2020 Virtual MS Open House

Department of Chemical Engineering
Columbia University

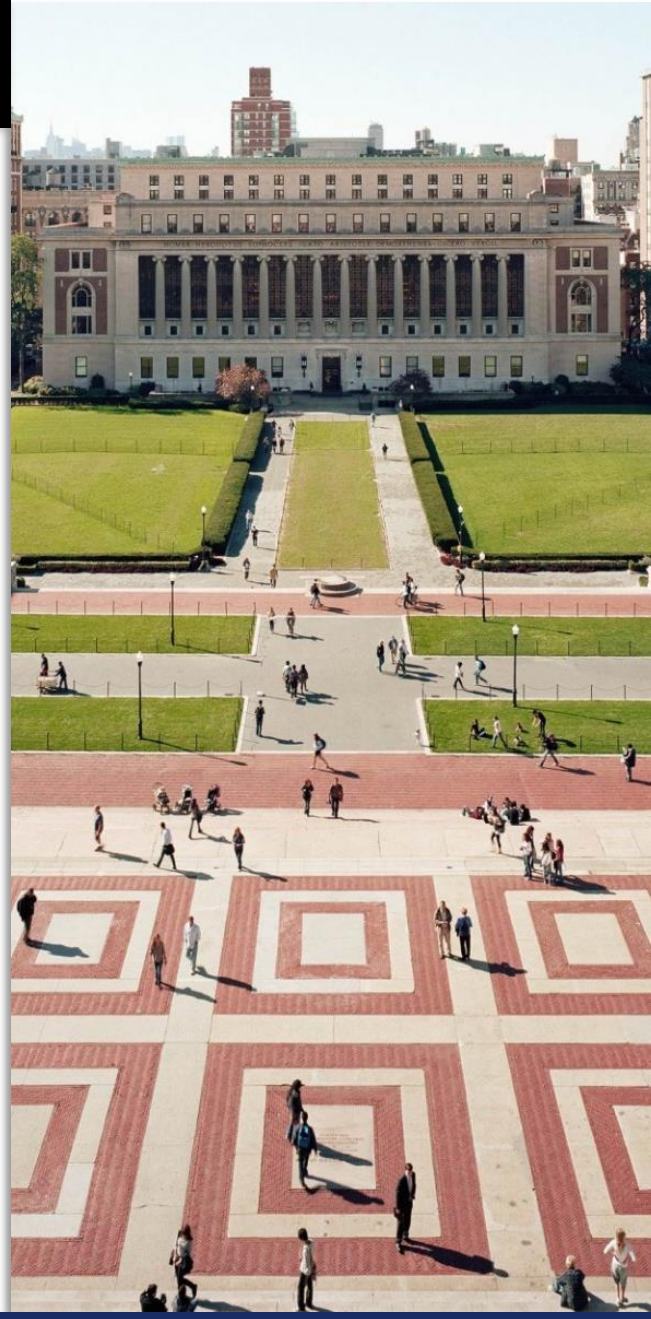
TRANSCENDING DISCIPLINES, TRANSFORMING LIVES

COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

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, Kathy Marte-Garcia + ISSO representative*
- *9:35 am Break-out Chatrooms*

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




DATA SCIENCE • SENSING • IMAGING • VISUALIZATION • MODELING • SIMULATION • MATERIALS • NANOSCIENCE • DEVICES • ROBOTICS •
SUSTAINABLE
HEALTHY
SECURE
CONNECTED
CREATIVE
COLUMBIA
ENGINEERING
FOR
HUMANITY

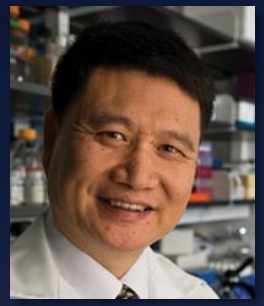
Columbia University

in the City of New York

PHOTO: DARCY PETERKA


Banta


Leonard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O'Shaughnessy

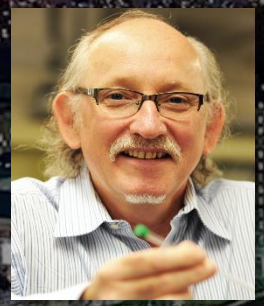
2009

A Decade of Growth in Chemical Engineering


West


Park


Kumar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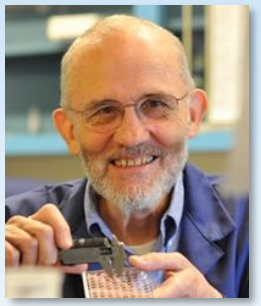
Durning


McNeil

Our Faculty


Banta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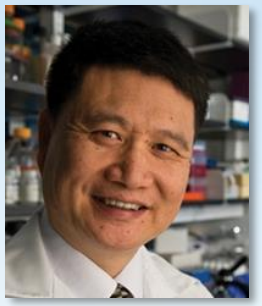
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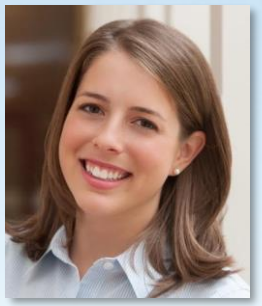
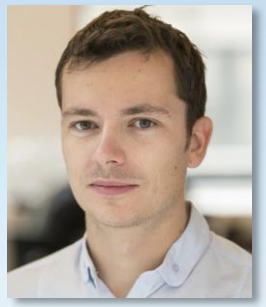

Obermeyer


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

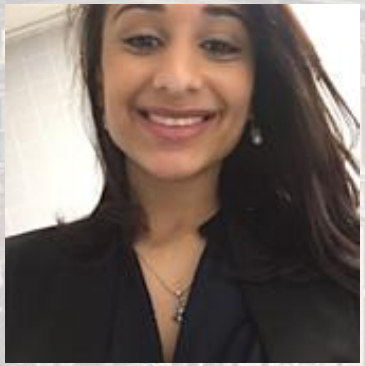
Scott Banta
Chair

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
  - ≈ 10 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[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

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

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

Scientist to Engineer Timeline – 30 credits + Essentials

Fall Sep- Dec	Spring Jan- May	Summer Jun- Aug	Fall Sep- Dec
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

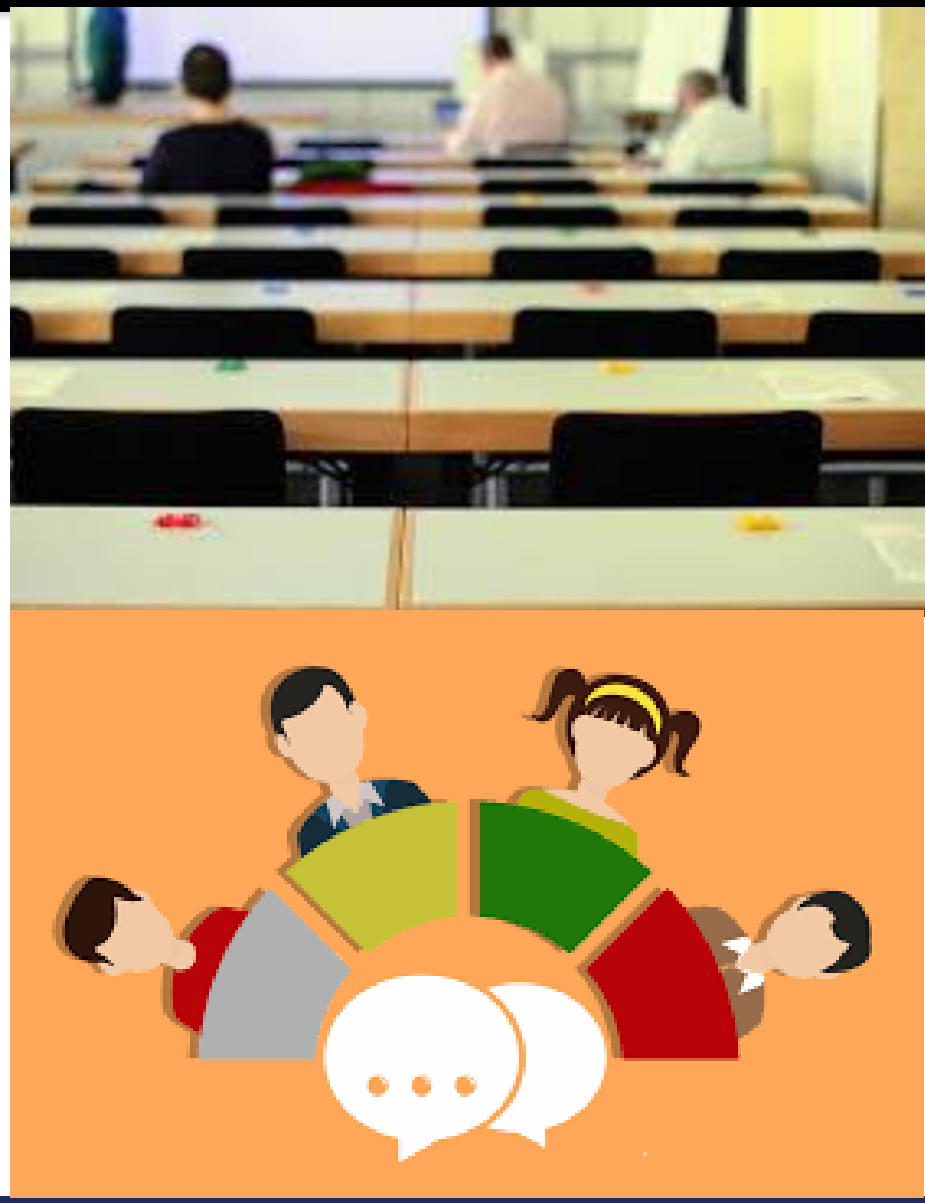
Networking

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 Scince

- *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

Questions?

Please type them into Zoom Chat!

Concentration in Data and Computational Science

<u>Electives</u>

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

<u>Electives</u>

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

<u>Electives</u>

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.