

# *2021 Virtual MS Open House*

*Department of Chemical Engineering  
Columbia University*

*Friday April 16<sup>th</sup> , 2021*

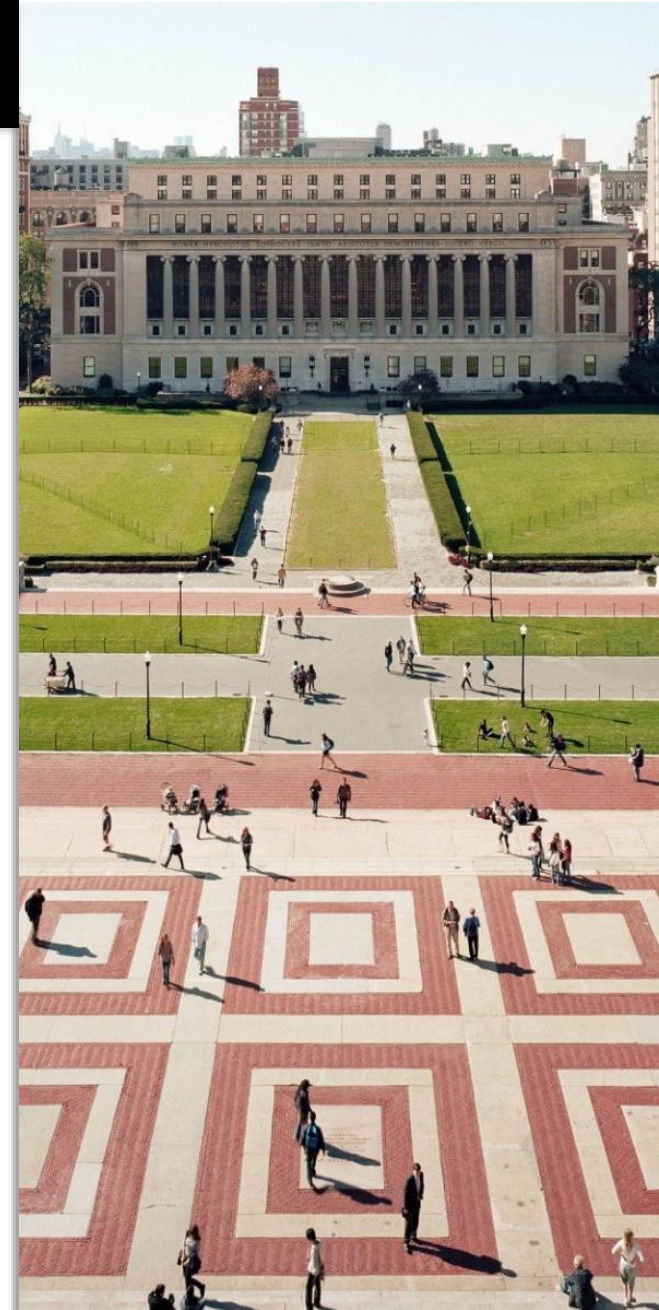


*TRANSCENDING DISCIPLINES, TRANSFORMING LIVES*

# Open House Agenda

- *Welcome remarks, Prof. Jingguang Chen, chair*
- *Intro to department and program overview, Prof. Banta and Moment*
- *Research, Prof. Esposito*
- *Career Placement, Raina Ranaghan*
- *Housing and International Student Affairs, Assistant Dean Yannick Brookes, Perry D'Amelio*
- *Break-out Chatrooms*

Type questions you have into the **Zoom chat**  
(reply to everyone or privately to Alex Urban)

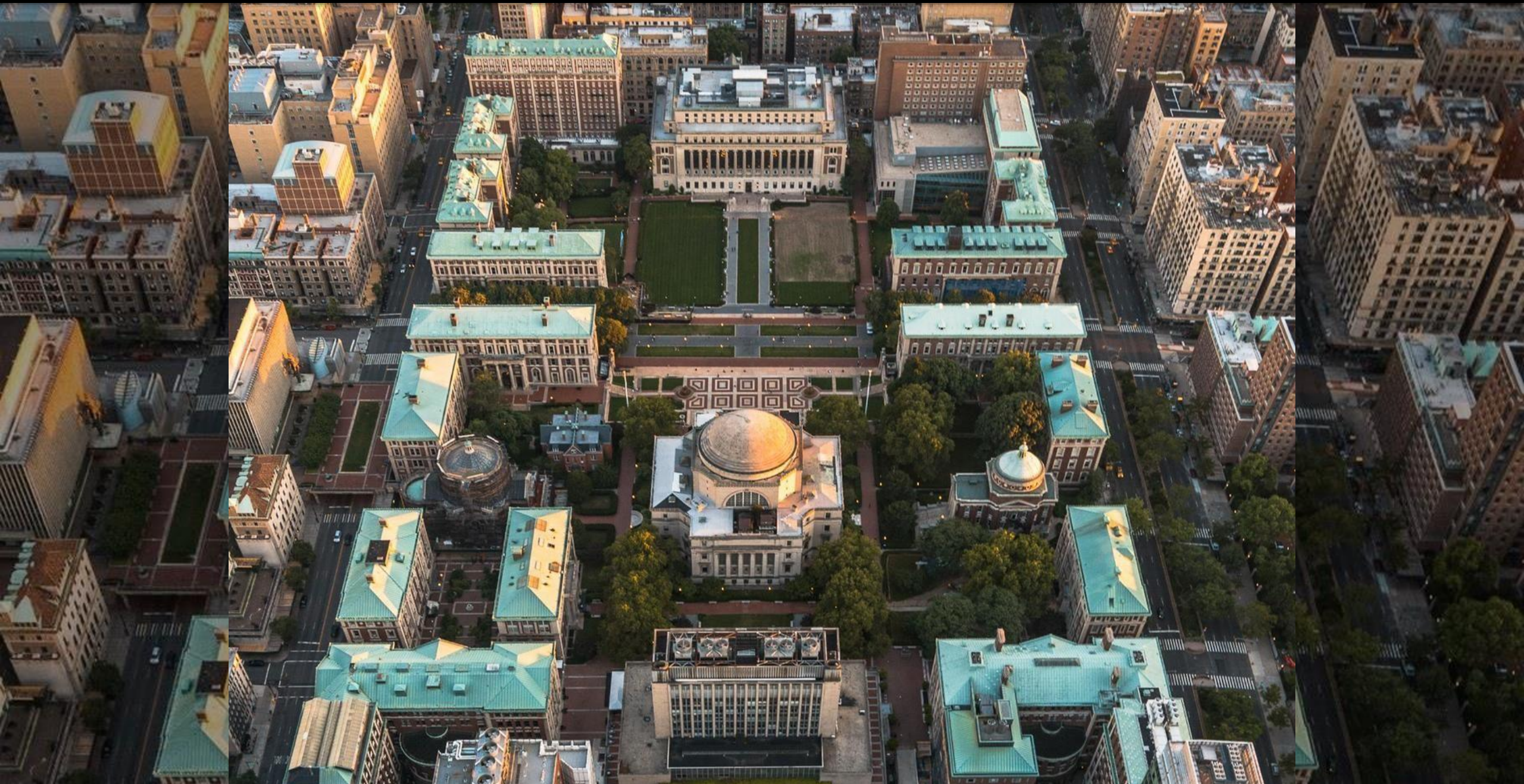








# Columbia University





# in the City of New York



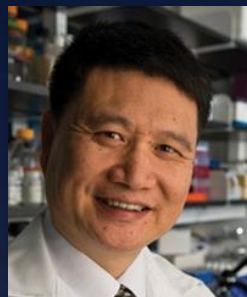




Banta



Leonard



Ju



O'Shaughnessy

2009



West



Park

## A Decade of Growth in Chemical Engineering



Kumar



Koberstein



Durning



McNeil



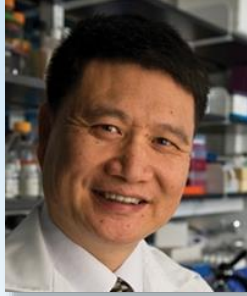
# Our Faculty



Banta



Leonard



Ju



Obermeyer



O'Shaughnessy



Moment



Simunovic



West



Steingart



Marbella



Urban



Chen



Esposito



Park



Kumar



Gang



Durning



Bishop



Boyce



McNeil



Venkatasubramanian



# MS Committee – Direction and Oversight



**Alex Urban**



**Scott Banta**  
Chair



**Robert Bozic**



**Daniel**  
**Esposito**

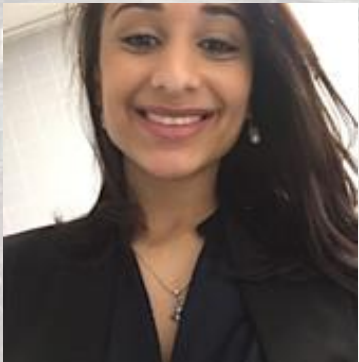


**Aaron Moment**





# 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)



# Chemical Engineers....

“... 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<sup>1</sup>” 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**

<sup>1</sup> US National Academy of Engineering Poll:  
<http://www.engineeringchallenges.org>





# Columbia Chemical Engineering MS Program

## Standard Timeline – 30 credits

Fall Sep- Dec	Spring Jan- May	Summer Jun- Aug	Fall Sep- Dec
Core MS Course Core MS Course MS Colloquium Elective Elective	Core MS Course Core MS Course Elective Elective	Time for Summer Internships Time for Research	Elective Elective

### Core Classes:

Kinetics

Math Methods

Advanced Thermo. or Statistical Mechanics

Transport Phenomena



# Columbia Chemical Engineering MS Program

## Scientist to Engineer Timeline – 30 credits + Essentials

Fall Sep- Dec	Spring Jan- May	Summer Jun- Aug	Fall Sep- Dec
<b>CHEN E4001 Essentials A</b> <b>CHEN E4002 Essentials B</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***

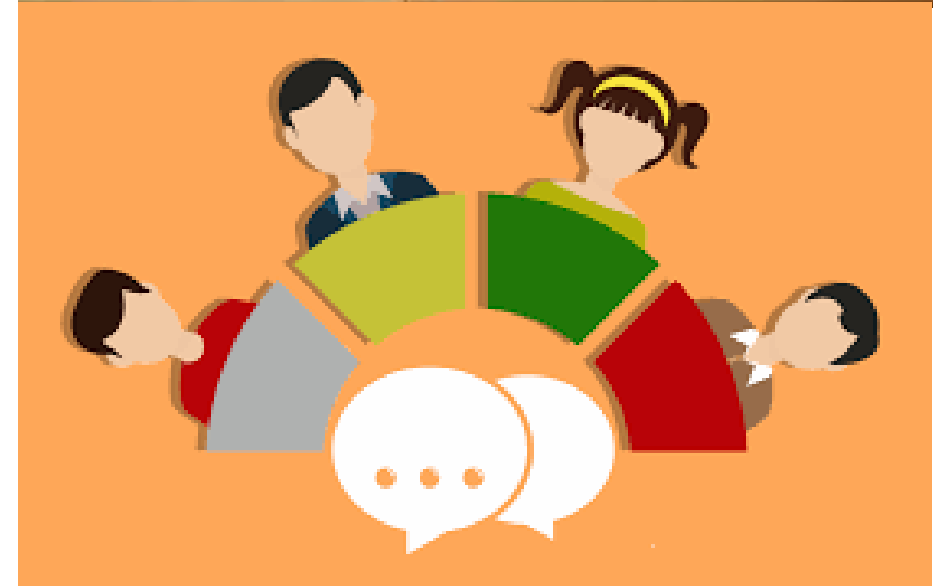
***Networking***

***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 and your calendar

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>)

Registration for classes is done through student services on line: <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>





*Questions?*

*Please type them into Zoom Chat!*





# Concentration in Data and Computational Science

## Electives

Numerical Methods in Chemical Eng.

Chem. Eng. Data Analysis

AI in Chem. Eng.

Statistical Mechanics

Computational Fluid Dynamics

Atomistic Simulations

Research



# Concentration in Climate Solutions

## 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.)

Biopharm., entrepreneurship, and Chem. Eng.

Solid State Chem. In Pharm. Dev.

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*



*TRANSCENDING DISCIPLINES, TRANSFORMING LIVES*



# Why Get Involved In Research During your MS studies?\*

- *Research Strongly Complements Coursework*
  - *Apply core concepts to open-ended problems.*
  - *Gain hands-on lab experience & skills while working with state-of-the art instruments and facilities.*
- *Gain Exposure to Cutting Edge Science & Engineering*
  - In-depth study on an emerging technology.
  - Get a feel for life as a PhD student or research scientist.
- *Connect with Faculty and PhD Students / Postdocs*
  - Opportunity to interact more closely with faculty.
  - Expand your professional network.

\*Around 1/3<sup>rd</sup> of MS students join a research lab at Columbia.



# Research Themes within the Chemical Engineering Department\*

## Energy & Environment

Chen	<i>Catalysis</i>	Marbella	<i>NMR characterization</i>
Esposito	<i>Solar fuels</i>	Steingart	<i>Electrochemical systems</i>
Park	<i>Carbon capture</i>	Urban	<i>Materials discovery</i>
McNeill	<i>Air quality</i>	West	<i>Multiscale modeling</i>
Venkat	<i>Artificial intelligence</i>		

## Biotechnology

Banta	<i>Protein engineering</i>
Ju	<i>DNA sequencing</i>
Obermeyer	<i>Protein biopolymers</i>
O'Shaughnessy	<i>Cell biophysics</i>
Simunovic	<i>Synthetic embryology</i>

## Soft Materials

Kumar	<i>Polymer composites</i>
Durning	<i>Membrane transport</i>
Gang	<i>Nanoparticle assemblies</i>
Bishop	<i>Colloidal robotics</i>
Boyce	<i>Granular flows</i>

\*See the MS open house website for links to websites, posters, and videos:  
<https://www.cheme.columbia.edu/virtual-open-house-prospective-ms-students>

SUSTAINABLE HUMANITY



McNeill

RESEARCH

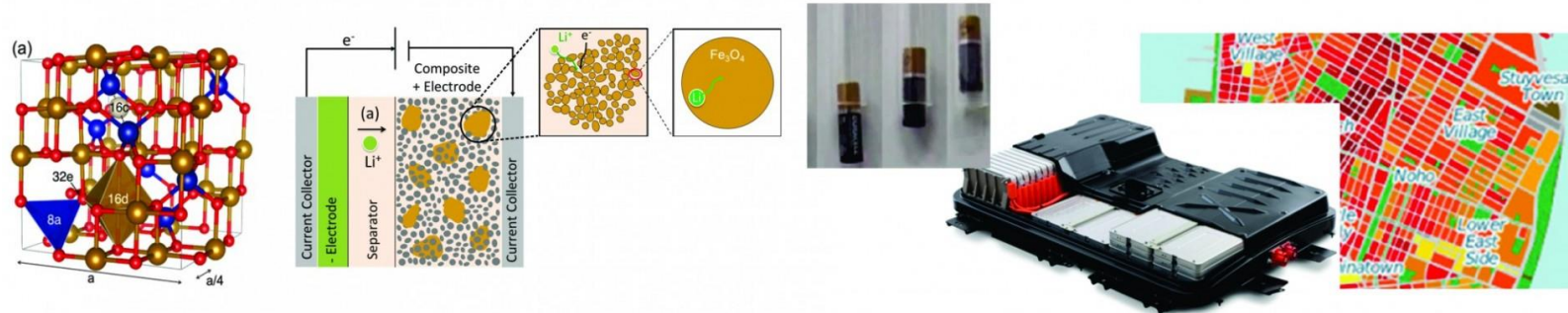
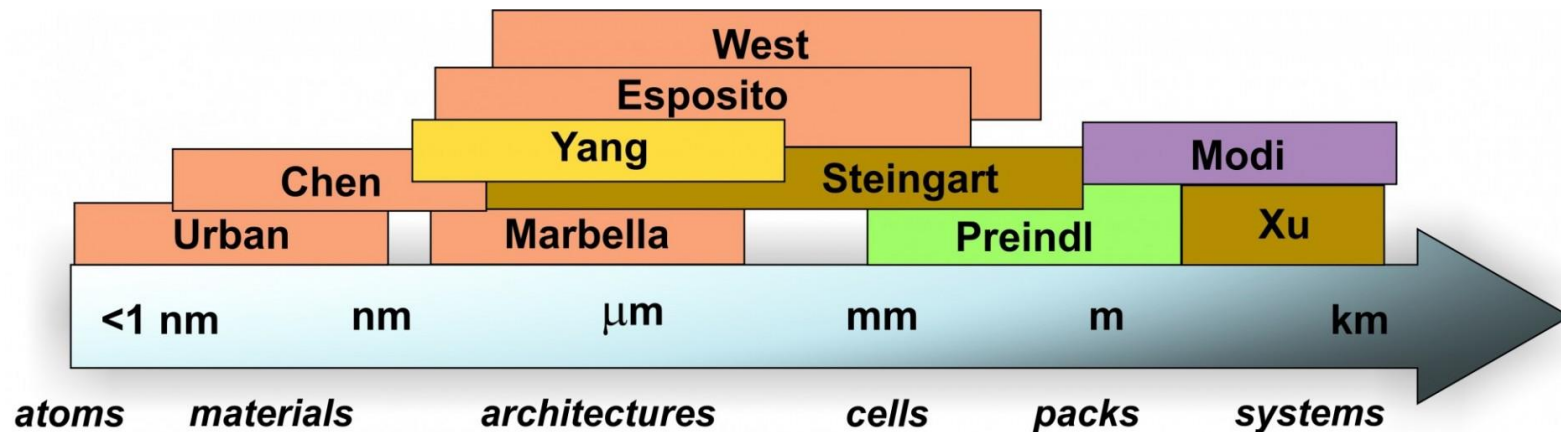


Imagine a world where the power of data and atmospheric chemistry can help protect human health.



# Collaborative Research

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



COLUMBIA | ENGINEERING

TRANSFORMERS

CHARTING THE FUTURE OF CLEAN ENERGY  
AND CLEAN ENERGY STORAGE

# Research facilities\*

- *Individual PI Labs (Including many recently renovated)*
- *Shared High Performance Computing (HPC) Clusters*
- *Soft Matter Lab*
  - Shared space and equipment for Kumar, Gang, Bishop and others
- *CEEC shared lab space (10<sup>th</sup> floor of Mudd)*
- *Northwest Corner Building*
- *Lasker Building (Medical campus)*
- *Columbia Nano Initiative (CNI) facilities*
  - Clean Room; characterization laboratory; microscopy facility

\*See photos and description of instruments of shared labs here:

<http://cni.columbia.edu/shared-labs>





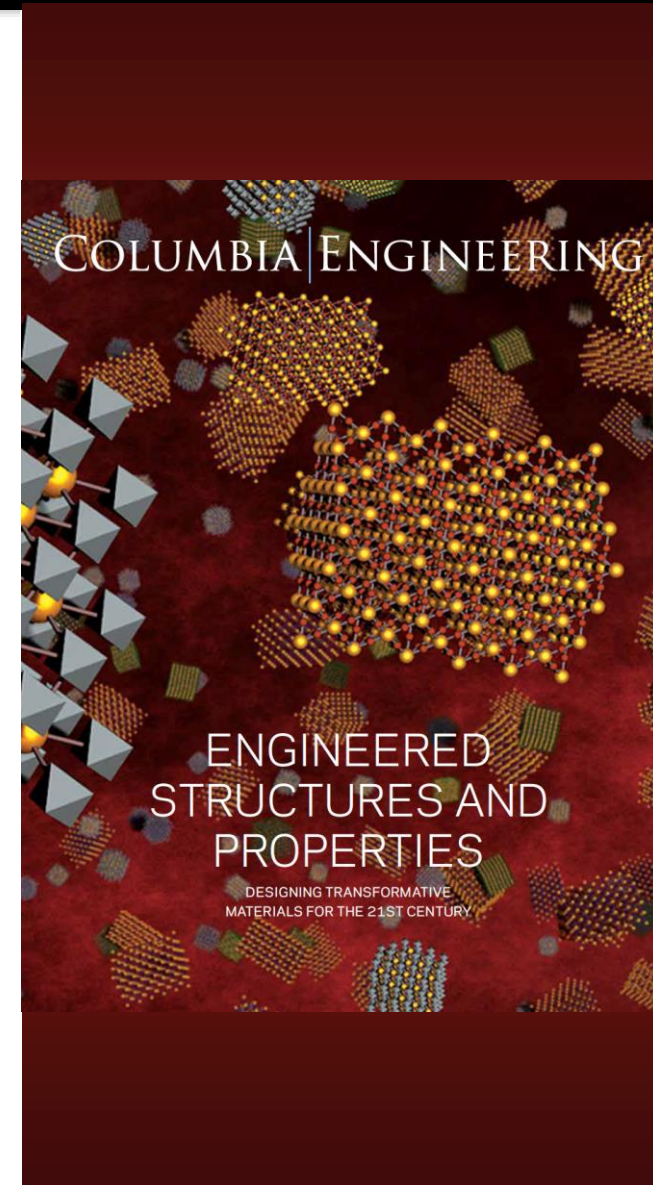
# How does an MS Student get Involved with Research?

## ○ *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<sup>nd</sup> 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](mailto:rmr2185@columbia.edu)

Phone or virtual appointments:

Schedule a meeting via [calendly](#)

\*Extended hours available upon request\*

Office Hours: Monday - Thursday

<https://cheme.columbia.edu/careers>



# Career Placement Officer (CPO) Function, Duties and Responsibilities



## **Primary Responsibility:**

- Career Placement of MS students in Full-Time, and/or Internships

## **Career Counseling:**

- Resume and Cover Letter Reviews
- Mock Interviews and Salary Negotiations
- Networking, Social Media & Job Search
- Job and Internship Postings
- [Resources](#) offered include but are not limited to VMOCK, Aspire, Vault, Big Interview, Goin Global ect.

## **Partnerships:**

- Industry Employers and Alumni
- Faculty, Staff, SEAS Administration
- Professional Associations and Groups
- Student Clubs
- Columbia Schools & Institutes

## **Career Development & Recruitment Events:**

- [Professional Development & Leadership Program](#) (PDL)
- Employer Info Sessions
- Industry Career Panels
- Career Talks / Alumni Chats
- Career Workshops
- Career Coaching Sessions

# 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!

# Sample List of Chemical Engineering Job Titles

- Laboratory Technician
- Quantitative Analyst
- Associate Estimator
- Associate Engineer
- Process Engineer
- Business Analyst
- Consultant
- Associate Scientist Analytical
- Water Resources Engineer
- Research & Development
- Global Product Manager
- Manufacturing Engineer
- Research & Development
- Research Run Plant Engineer



# 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



# MS Chemical Engineering Career Placement

Prospective students should email Raina Ranaghan, Career Placement Officer at [rmr2185@Columbia.edu](mailto:rmr2185@Columbia.edu) directly for more details and statistics related to job placement.





**No road is long, when dreams are big, and the sky is  
the limit...**

**Jessie Kotini**

# Welcome to Columbia

Yannick L. Brookes (*he/him/his*)  
**Graduate Student Affairs**

Perry D'Amelio (*he/him/his*)  
**Graduate Admissions**

 **COLUMBIA UNIVERSITY**  
IN THE CITY OF NEW YORK

**\*Note\*** The information provided in this portion of the presentation was accurate as of the date of this event (4/17/21), but please be aware that matters related to international student affairs have frequently changed over the past year. Thus, make sure that you contact the international student affairs (ISSO) office with any questions you have to make sure that you are getting up-to-date advice (see Slide 52 for contact info).







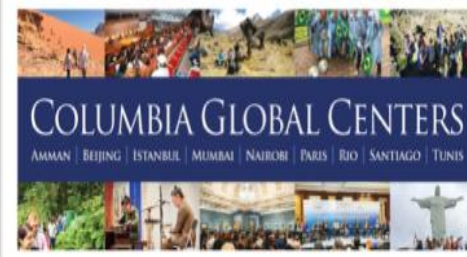
ORIENTATION & WELCOME MONTH



HOUSING



WELLNESS



COLUMBIA GLOBAL CENTERS

AMMAN | BEIJING | ISTANBUL | MUMBAI | NAIROBI | PARIS | RIO | SANTIAGO | TUNIS



STUDENT LIFE



STUDENT DIVERSITY INITIATIVES



DISABILITY SERVICES



FELLOWSHIPS



ACADEMIC INTEGRITY



STUDENT PROGRAMMING



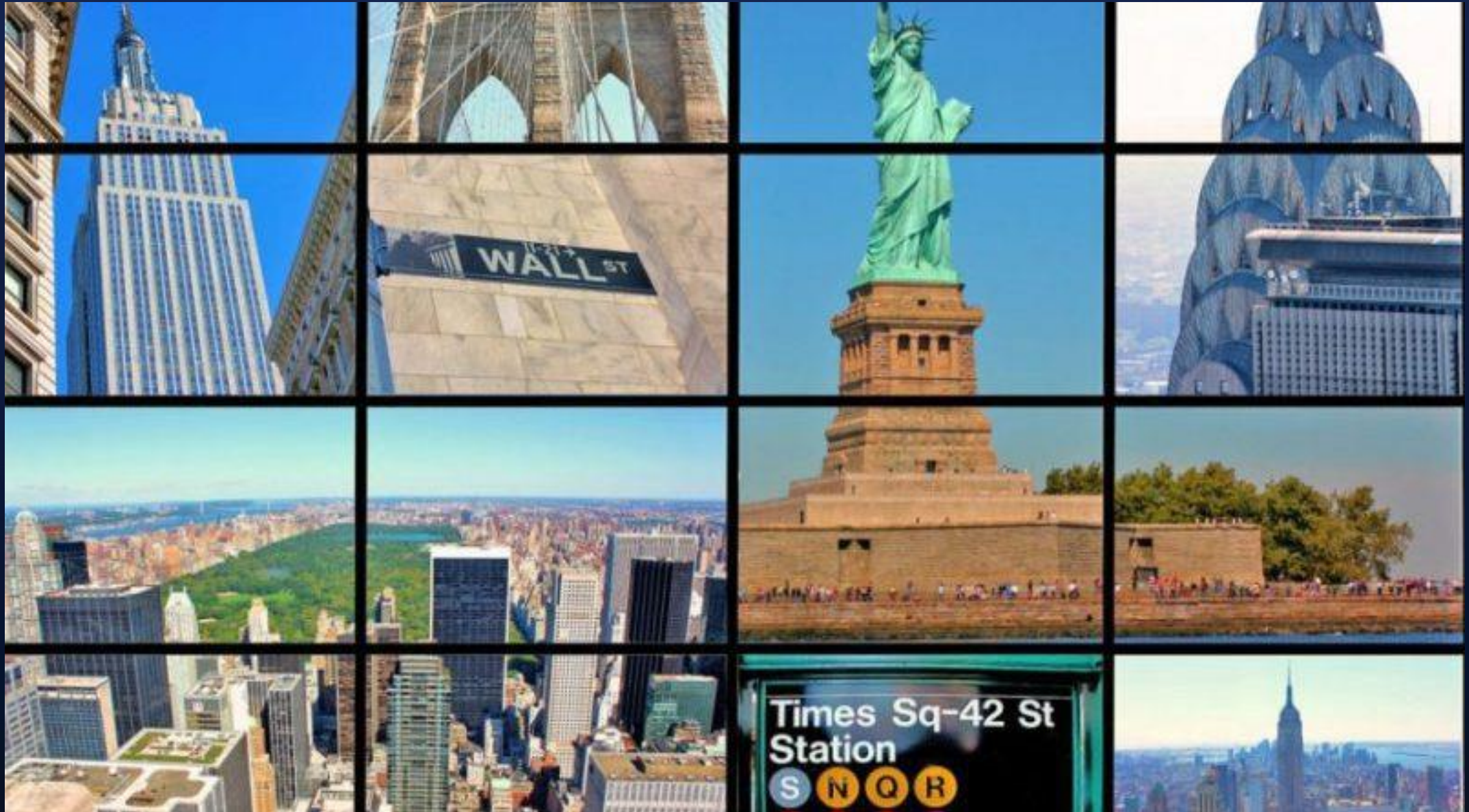
COMMENCEMENT & CLASS DAY



Relational Well-Being	Intellectual Well-Being	Career Well-Being	 <b>ENGINEERING WELLNESS</b> OFFICE OF GRADUATE STUDENT AFFAIRS
To develop positive, supportive, and ongoing connections in interpersonal, community, and organizational spheres	To explore ideas and experiences that stimulate learning and knowledge application.	To pursue fulfillment, connection, and growth in one's work	
Emotional Well-Being	Spiritual Well-Being	Contact Information	
To identify and manage feelings while responding and adapting effectively	To seek and express meaning, purpose, and "connectedness to the moment, self, others, nature, and the significant or sacred."	SEAS_GSA@COLUMBIA.EDU	
Physical Well-Being	Financial Well-Being	For Emergencies	
To engage in a dynamic state of continuous physiological renewal	To access and manage resources in order to feel secure while meeting current and on-going needs.	<b>(212) 854-5555</b>	



# Experience New York City





# Your Future New Neighborhood



Spring 2021 Department of Chemical Engineering Open House



# 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)





# 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/>
- Great resources. Call , email to schedule an appointment





## What are other Housing search 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



# *How to apply?*

- Receive Your I-20/DS-2019 and Pay Your SEVIS Fee
- Complete the DS-160 Visa Application
- Schedule Your Visa Interview
- Prepare Your Documents
- Attend Your Interview
- Receive and Review Your Entry Visa



# HELPFUL TIPS

- **U.S. Address or Point of Contact**

- Not sure who to list? Use your school or department address. The phone number is 212-854-1754.

- **Dependents**

- Dependents must submit their own DS-160.

- **Course of Study**

- Use your program name as it appears on your admission letter or your I-20/DS-2019.

- **Intended Length of Stay**

- Use your best estimate on the time you need to complete your program. The response to this question does not determine the [length of your visa](#).

- **Present Work/ Education/ Training Information**

- Select the best option that is true at the time of submitting the application.

- **Person/ Entity Paying for Your Trip**

- List your primary source of funding as it appears on your I-20/DS-2019.

# Document Breakdown - Students



- Passport (valid for at least six months beyond the date of travel to the U.S.)
- DS-160 confirmation page
- Valid I-20/DS-2019 (original, not a copy)
- Copy of Columbia admission letter/email
- [SEVIS Fee Receipt](#)
- Financial documents (issued within the previous 3 months)
- Any other documents listed on embassy/consulate website





International Students and Scholars Office

EMAIL: [newintstudent@columbia.edu](mailto:newintstudent@columbia.edu) PHONE: [212-854-3587](tel:212-854-3587)

<https://isso.columbia.edu/content/isso-morningside-admitted-student-services>

# Contact Information

ISSO Morningside Heights Office

[newintlstudent@columbia.edu](mailto:newintlstudent@columbia.edu)

Chemical Engineering Department:

Kathy Marte-Garcia, [kmm2270@columbia.edu](mailto:kmm2270@columbia.edu)

Graduate Admissions

[seasgradmit@columbia.edu](mailto:seasgradmit@columbia.edu)

Graduate Student Affairs:

[seas\\_gsa@columbia.edu](mailto:seas_gsa@columbia.edu)



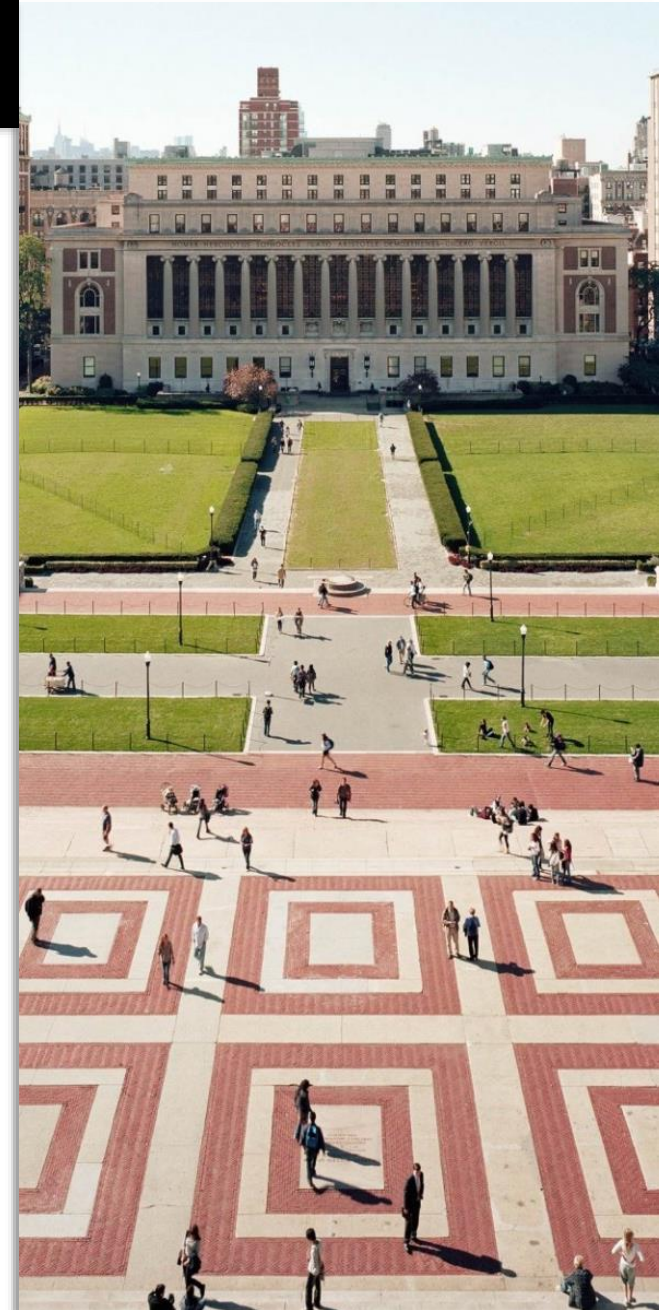


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- *Career Placement, Raina Ranaghan*
- *Housing and International Student Affairs, Assistant Dean Yannick Brookes*

## ○ **Break-out Chatrooms**

Type questions you have into the **Zoom chat**  
(reply to everyone or privately to Alex Urban)



# Instructions for Chat Room Sessions

1. Click on zoom link for chat room session that is most relevant to what you'd like to learn more about.
2. Please mute yourself, and type questions into the chat box feature.
3. Feel free to leave chat room and enter another.



Links to Zoom chat room sessions available in “2021 CU ChemE Open House Agenda.pdf”, which was sent out by email and available on the following webpage:

[https://www.cheme.columbia.edu/files/seas/content/2021\\_cu\\_cheme\\_ms\\_open\\_house\\_agenda.pdf](https://www.cheme.columbia.edu/files/seas/content/2021_cu_cheme_ms_open_house_agenda.pdf)

Room #	Topics being discussed & Zoom link to join room through your web browser	Topic leader(s)
1	General questions about MS program & curriculum: <a href="#">Zoom Link</a> Passcode: 167400	Prof. Moment
2	Questions about S2E program & curriculum: <a href="#">Zoom link</a> : Passcode: 908749	Profs. Banta & Bozic
3	Research during MS studies: <a href="#">Zoom link</a> . Passcode: 478670	Profs. Esposito & Urban
4	Career placement & grad student affairs: <a href="#">Zoom link</a> . Passcode: 328084	Raina Ranaghan + GSA rep.
5	Talk to current MS students / recent grads: <a href="#">Zoom link</a> . Passcode: 370558	Students in traditional MS program
6	Talk to current MS students / recent grads: <a href="#">Zoom link</a> . Passcode: 240908	Students in S2E (36 credit) MS program