2023 Undergraduate Orientation

Dr. Justin Opatkiewicz
Associate Teaching Professor
Chemical Engineering Program
Chemical Engineering Program

- Program founded in the late 1970s
- First graduating class in 1980
- ABET accredited in 1984
- Transferred from the MAE department to NANO in 2007
Hands-on classes
Open hours for your own projects
EnVisionaries student org

The Jacobs School’s Makerspace
SME 301

Envision.ucsd.edu
What is Chemical Engineering?
What is Chemical Engineering?

- Calculus
- Chemistry
- Physics

Chemical Engineering
What is Chemical Engineering?

Chemical Engineering

- Calculus
- Statistics
- Economics
- Mechanical Engineering
- Civil Engineering
- Chemistry
- Electrical Engineering
- Computer Science
- Physics
- Biological Engineering
- Materials Science
- Biology
Chemical engineers (that will be you!) transform low value stuff into high value stuff.
Chemical engineers are **not** chemists.

$$A + B \rightarrow C + D$$
Chemical engineers are not chemists.
Traditional chemical engineering use TSTs to do what chemistry alone cannot.
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TST = Tall Shiny Things
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Distillation – Separating things that don’t want to separate.

[theamericanenergynews.com]
Traditional chemical engineering use TSTs to do what chemistry alone cannot.

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Mixers – Making things stick when they don’t want to.

[wired.com]
Traditional chemical engineering use TSTs to do what chemistry alone cannot.

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Reactors – Synthesizing the good stuff on a grand scale.

[eastsidebrewers.org]
Traditional chemical engineering use TSTs to do what chemistry alone cannot.

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Heat exchangers – Making the hot cold and the cold hot.

[hotflusher.com/industrial.cfm]
Modern chemical engineering is highly interdisciplinary.
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Clean energy – Transitioning from fossil fuels to renewables.

[carmagazine.co.uk]
Modern chemical engineering is highly interdisciplinary.

Water purification – Addressing local, regional, and global shortages.

[news.discovery.com]
Modern chemical engineering is highly interdisciplinary.

Bioengineering – Producing high-value, low-yield products

[wikipedia.org/biochemical_engineering]
Modern chemical engineering is highly interdisciplinary.

NanoEngineering – There’s plenty of room at the bottom! *

[wikipedia.org/biochemical_engineering]
To do all this, you’ll learn an enormous amount of material.
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It should take transfer students only 2 years.

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There are many organizations that you can join as an undergraduate.

- American Institute of Chemical Engineers (AIChE)
- NanoEngineering and Technology Society (NETS)
A degree in chemical engineering gives you career flexibility.

ChemE Core
- Design
- Optimization
- Control
- Kinetics
- Transport
- Thermo

Math
Physics
Chemistry
Biology

Industry
- Biotechnology
- Chemicals
- Electronics
- Fuel/Energy
- Materials
- Pharmaceuticals
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Math
Physics
Chemistry
Biology

ChemE Core
Design
Optimization
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Graduate School

Professional School

Law
Medicine
Business

Industry
Biotechnology
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ChemE Core
- Design
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Professional School
- Law
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- Business

Graduate School
- Biotechnology
- Chemicals
- Electronics
- Fuel/Energy
- Materials
- Pharmaceuticals

Industry

Academia
We do pretty well when it comes to compensation.
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2022 Mean entry level [payscale.com]

- Chemical: $68k
- Environmental, Civil, Biomedical, Mechanical, Electrical, Mat. Sci. Eng., Computer
We do pretty well when it comes to compensation.

- 2022 Mean entry level [payscale.com]
- 2021 Mean [US Dept. Labor]

$121k
How to Succeed in College

• Schedule plenty of time to study
  ✓ don't get over-committed with jobs, clubs, etc.
  ✓ form a study group, don't always work alone
  ✓ get help if you are struggling, talk to your professor early!

• Get good advice
  ✓ talk to dept advisors and your professors about major requirements
  ✓ talk to college advisors about college requirements
  ✓ join student engineering clubs and talk to juniors and seniors
  ✓ getting academic advice from freshmen and sophomores correlates with leaving school
• Each student has two advisors:
  - Department Advisors - help with major related courses and questions
  - College Advisors - help with general education and university-wide questions

• Questions about Chemistry, Math, Physics, and Biology requirements: direct to the respective department

• All courses on academic plan must be taken for a letter grade (except NANO 4, CENG 4, or NANO/CENG 199). Stick to the academic plan. Core courses only offered once a year

• We recommend that you register for general courses (CHEM, MATH, PHYS) during your first pass, and major courses (CENG/NANO) during your second pass (two passes start your Winter quarter)

• Pre-authorization Request vs Petitions - know the difference and when to use what. On our website.

• How to contact advising: Virtual Advising Center messages, walk-in advising, and appointments only

• Familiarize yourself with our website, the student handbook, and your advisors!

www.nanoengineering.ucsd.edu
We’ll see you in class