CHEMICAL ENGINEERING, PHD

Department Chair

Shikha Nangia
329F Link Hall
315-443-1931; fax: 315-443-9175

Faculty

Christian Aponte-Rivera, Jesse Q. Bond, Michael Blatchley, Katie D. Cadwell, Ruth Chen, Julie M. Hasenwinkel, James H. Henderson, Era Jain, Andrea Joseph, Zhen Ma, Shikha Nangia, Ashok Sangani, Cindy Smith, Pranav Soman, Radhakrishna Sureshkumar, Theodore Walker, Yaoying Wu, Pun To Yung, Jialiu Zeng, Yi Zheng

Adjunct/Research Faculty

Eric Finkelstein, Kent Ogden, David Quinn, Katherine Tsokas, Dacheng Ren

Affiliate Faculty

Samuel Herberg, Juntao Luo, Liviu Movileanu, Davoud Mozhdehi, Alison Patteson, Rachel Steinhardt

Emeritus Faculty

Gustav Engbretson, John Heydweiller, George Martin, Philip Rice, Robert L. Smith, Lawrence L. Tavlarides

Graduate Chemical Engineering Program Director

Zhen Ma
303G Bowne Hall
315-443-4057, zma112@syr.edu

The Department of Biomedical and Chemical Engineering offers a comprehensive set of graduate programs in bioengineering and chemical engineering, including Master's of Science (MS) degrees and Doctor of Philosophy (PhD) degrees. Graduates of these programs work in the medical profession, the biomechanics and bioinstrumentation industries, the pharmaceutical industry, the chemical engineering industry, the government, and in education.

The graduate program in chemical engineering features a core of courses in chemical engineering, elective courses in areas of student interest, and an intense research or independent study experience with the student's faculty advisor. Elective courses may be concentrated in a large number of special areas, including bioengineering, environmental engineering, computer science, materials science, and manufacturing engineering. New initiatives are underway in the multidisciplinary area of environmental systems that should provide a wealth of opportunities to graduate students in chemical engineering.

Current Research Areas

- Bioengineering and Chemical Engineering
- Biomaterials & Tissue Engineering
- Complex Fluids, Soft Matter & Rheology
- Catalysis & Reaction Engineering
- Corrosion and Electrochemistry
- Drug Delivery
- Molecular Biotechnology
- Multiscale Modeling and Simulation
- Nanotechnology
- Sustainable Energy Production
- Systems Biology & Metabolic Engineering

Student Learning Outcomes

1. Define research objectives and acquire the necessary skills to achieve these objectives
2. Choose and use appropriate research methods to achieve the defined objectives
3. Use appropriate methods to analyze research data and interpret the findings
4. Effectively communicate the work to its intended audiences
5. Critically analyze his or her own research work and existing scholarship in the field

Ph.D. in Chemical Engineering

The Doctor of Philosophy (PhD) in Chemical Engineering is designed for students interested in research and teaching. The program of study consists of coursework, a qualifying examination, and preparation and defense of the dissertation. A student entering the PhD program with a MS degree may apply up to 30 credits toward the required coursework, with the approval of the program director.

Residence Time

A student must be enrolled for at least three academic years of full-time graduate-level study beyond the baccalaureate degree.

General Requirements

Minimum GPA

All graduate students must achieve the following minimum grade point averages (GPA):

- 3.000 GPA for all credits counted toward the completion of coursework requirements; and
- 2.800 GPA cumulative for all credits earned at Syracuse University.

Maximum Credits of 500-Level Coursework

Graduate students in the PhD program may not count more than 14 credits of 500-level coursework toward the completion of their PhD program of study.

Maximum Credits of Research-Based Study

Graduate students in the PhD program may count up to 6 credits of research-based study toward the completion of their PhD program of study from any combination of:

- CEN 999 - Dissertation under supervision of their dissertation advisor;
- CEN 690 Independent Study not supervised by their dissertation advisor;
- CEN 991 Introduction to MS Research and CEN 997 Masters Thesis transferred from the MS program.

Program Requirements

Chemical Engineering Graduate Core

All graduate students in Chemical Engineering are required to complete a set of 4 core courses:

Code	Title	Credits
CEN 651	Molecular and Statistical Thermodynamics	3
CEN 671	Chemical Engineering Methods I	3
CEN 786	Kinetics	3
CEN 741	Transport Phenomena I	3
or CEN 643	Fluid Dynamics	

Coursework Requirements (42 Credits)

In addition to the 12 credit Chemical Engineering Graduate Core, all PhD students must complete:

- At least 12 additional credits of coursework in chemical engineering (CEN); and
- 18 credits of approved electives

Exit Requirements

Qualifying Examination

All PhD students must successfully complete a Qualifying Examination in order to be entered into doctoral candidacy.

The Qualifying Examination has two components; a written outline of the student's research and an oral presentation before the examination committee.

Timing

Students are expected outline and present their research to a faculty examination committee by the end of their third semester of study.

Organization of Outline

The written outline will consist of two parts; a concise summary of the student's research since entering the program (the **Research Update**), and a description of future plans for the duration of PhD study based on the current research topic (the **Research Plan**).

The **Research Update** should include sections for Introduction, Methods, Results, Discussion, and Conclusion. The **Research plan** should include sections for Significance, Rationale, Proposed Research, and Potential Pitfalls.

The document should be from the student's own writing but students are encouraged to consult with their advisor on how to best summarize research results and design future studies.

Document Length

The outline should be no more than ten pages, all included, plus a cover page.

Examination Committee

The examination committee will consist of the dissertation advisor and at least three tenured or tenure-track faculty members. All faculty are invited to participate.

Dissertation

The Oral Dissertation Defense and submission of the dissertation document to the Syracuse University Graduate School are the final requirements of the PhD program.

Defense paperwork must comply with Graduate School policy, including formatting.

Link to the Graduate School's guidelines (https://graduateschool.syr.edu/current-students/graduation/?redirect)

Preparation

It is recommended that the student meet with their defense committee to review dissertation progress at least three to six months in advance of the defense.

Deadlines

The official Request for Examination form must be signed and submitted to the Graduate School at least **three full weeks** prior to the oral defense date.

A copy of the dissertation document must be delivered to all members of the defense committee at least **two full weeks** prior to the oral defense date.

Defense Committee

The dissertation defense committee will consist of six members, including

- the research advisor;
- four tenured or tenure-track faculty members from the department; and
- the Chair of the Oral Examination Committee.

The Chair of the Oral Examination Committee must be a Syracuse University tenured or tenure-track faculty member from outside the department and program.

The student may substitute one committee member based on subject-matter expertise who is external to Syracuse University. Additional external committee members may be allowed by petition.