2020 Virtual MS Open House

Department of Chemical Engineering
Columbia University
Open House Agenda

- 8:00 am Welcome remarks, Prof. Jingguang Chen, chair
- 8:05 am Intro to department and program overview, Prof. Kumar and Moment
- 8:45 am Research, Prof. Esposito
- 9:00 am Career Placement, Raina Ranaghan
- 9:20 am Housing and International Student Affairs, Kathleen Vital-Herne, CU Admissions
- 9:35 am Break-out Chatrooms

Type questions you have into the Zoom chat (reply to everyone or privately to Alex Urban)
COLUMBIA ENGINEERING FOR HUMANITY
A Decade of Growth in Chemical Engineering

2009

Banta, Leonard, Ju, O’Shaughnessy, West, Park, Kumar, Koberstein, Durning, McNeil
MS Committee – Direction and Oversight

Alex Urban
Scott Banta Chair
Robert Bozic
Daniel Esposito
Aaron Moment
Our Staff

Emely Aquino
Administrative Assistant

Rezarta Binaj
Business Manager

Kathy Marte-Garcia
Director of Finance and Administration

Ariel Sanchez
IT Manager

Raina Ranaghan
Career Placement Officer
Our Students

- **Chemical Engineering Students**
  - ≈ 75 PhD students (growing)
  - ≈ 120 undergraduate students
  - ≈ 100 M.S. students
  - ≈ 20 postdoctoral & staff associates

- **Interactions with M.S. and undergrads**
  - **Research:** MS students who do research often work closely with Ph.D. students or postdocs.
  - **Shared events:** ChEGO brunch and happy hour, Gaden lecture, professional development activities
  - **Classes/Teaching:** MS and Ph.D. students take the same classes; Ph.D.s serve as TAs for courses and hold office hours.

Recent Chemical Engineering M.S. graduating class

Marshall Scholarship recipient Amar Bhardwaj (class of 2020)
“... take laboratory or conceptual ideas and turn them into value added products. From computer chips to innovations in recycling, treating disease, cleaning water, and generating energy, the processes and products that chemical engineers have helped create touch every aspect of our lives.”

“Grand Challenges\(^1\)” related to ChemE:
- Making solar energy economical
- Provide energy from fusion
- Provide access to clean water
- Develop carbon sequestration methods
- Restore and improve urban infrastructure
- Engineer better medicines
- Manage the nitrogen cycle

\(^1\) US National Academy of Engineering Poll: http://www.engineeringchallenges.org
# Standard Timeline – 30 credits

<table>
<thead>
<tr>
<th>Fall Sep- Dec</th>
<th>Spring Jan- May</th>
<th>Summer Jun- Aug</th>
<th>Fall Sep- Dec</th>
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<tr>
<td>Core MS Course</td>
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<td>Time for Summer Internships</td>
<td>Elective</td>
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<td>Time for Research</td>
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### Core Classes:
- Kinetics
- Math Methods
- Advanced Thermo. or Statistical Mechanics
- Transport Phenomena
# Standard Timeline – 30 credits

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## Core Classes:
- Kinetics
- Math Methods
- Advanced Thermo. or Statistical Mechanics
- Transport Phenomena
## Scientist to Engineer Timeline – 30 credits + Essentials

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<th>Spring</th>
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| CHEN E4001 Essentials A  
CHEN E4002 Essentials B  
MS Colloquium  
Elective  
Elective | Core MS Course  
Core MS Course  
Elective  
Elective | Time for Summer Internships  
Time for Research | Core MS Course  
Core MS Course  
Elective  
Elective |

**Core Classes:**
- Kinetics
- Math Methods
- Advanced Thermo. or Statistical Mechanics
- Transport Phenomena
- One Design Elective
Scientist to Engineer Essentials of Chem Eng A and B

Essential chemical engineering principles

**CHEN E4001x Essentials of Chem Eng – A**
1. Introduction to Chemical Engineering
2. Chemical Engineering Control
3. Transport Phenomena I
4. Transport Phenomena II

**CHEN E4002x Essentials of Chem Eng – B**
1. Thermodynamics I
2. Thermodynamics II
3. Reaction Kinetics & Reactor Design
4. Chemical & Biochemical Separations

A graduate-level course with substantial design
MS Colloquia

Program Welcome!
Life as a Graduate Student
Pursuing a PhD

Guest Speakers from Academia and Industry

Networking

Internships, Resumes and Corporate Recruiting

Your Academic Seminar

American Institute of Chemical Engineers
Young Professionals

Contemporary topics in Chemical Engineering
Electives

- **Broad selection in areas such as**
  - Soft Matter and Polymer Science
  - Electrochemical Energy
  - Biotechnology and Biopharmaceuticals
  - Computation and Data Science

- **More details**
  - Up to two electives outside of Chemical Engineering
  - Fieldwork and internships may count as elective credit
  - Concentrations are collections of four focused electives
  - Research counts as elective credit
Concentrations

Three current areas:
- Computation and Data Science
- Climate Solutions
- Biotechnology and Biopharmaceuticals

Elective choices are available here:
https://cheme.columbia.edu/master-science-program-0
Advising of MS students is currently the responsibility of the Masters Committee. Each incoming MS student will be assigned an advisor who will meet with you and approve courses.

Chemical Engineering Graduate Student Handbook: [http://cheme.columbia.edu/masters-program-2](http://cheme.columbia.edu/masters-program-2)

Registration for classes is done through student services online: [https://ssol.columbia.edu/](https://ssol.columbia.edu/)

Graduate student course registration dates are dictated by the CU Registrar Office and posted at the Columbia Academic Calendar site. [http://registrar.columbia.edu/event/academic-calendar](http://registrar.columbia.edu/event/academic-calendar)
Questions?

Please type them into Zoom Chat!
Electives
Numerical Methods in Chemical Eng.
Chem. Eng. Data Analysis
AI in Chem. Eng.
Statistical Mechanics
Computational Fluid Dynamics
Atomistic Simulations
Research
Electives
Eng. Appl. In Electrochemistry
Solar Fuels
Electrochemical Energy Storage Sys.
Carbon Utilization and Conversion
Atmospheric Aerosols
Energy Sources and Conversion
Intro. to Atmospheric Science
Managing and Adapting to Climate Change
NMR in Bio, Soft, Energy Materials
Atmospheric Radiation
Concentration in Biotechnology and Biopharmaceuticals

Electives
Tissue and Mol. Eng. Lab (inst. perm.)
Principles of System Pharm. (inst. perm.)
Pharm. Eng.
Biopharm. Process Lab
Summer Intensive Lab in Biotech. (inst. perm.)
Research
Bioseparations
Biochemical Eng.
Principles of Genomic Tech.
Protein Eng.
Biostatistics for Eng.
Research Opportunities for MS Students

Prof. Esposito
Why Get Involved In Research During your MS studies?*

- **Research Strongly Complements Coursework**
  - Apply core concepts to open-ended problems.
  - Gain hands-on laboratory experience & skills while working with state-of-the art instruments and facilities.

- **Gain Exposure to Cutting Edge Science & Engineering**
  - Carry out in-depth study on an emerging technology.
  - Get a sense for life as a PhD student or research scientist.

- **Connect with Faculty and PhD Students**
  - Opportunity to interact more closely with faculty.
  - Expand your professional network.

*About 1/3rd of MS students have participated in research in recent years.*
### Research themes*

**Energy & Environment**

<table>
<thead>
<tr>
<th>Chen</th>
<th>Catalysis</th>
<th>Marbella</th>
<th>NMR characterization</th>
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</thead>
<tbody>
<tr>
<td>Esposito</td>
<td>Solar fuels</td>
<td>Steingart</td>
<td>Electrochemical systems</td>
</tr>
<tr>
<td>Park</td>
<td>Carbon capture</td>
<td>Urban</td>
<td>Materials discovery</td>
</tr>
<tr>
<td>McNeill</td>
<td>Air quality</td>
<td>West</td>
<td>Multiscale modeling</td>
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<tr>
<td>Venkat</td>
<td>Artificial intelligence</td>
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**Biotechnology**

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<th>Banta</th>
<th>Protein engineering</th>
<th>Kumar</th>
<th>Polymer composites</th>
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</thead>
<tbody>
<tr>
<td>Ju</td>
<td>DNA sequencing</td>
<td>Durning</td>
<td>Membrane transport</td>
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<tr>
<td>Obermeyer</td>
<td>Protein biopolymers</td>
<td>Gang</td>
<td>Nanoparticle assemblies</td>
</tr>
<tr>
<td>O'Shaughnessy</td>
<td>Cell biophysics</td>
<td>Bishop</td>
<td>Colloidal robotics</td>
</tr>
<tr>
<td>Simunovic</td>
<td>Synthetic embryology</td>
<td>Boyce</td>
<td>Granular flows</td>
</tr>
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**Soft Materials**

*See the MS open house website for links to websites, posters, and videos:*

[https://cheme.columbia.edu/virtual-open-house-prospective-ms-students](https://cheme.columbia.edu/virtual-open-house-prospective-ms-students)

Imagine a world where the power of data and atmospheric chemistry can help protect human health.
Collaborative research

- **Columbia Electrochemical Energy Center (CEEC)**
  - Batteries, fuel cells, and electrolyzers
  - Multiscale approach from electrons to devices to systems
Shared facilities*

- **Soft Matter Lab**
  - Shared space and equipment for Kumar, Gang, Bishop and others

- **CEEC shared lab space (10th floor of Mudd)**

- **Renovated Labs in Mudd**

- **Northwest Corner Building**

- **Lasker Building**

- **Columbia Nano Initiative (CNI)**
  - Clean Room; characterization laboratory; electron microscopy

*See photos and description of instruments here: [http://cni.columbia.edu/shared-labs](http://cni.columbia.edu/shared-labs)
How does an MS Student get Involved with Research?

- **Process for Joining a Lab**
  - Read about faculty research labs.
  - Reach out to faculty with your resume and express interest in doing research in their lab.
  - Begin doing research for credit (CHEN E9400) in your 2\textsuperscript{nd} semester. Up to 6 credits count towards 18 point elective requirement for the MS program.

- **Summer Research**
  - Great opportunity to do a “deep dive” into a research project and better get to know NYC.
  - Funding support available (Societe scholarship, Dean’s office fund matched by faculty)
  - LifeSci NYC Intern program: R&D in bioengineering / biotech.
Career Placement

Raina Ranaghan
Career Placement Officer

Phone: 212-854-9158
Email: rmr2185@columbia.edu

Phone or virtual appointments:
https://calendly.com/eeecheme/apt
*Extended hours available upon request*
Office Hours: Monday - Friday

https://cheme.columbia.edu/careers
Career Placement Officer (CPO)
Function, Duties and Responsibilities

Primary Responsibility:
• Career Placement of MS ChemE Students in Full-Time, and/or Internships

Career Counseling:
• Resume and Cover Letter Reviews
• Mock Interviews and Salary Negotiations
• Networking, Social Media and Job Search
• Job and Internship Postings

Partnerships:
• Industry Employers and Alumni
• Faculty, Staff, SEAS Administration
• Center for Career Education: https://www.careereducation.columbia.edu/
• Professional Associations, Industry Groups and Student Clubs

Career Development & Recruitment Events:
• Professional Development and Leadership Program
• Employer Info Sessions
• Industry Career Panels
Bureau of Labor Statistics: Chemical Engineers Work Environments

- Chemical engineers generally work in offices or laboratory settings, although sometimes they must work in an industrial setting to oversee production.
- They may spend time at industrial plants, refineries, and other locations, where they monitor or direct operations or solve onsite problems.

https://www.bls.gov/ooh/architecture-and-engineering/mobile/chemical-engineers.htm
Join Our Chemical Engineering LinkedIn Group

This is a private unlisted group for ChemE students, faculty and alumni.

Our LinkedIn group is focused on connecting alumni, current students, and faculty, hearing about your accomplishments, and organizing future events.

By connecting with us, we can share opportunities!
Examples of Industries and Sectors

- Medicine, Government, Aviation and Aerospace
- Pharmaceutical, Packaging & Containers
- Oil & Gas, Defense & Space, Automotive
- Design & Manufacturing, R&D
- Energy & Utilities, Environmental
- Education, Finance, Bioprocess
- Tech, Consulting, Research
- Materials Science, Law
The results of AIChe’s biennial salary survey are in, revealing positive advances for the chemical engineering profession. The median annual salary of respondents to the 2019 survey is $126,000 — a 1.6% increase over the 2017 median of $124,000.
AICHE: ▲ Figure 1. The median salary for chemical engineers increased slightly in 2019.
No road is long, when dreams are big, and the sky is the limit...

Jessie Kotini
Housing and International Student Scholars Office (ISSO)

Kathleen Vital-Herne
Assistant Director of Graduate Admissions at Columbia
How do I apply for University Housing?

University Housing Portal

What are the requirements for University Housing?

What happens if I do not get University Housing?

Tips from Department
How do I apply for University Housing?

- Within two weeks of your acceptance, you will receive an email from Graduate Student Affairs to your personal email account.
- That email will ask you to create an account on the housing portal. This email will contain your PID, UNI, and a link to the housing application, via My Housing Portal.
- On the housing portal, you will be able to apply for housing, review your application, request a transfer.
- If you do not receive the email in two weeks, contact seas_gsa@columbia.edu and cc department administrator, Kathy Marte-Garcia (kmm2270@columbia.edu)
Applying for University Housing

https://uah.facilities.columbia.edu/

Welcome to My Housing Portal.

Please use the tabs above to navigate.

Housing Application – Apply for housing, review your application, make changes, check the status of your housing application, or cancel your application.

Housing Assignment – Accept an offer, make initial housing payments, choose your move-in date, and make an appointment to sign the rental agreement.

Tenant Profile – Update your personal information, and request a change in your affiliation.

Housing Transfer – Request to transfer.

Sublets – Submit a sublet application.

Moving out – Submit a vacancy form.

Contact Us.
What happens if you do not get University Housing?

- University has a Columbia Off-Campus Housing Assistance that assists students in finding housing.
- The office also supports students with sublet questions, finding roommates and other important housing questions.
- [https://ocha.facilities.columbia.edu/](https://ocha.facilities.columbia.edu/)
- Great resources. Call, email to schedule an appointment.
Housing

Other Options:

- Join facebook group today : https://www.facebook.com/groups/Grad.SEAS.Housing/
- Use the following websites:
  - Streeteasy.com
  - Zillow.com
  - Realtor.com
  - Naked apartments.com
  - Nybits.com
  - Padmapper.com
Tips from the Department:

- Decide whether you want to live alone or roommates. Roommates = pay less
- Think of the neighborhood you want to live in. West side / East side. MTA is reliable, but cross town will take longer to get to campus
- New York has amazing things to offer. Search for places near subways
- Take virtual apartment tours if option is available.
- Reach out to me if you are having difficulties and beware of scammers.
How do I apply for an I-20?

How long does it take for me to receive my visa?

What if I don’t receive my visa in time?

Tips from the ISSO office
How do I apply for an I-20?

- Accept your offer of admission (link located in admission letter)
- CUID/PID and UNI will be generated within 5-7 business days and emailed
- Prepare your documents early
How long does it take to receive my visa?

*Processing time is approximately 3 weeks*

- A copy of admission letter/email, the identification page of your passport, Financial Certification Form (Refer to the Estimated Expenses for your program), Evidence of Financial Support (Refer to the Funding Documents Checklist), COE

  - Processing Fee: $103 fee

- Log in to Compass to apply for your I-20/DS-2019
  - PID or with a UNI; Your PID is the 9-digit number beginning with “C” you receive from your admissions office (e.g. C123456789). If you don’t have a PID, contact your admissions office.
Tips for international students:

- Apply for I-20 as soon as possible
- Monitor the status of your U.S. Consulate
- Keep open communication with department and graduate admissions office

https://isso.columbia.edu/content/isso-covid-19-newly-admitted
Contact information:

ISSO Morningside Heights Office
newintlstudent@columbia.edu

Chemical Engineering Department:
Kathy Marte-Garcia, kmm2270@columbia.edu

Graduate Admissions
seasgradmit@columbia.edu

Graduate Student Affairs:
seas_gsa@columbia.edu