

# *2020 Virtual MS Open House*

*Department of Chemical Engineering  
Columbia University*

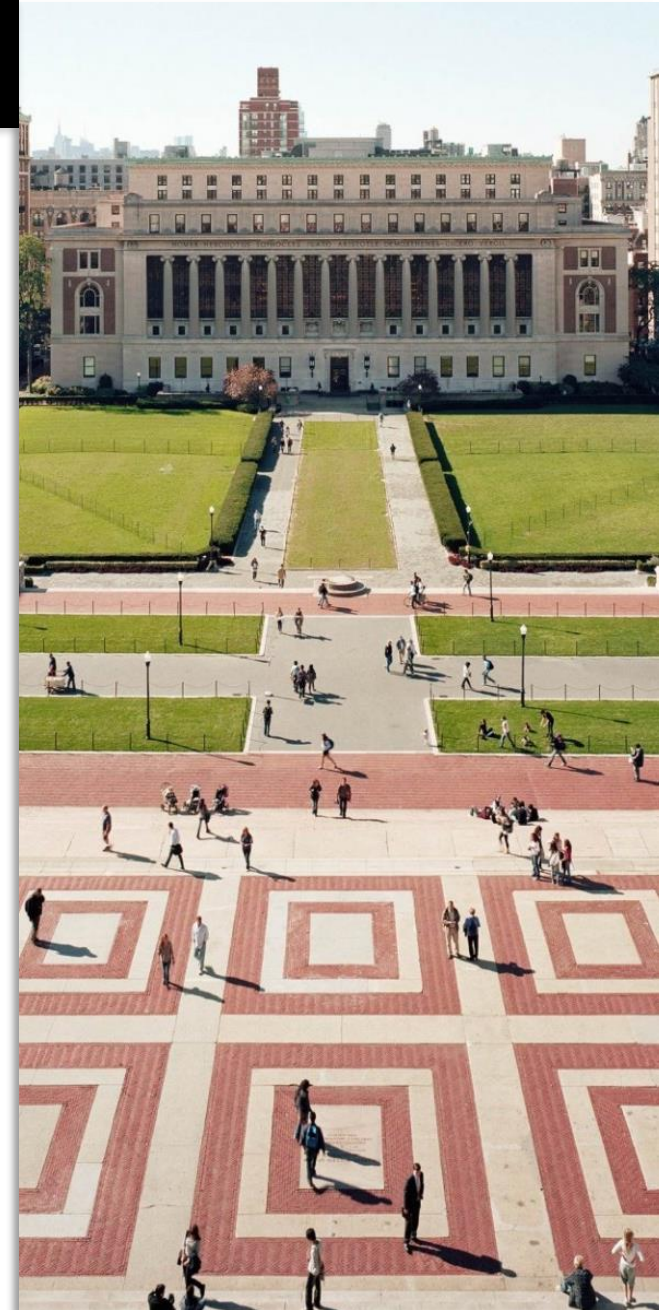


*TRANSCENDING DISCIPLINES, TRANSFORMING LIVES*

# 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 University



in the City of New York

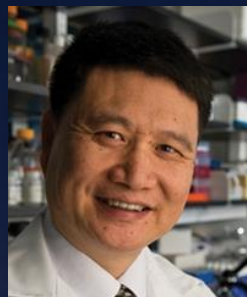




Banta



Leonard



Ju



O'Shaughnessy

2009



West

## A Decade of Growth in Chemical Engineering



Park



Kumar



Koberstein



Durning



McNeil

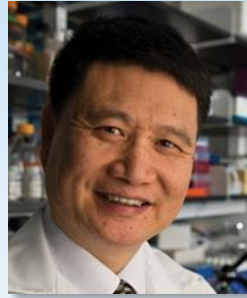
# Our Faculty



Banta



Leonard



Ju



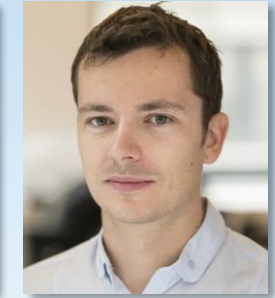
Obermeyer



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**



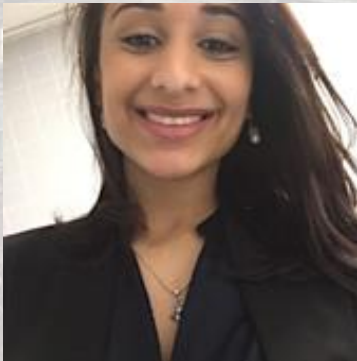
**Daniel  
Esposito**



**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>

**AIChE**  
The Global Home of Chemical Engineers



# 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

## Standard Timeline – 30 credits

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<b>Core MS Course Core MS Course MS Colloquium Elective Elective</b>	<b>Core MS Course Core MS Course Elective Elective</b>	<b>Time for Summer Internships Time for Research</b>	<b>Elective Elective</b>

### 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***

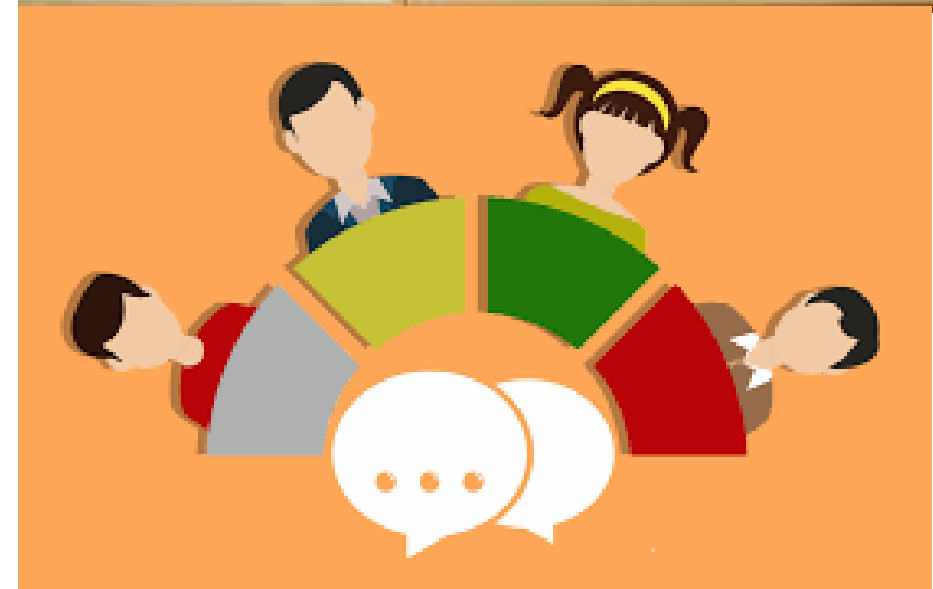
***Networking***

***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*

*Prof. Esposito*



*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 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 1/3<sup>rd</sup> of MS students have participated in research in recent years.



# Research themes\*

## Energy & Environment

Chen  
Esposito  
Park  
McNeill  
Venkat

*Catalysis*

*Solar fuels*

*Carbon capture*

*Air quality*

*Artificial intelligence*

Marbella  
Steingart  
Urban  
West

*NMR characterization*

*Electrochemical systems*

*Materials discovery*

*Multiscale modeling*

## Biotechnology

Banta  
Ju  
Obermeyer  
O'Shaughnessy  
Simunovic

*Protein engineering*

*DNA sequencing*

*Protein biopolymers*

*Cell biophysics*

*Synthetic embryology*

Kumar  
Durning  
Gang  
Bishop  
Boyce

*Polymer composites*

*Membrane transport*

*Nanoparticle assemblies*

*Colloidal robotics*

*Granular flows*

## Soft Materials

SUSTAINABLE HUMANITY



McNeill

RESEARCH

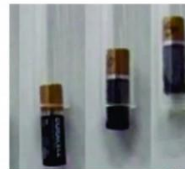
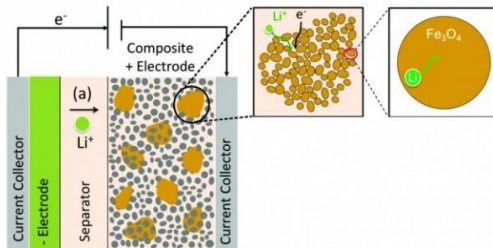
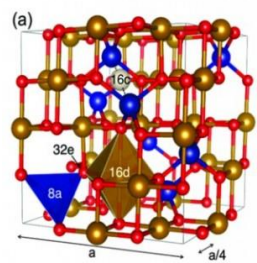
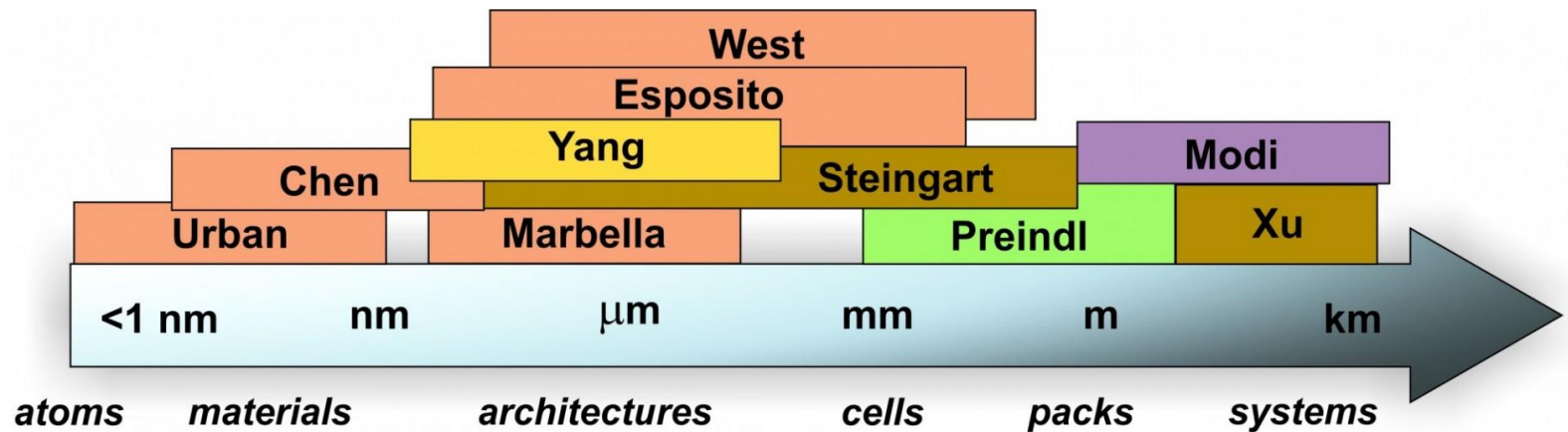


Imagine a world where the power of data and atmospheric chemistry can help protect human health.

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

# 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

# Shared facilities\*

- *Soft Matter Lab*
  - Shared space and equipment for Kumar, Gang, Bishop and others
- *CEEC shared lab space (10<sup>th</sup> 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>



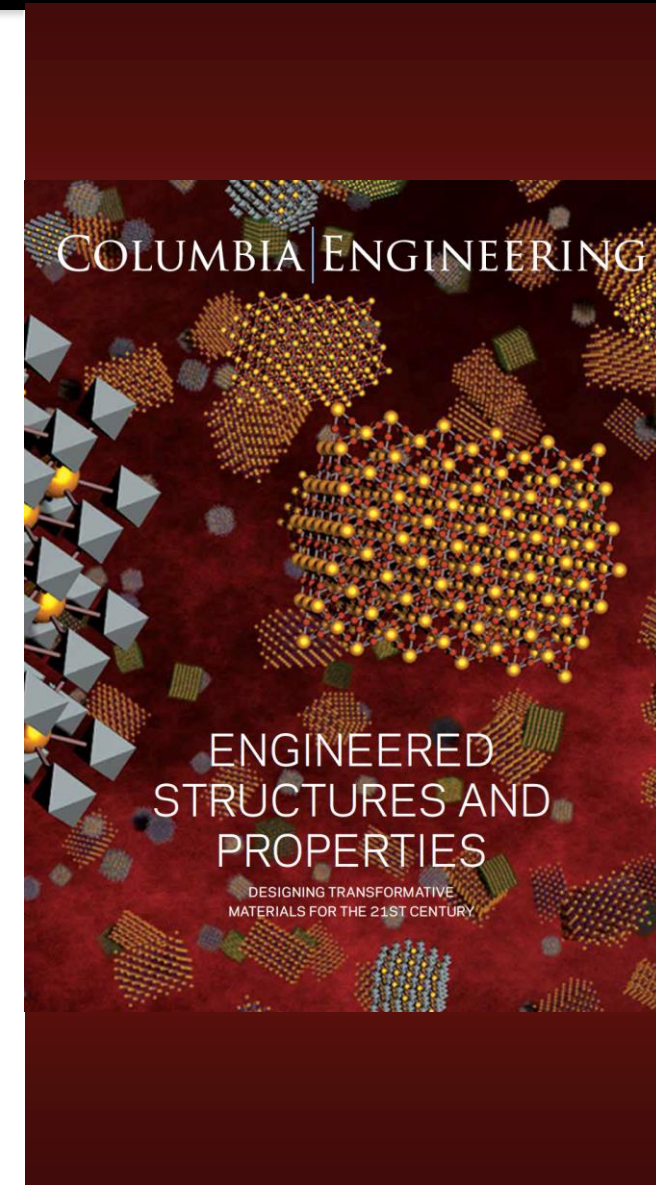
# How does an MS Student get Involved with Research?

## ○ *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:

<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!



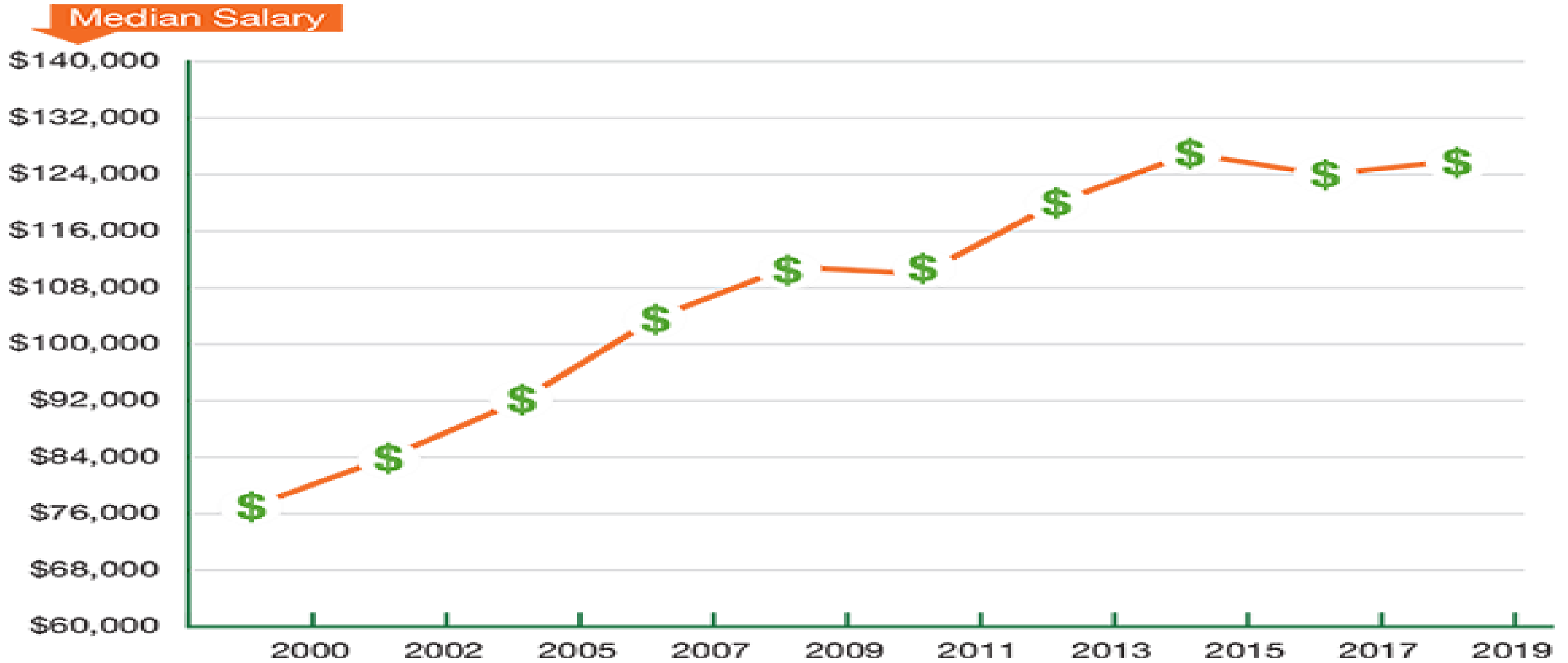
## June 2019 AIChE Salary Survey: Overview



AIChE: <https://www.aiche.org/>

June 2019 issue of *Chemical Engineering Progress*. Chemical engineers continue to earn more than the average U.S. worker.


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.

# Employer Sampling of Full-Time and Internship Placements





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

**Jessie Kotini**

A wide-angle photograph of a Columbia University campus scene. In the foreground, a large, ornate fountain stands on a paved plaza. People are walking across the plaza and along a path. In the background, several large, multi-story buildings with classical architectural features are visible under a cloudy sky. The scene is captured during the day, with some buildings having their lights on.

# Housing and International Student Scholars Office (ISSO)

**Kathleen Vital-Herne**  
**Assistant Director of Graduate Admissions at Columbia**

# Housing

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



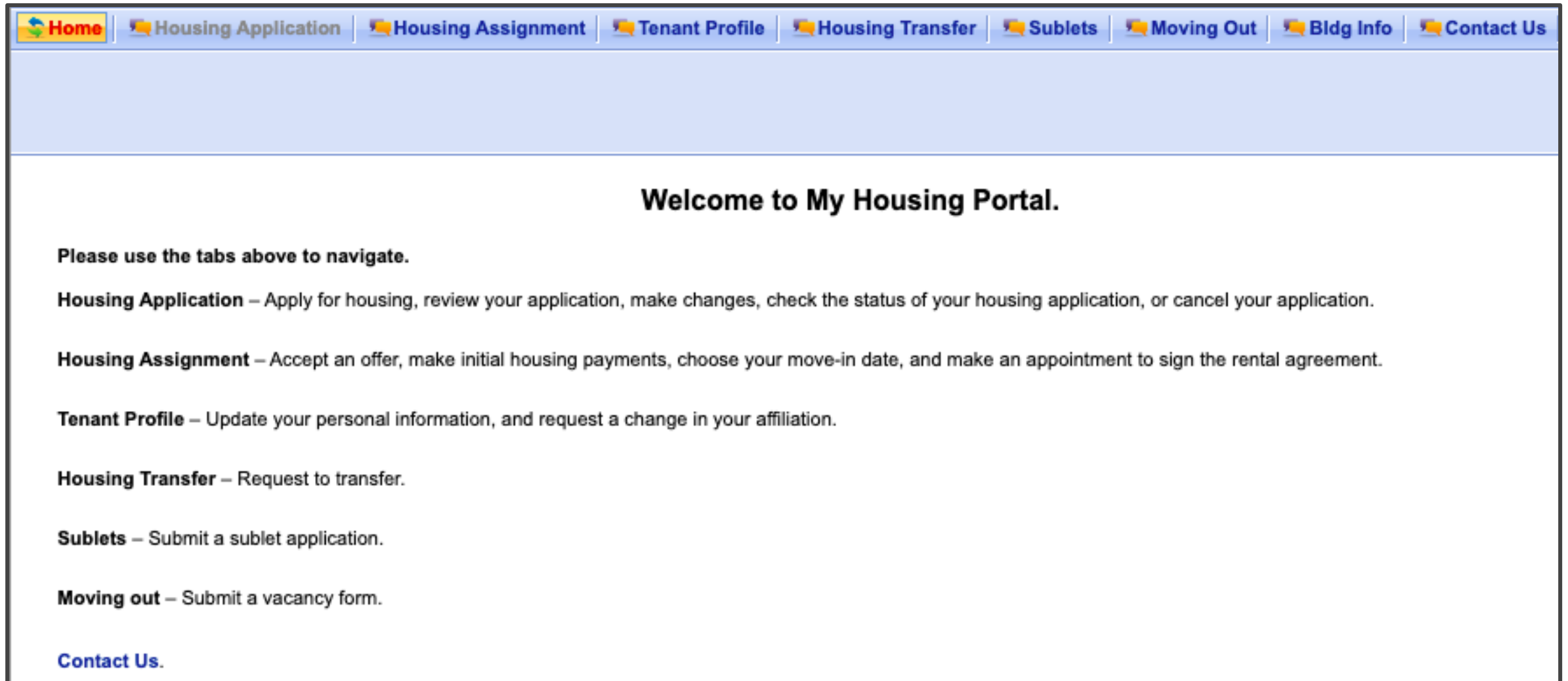
# Housing

## 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](mailto:seas_gsa@columbia.edu) and cc department administrator, Kathy Marte-Garcia ([kmm2270@columbia.edu](mailto:kmm2270@columbia.edu))

# Applying for University Housing

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



The screenshot shows a web browser window with a navigation bar at the top. The navigation bar contains several tabs: Home, Housing Application, Housing Assignment, Tenant Profile, Housing Transfer, Sublets, Moving Out, Bldg Info, and Contact Us. Below the navigation bar is a large blue header area with the text "Welcome to My Housing Portal." in the center. Underneath the header, there is a list of instructions for each tab, explaining what users can do in each section. The "Contact Us" link is highlighted in blue.

**Home** | **Housing Application** | **Housing Assignment** | **Tenant Profile** | **Housing Transfer** | **Sublets** | **Moving Out** | **Bldg Info** | **Contact Us**

## 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.](#)

# Housing

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

# 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

# Housing

## 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.**

# International Students and Scholars (ISSO)

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

# International Students and Scholars (ISSO)

## 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**

# International Students and Scholars (ISSO)

## 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.



# International Students and Scholars (ISSO)

## 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>

# International Students and Scholars (ISSO)

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)