documented.

## RESEARCH PROPOSAL EXAM

#### **Content of the Exam**

- A **15-page Written Proposal** should present a clear plan of the proposed research and its potential significance to the broader field of study. The format of the proposal may follow NSF or NIH proposal guidelines; however, the student should consult their advisor for detailed advice about the format. The 15-page limit includes figures but excludes the references cited. The proposal should address the following questions (the so-called <u>Heilmeier Catechism</u>):
  - What are you trying to do? Articulate your objectives using no jargon.
  - How is it done today, and what are the limits of current practice?
  - What is new in your approach and why do you think it will be successful?
  - Who cares? If you are successful, what difference will it make?
  - How long will it take? What are the mid-term and final "exams" to check for success?
- A 20 minute Oral Presentation should clearly communicate the content of the written proposal including the research objectives, relevant prior work, and preliminary results.
- A 20 minute Question & Answer Period should demonstrate the student's thorough knowledge of the literature relevant to the proposed research.

#### **Outcome of the Exam**

- **Pass.** Students who pass the Research Proposal Exam are considered to be in good academic standing and should continue their progress toward the PhD. Students who pass may be requested to address deficiencies in their exam performance identified by the exam committee.
- Fail. Students who fail the Research Proposal Exam are not permitted to continue on the doctoral track and must exit the program. Exiting students are supported for one additional term as they wrap up their research and plan for the next stage of their career.

Regardless of the outcome, this <u>GSAS form</u> must be completed and returned to the Student Affairs Coordinator (Greg Chingas) upon completion of the proposal exam.



## 4TH YEAR TALKS

#### **Departmental Research Seminar**

All fourth-year graduate students are required to present a departmental seminar. All graduate students are required to attend. The event is held as a professional conference, typically sometime in September or October. A program is published on the web and posted. Speakers are asked to prepare an abstract, which is distributed. Talks are approximately 15 uninterrupted minutes with 5 minutes for questions.



Simunovic Lab

Boyce Lab

Gang Lab

## YOUR DISSERTATION

#### Distribution, Defense, and Depositing your Dissertation

The requirements for the PhD Dissertation are specified by the Graduate School of Arts and Science (GSAS). The following guidance is adapted from their website; please see the <u>website</u> for the most up-to-date information.

All of the steps below can take place at any time during the year. However, if you are aiming to receive your degree at a specific degree conferral (October, February, or May), you must follow a set of **Dissertation Dates and Deadlines** for that conferral. Please note also that these steps are intended to be a general guideline for the distribution, defense, and deposit, but it is your responsibility to review the more detailed policies, such as those on **copyrighted material and "fair use"**, found on the **Dissertation Office** page.

- Get in touch with your department or program's office. Your program's student affairs coordinator (Greg Chingas, gjc2147@columbia.edu) should be your first stop when preparing to distribute and defend. They are knowledgeable about GSAS policies, and can advise you on any program requirements that go beyond GSAS rules.
- Discuss with your sponsor (advisor) to determine your five-person examining committee. Guidelines for the nomination and appointment of the defense committee are available <u>here</u>. Briefly, three members of the committee must be "inside examiners" and should hold an appointment in the Chemical Engineering department. At least one member of the committee should be an "outside examiner" and not have an affiliation with the ChemE department. Any questions about committee composition should be directed either to your chair, DGS, DAAF, or to the Dissertation Office. Please note that GSAS policy states that students should not be put in the position of approaching faculty members about serving on their committee. This is the responsibility of the sponsor and/or department.
- Only departmental or program administrators may submit the five names of your proposed committee to GSAS for approval. The <u>Application for Dissertation Defense form</u> is signed by your department or program's chair or director of graduate studies, and is submitted by your program's office to the GSAS Dissertation Office. This form must be submitted a minimum of 2 weeks in advance of your scheduled defense date.
- Your department or program schedules the defense.
- Distribute final copies of your dissertation to your five examiners after your committee is approved. You must be registered for the semester in which your distribution takes place. This is your final semester of registration, even if your defense and deposit take place in a subsequent semester. Click <u>here</u> for more detailed information about final registration requirements. International students with questions about their registration and remaining in visa compliance should contact the <u>International Students and Scholars Office (ISSO)</u>. Full-time doctoral students who are supported on faculty grants through twelve-month research appointments in the sciences and related fields should pay particular attention to the special conditions that are noted on the <u>Registration and Application for PhD Defense page</u>.

## YOUR DISSERTATION

#### (continued)

- **Defend your dissertation.** GSAS expects that the defense will take place <u>within two months</u> <u>after distribution</u>. Please remember that during the actual examination, there should be no one present other than the five examiners and the doctoral candidate.
- **Complete any required revisions.** Students who receive a vote of "approved pending revisions" are given a maximum of six months to complete these revisions and deposit their dissertation. For more detailed information, please consult <u>this page</u>.
- Obtain approval to deposit your dissertation, and determine if any part of your dissertation includes co-authored material. Approval to deposit is done using the Blue Card, given to you upon passing your defense. After your revisions are approved, the card must be signed by your sponsor, as well as your department chair or program director. These signatures allow you to deposit your dissertation. Please note that under copyright law, you automatically hold a copyright on your work. This is why we have you include a copyright page in your dissertation. Copyright registration provides important practical and legal benefits beyond those you already enjoy as the creator of an original work. Columbia's Copyright Advisory Office provides extensive information about copyright issues; of particular interest is this page, which explains your rights as the author of a dissertation or of any other original work. If you are the sole author of your dissertation, you may proceed with single-author copyright registration through ProQuest/UMI. This service costs \$75, and can be paid via credit card directly to ProQuest through the upload system. If your dissertation includes coauthored text or materials, you must register directly with the US Copyright Office via a Standard Application.
- **Deposit your dissertation with GSAS.** This is the final step to earning your PhD degree. Complete information regarding the deposit is available through the <u>Deposit Gateway</u>. You should also review the <u>FAQs</u> about the electronic deposit system.
- Register to Participate in Graduation Ceremonies. The <u>University Commencement</u> ceremonies, held in May, recognize graduates from the October, February, and May degree conferrals. We look forward to celebrating your accomplishment with you, but please note that you are not required to attend the graduation ceremonies to receive your degree.

For questions about the deposit process, please contact the Dissertations Office at <u>gsas-dissertations@columbia.edu</u>.











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## PHD COMMITTEE MEMBERS

#### **Allie Obermeyer**

#### Associate Professor of Chemical Engineering

Allie has been on the PhD committee since 2017 and has served as the head of the committee since 2024. You can reach her at aco2134@columbia.edu.

#### Ben O'Shaughnessy

#### **Professor of Chemical Engineering**

Ben is currently the longest serving member of the PhD committee. You can reach him at bo8@columbia.edu

#### **Oleg Gang**

#### **Professor of Chemical Engineering**

Oleg has served on the PhD committee since starting at Columbia in 2016. You can reach him at og226@columbia.edu

#### Juliana Carneiro

#### Assistant Professor of Chemical Engineering

Juliana has been a member of the PhD committee since starting at Columbia in 2023. You can reach her at js6441@columbia.edu.

#### **Mijo Simunovic**

#### Assistant Professor of Chemical Engineering

Mijo joined the PhD committee in 2024. You can reach them at ms6051@columbia.edu.

## MEET THE CHEME STAFF







#### Kathy Marte-Garcia

**Director of Finance and Administration** 

Kathy oversees the department finance and administration operations and can help with essentially all of the areas described below. She can help answer questions about ad comp, admissions, hiring, account balances, OPT, and general wellness. You can reach her at kmm2270@columbia.edu.

#### **Gregory Chingas**

Student & Academic Affairs Specialist

Greg works to help students navigate their academic programs at Columbia. You can ask Greg questions about advising, account balances, registration, disability services, enrollment status, student life (and wellness), as well as CPT and OPT. In addition, Greg can help answer questions about ABET requirements, admissions, communications (8th floor TVs, website) and announcements, departmental e-mail listservs, and reserving rooms. You can reach him at gjc2147@columbia.edu

#### **Raina Ranaghan**

**Assistant Director of Career Placement** 

Raina is here to help as you think about your career beyond Columbia. She can provide advising, help with placement, and can connect you with resources in Professional Development & Leadership provided via Columbia Engineering. You can reach her at rmr2185@columbia.edu









#### **Esthefany Pena**

HR & Events Manager

Esthefany manages human resources and events within the department. She can help answer questions about department wide events, hiring, onboarding, and seminar agendas. You can reach her at ep3086@columbia.edu.

#### **Serxhio Hysa**

Grants & Operations Manager

Serxhio works across several functions in the department, including finance & operations as well as budgets & grants. Serxhio can help students with questions regarding communication via the website and 8th floor TVs, e-mail listservs, journal vouchers, lab access and equipment inventories, and poster printing. You can reach him at sh4234@columbia.edu.

#### Sarah Khanfar

**Financial Assistant** 

Sarah handles a range of largely financial activities. If you need assistance, Sarah can help with Concur, reimbursements, orders on Quartzy, packages, booking travel, as well as booking rooms and food deliveries on campus. You can reach her at sk5414@columbia.edu.

#### **Adriana Gibbons**

**Budget & Finance Manager** 

Adriana largely works on managing faculty proposals and grants. She can answer questions that you may have regarding nearly anything related to proposal applicants or awarded (and subawarded) grants. You can reach her at ar3271@columbia.edu.

See the most recent staff organization sheet for the most up to date information on the appropriate staff member to contact about various questions or requests.

There are also a few useful e-mail addresses that can be used for questions: ordercheme@gmail.com (goes to Sarah, Serxhio, and Kathy) chemehr@columbia.edu (goes to Esthefany and Kathy) cheme@columbia.edu (goes to all staff)

## LINKS TO FORMS

<u>Research Interests Form</u> - submit around the end of October

PhD Advisor Selection Form - submit around the end of October

Petition to take the Qualifying Exam - submit by May 31 of your first year

Submit your Qualifying Exam Report - submit one week prior to the Qualifying Exam

<u>Submit your Proposal Exam Information</u> - submit prior to your proposal exam, and no later than May 31 of your second year

<u>GSAS Form for the Proposal Exam</u> - This is the official GSAS form that needs to be filed upon completion of your proposal exam.

Submit your 4th Year Talk Abstract - submit 1 month before the departmental research symposium

## CAMPUS RESOURCES

#### Office Of The Registrar

210 Kent Hall, MC 9202 1140 Amsterdam Avenue Email: <u>registrar@columbia.edu</u>

#### Student Service Center

210 Kent Hall Phone: 212-854-4400 Email: <u>ssc@columbia.edu</u>

#### **ID center**

210 Kent Hall Phone: 212-854-4400 Email: <u>idcard@columbia.edu</u>

#### **Engineering Wellness**

Mudd 530 Phone: 212-854-6438 Email: <u>seas-wellness@columbia.edu</u> https://wellness.engineering.columbia.edu/

#### Engineering Student Affairs (ESA)

510 Mudd Phone: 212-854-6438 Email: <u>seas-life@columbia.edu</u> https://www.engineering.columbia.edu/student-life/graduatestudent-life Admissions Phone: 212-854-4688 Email: <u>seasgradmit@columbia.edu</u>

#### Columbia Health - Medical Services

Schedule a Clinical Appointment secure.health.columbia.edu (same day only) Phone: 212-854-7426 Urgent or Immediate Assistance Phone: 212-854-7426 (for nurse consultation 24/7)

#### Columbia Health - Counseling and Psychological Services

Alfred Lerner Hall, 5th and 8th Floors 2920 Broadway Phone: 212-854-2878 (available 24/7)

#### **Columbia Residential**

Phone: 212-854-9300 Email: <u>residential@columbia.edu</u>

#### Columbia University Information Technology (CUIT)

CUIT Walk-in Center 202 Philosophy Hall CUIT Helpline: 212-854-1919 Email: <u>askcuit@columbia.edu</u>

Mount Sinai Morningside: Emergency Room 443 W 113th St (at Amsterdam Ave) Phone: 212-523-3336

Columbia International Students & Scholars Office (ISSO) 524 Riverside Drive, International House North, 1st Floor Phone: 212-854-3587 Email: isso@columbia.edu

#### Information on Leaves of Absence

https://www.gsas.columbia.edu/content/leaves-absence



## IMPORTANT DATES

#### For students entering the PhD program in Fall 2024 / Spring 2025

October 31, 2024	Submit Advisor Selection & Research Interests Forms
May 31, 2025	Submit Petition to take the Qualifying Exam
August 5, 2025	Last day for advisor help with Qualifying Exam
August 29, 2025	Submit Qualifying Exam Report
September 5, 2025	Take Qualifying Exam
May 31, 2026	Complete Research Proposal Exam
Fall 2028	Present 4th Year Talk
2029-2030	Defend Dissertation!



## IMPORTANT DATES

#### For students entering the PhD program in Fall 2025 / Spring 2026

October 31, 2025	Submit Advisor Selection & Research Interests Forms
May 31, 2026	Submit Petition to take the Qualifying Exam
August 11, 2026	Last day for advisor help with Qualifying Exam
September 4, 2026	Submit Qualifying Exam Report
September 11, 2026	Take Qualifying Exam
May 31, 2027	Complete Research Proposal Exam
Fall 2029	Present 4th Year Talk
2030-2031	Defend Dissertation!



## LET'S WORK

cheme.columbia.edu Department of Chemical Engineering 500 W. 120th St. New York, NY 10027