VIRTUAL OPEN HOUSE
Undergraduate Admissions
MONDAY, NOVEMBER 23, 2020

Apply to CEE! Nov. 30th
Tonight’s Agenda

Welcome: Prof. David Cocker, Chair
Undergraduate Admissions: Mr. Desmond Harvey
Research Thrust Overviews
• Materials: Prof. Leslie Abdul-Aziz
• Biotechnology: Prof. Robert Jinkerson
• Water Quality: Prof. Yun Shen
• Air Quality: Prof. Don Collins
Moderated Q&A: Faculty Panel
Close
Welcome!
Prof. David Cocker, Chair
Undergraduate Admissions
Mr. Desmond Harvey
DEGREE PROGRAMS

• Chemical Engineering
  - Chemical Engineering (CHEN)
  - Biochemical Engineering (BCEN)
  - Nanotechnology (NANO)

• Environmental Engineering
  - Air Pollution Control (AIRP)
  - Water Pollution Control (WTRP)
Chemical Engineering
Lower-Division Courses

• Introduction to Chemical & Environmental Engineering

• Calculus

• C++ Programming

• Differential Equations

• General Chemistry

• Multivariable Calculus

• Organic Chemistry

• Physics
## Chemical Engineering
### Upper-Division Courses

- Applied Fluid Mechanics
- Chemical Process Analysis
- Engineering Modeling & Analysis
- Fluid Mechanics
- Heat Transfer
- Kinetics
- Mass Transfer
- Process Dynamics & Control
- Professional Development
- Separation Processes
- Senior Design
- Thermodynamics
Chemical Engineering
Technical Electives

- Analytical Methods for Chemical & Environmental Engineers
- Catalytic Reaction Engineering
- Chemistry of Materials
- Combustion Engineering
- Electrochemical Engineering
- Fundamentals of Air Pollution Engineering
- Green Engineering
Environmental Engineering
Lower-Division Courses

- Introduction to Chemical & Environmental Engineering
- Multivariable Calculus
- Calculus
- Organic Chemistry
- C++ Programming
- Physics
- Differential Equations
- Statics
- General Chemistry
Environmental Engineering
Upper-Division Courses

- Applied Fluid Mechanics
- Engineering Modeling & Analysis
- Fate & Transport of Environmental Contaminants
- Fluid Mechanics
- Fundamentals of Air Pollution Engineering
- Introduction to Soil Science
- Mass Transfer
- Professional Development
- Senior Design
- Thermodynamics
- Unit Operations & Processes
- Water Quality Engineering
- Water Quality Systems Design
BREADTH REQUIREMENTS

- World History
- Fine Arts, Literature, Philosophy or Religious Studies
- Human Perspectives on Science & Technology
- Economics or Political Science
- Anthropology, Psychology, or Sociology
- Ethnicity
# COURSE PLAN – CHEMICAL ENGINEERING

## Suggested Course Plan for a UC Riverside Major in CHEMICAL ENGINEERING

### Catalog Year: 2020

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To earn a B.S., you must complete all College and University requirements. For a full list of requirements, go to catalog.ucr.edu.

**ENGLISH COMPOSITION**

A C or better is required in all English Composition courses to satisfy the graduation requirement. Please consult with your Academic Advisor for ENGL 1C alternatives.

**BREADTH REQUIREMENTS**

For an approved list of Breadth courses, go to http://student.engr.ucr.edu/policies/requirements/breadth.html.

- Humanities: (3 courses)
  - A. World History: __________
  - B. Fine Arts/Art/Phil/Rel: __________
  - C. Human Persp. on Sci: __________
- Social Sciences: (3 courses)
  - A. Econ. or Poli.: __________
  - B. Anth, Psy, or Soc.: __________
  - C. General Social Science: __________

**ETHNICITY**

- 1. __________
- 2. __________

**TECHNICAL ELECTIVES**

Please note that Technical Electives may be offered throughout the Academic Year. Consult with your Faculty Mentor about potential offerings. See approved technical electives on back.

Course Plan is subject to change.
# COURSE PLAN – ENVIRONMENTAL ENGINEERING

**ENVIRONMENTAL ENGINEERING**

### Catalog Year: 2020

**To earn a B.S., you must complete all College and University requirements. For a full list of requirements, go to catalog.ucr.edu.**

**ENGLISH COMPOSITION**

A C or better is required in all English Composition courses to satisfy the graduation requirement. Please consult with your Academic Advisor for ENGL 1AC alternatives.

**BREADTH REQUIREMENTS**

For an approved list of breadth courses, go to http://student.engr.ucr.edu/policies/requirements/breadth.html.

- Humanities: (3 courses)
  - A. World History: ____________
  - B. Fine Arts, Lit., Phil., Rts: ____________
  - C. Human Persp. on Science: ____________
  - Social Sciences: (3 courses)
    - A. Econ. or Pol.: ____________
    - B. Anth., Psych, or Soc.: ____________
    - General Social Science: ____________

- Ethnicity: (1 course)
  - Upper Division: (2 courses)
    - 1. ____________
    - 2. ____________

**TECHNICAL ELECTIVES**

Please note that Technical Electives may be offered throughout the Academic Year. Consult with your Faculty Mentor about potential offerings. See approved technical electives on back.

Course Plan is subject to change.

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| **SECOND YEAR** |       |                |       |               |       |
| CHEM 008A & CHEM 08LB | 4     | CHE 100 | 4     | CHE 100 | 4     |
| Organic Chemistry |       | Engineering Thermodynamics |       | C++ Programming |       |
| ENV 171        | 4     | CHEM 008B & CHEM 08LB | 4     | ENV 171 | 4     |
| MATH 040       | 4     | MATH 009A | 4     | MATH 009B | 4     |
| Differential Equations |       | Multivariable Calculus |       | Multivariable Calculus |       |
| PHYS 040C      | 5     | Breadth | 4     | ME 010 | 4     |
| Physics (Electricity/Magnetism) |       | Humanities/Social Sciences |       | Humanities/Social Sciences |       |

| **THIRD YEAR** |       |                |       |               |       |
| BIOL 055A & BIOL 055A | 5     | CHE 120 | 4     | ENV 146 | 4     |
| Cell & Molecular Biology & Lab |       | Mass Transfer |       | Water Quality Systems Design |       |
| CHE 114        | 4     | ENVE 133 | 4     | ENVE/160A | 3     |
| Applied Fluid Mechanics |       | Fund. of Air Pollution Engineering |       | Chem. & Env. Engineering Lab |       |
| ENGR 118       | 5     | ENVE 142 | 4     | Technical Elective** | 4     |
| Engineering Modeling & Analysis |       | Water Quality Engineering |       | Breadth | 4     |
| Breadth | 4     | Breadth | 4     | Breadth | 4     |
| Humanities/Social Sciences |       | Humanities/Social Sciences |       | Humanities/Social Sciences |       |

| **FOURTH YEAR** |       |                |       |               |       |
| EPSC/SWSC 100  | 4     | ENVE 135 | 4     | ENVE 175B | 4     |
| Intro to Soil Science |       | Fate & Trans. of Env. Contaminants |       | Senior Design Project |       |
| ENVE 120       | 4     | ENVE 160C | 3     | Technical Elective** | 4     |
| Unit Operations and Processes |       | Environmental Engineering Lab |       | Technical Elective** | 4     |
| ENVE 160B      | 3     | ENVE 175A | 4     | Technical Elective** | 4     |
| Environmental Engineering Lab |       | Senior Design Project |       | Breadth | 4     |
| CEE 158        | 3     | Breadth | 4     | Breadth | 4     |
| Professional Development for Eng. |       | Humanities/Social Sciences |       | Humanities/Social Sciences |       |

Total Units: 135

Maximum units: 212
ADMISSIONS

- Visit Admissions website for:
  - Financial Aid, Costs, and Fees
  - Important Deadlines
  - Resources & Support
  - UC Application

- November 30th Deadline

https://admissions.ucr.edu/
Chemical Engineers transform raw materials into useful everyday products. Chemical engineers turn the discoveries of chemists and physicists into commercial realities.

Example: Scientists discovered effective COVID vaccine, **Chemical Engineers** will develop the process to mass produce vaccine for the general population

- Our graduates have found jobs in a variety of fields including pharmaceuticals, materials, chemical, fuels, pollution control, medicine, and nuclear and electronic industries

- The unique experience of our department is the synergy between chemical and environmental engineers!
Advanced Materials and Nanotechnology Faculty

- 7 Faculty

Research Areas range from:
- Professor Zachariah: Aerosol, Energetic Materials
- Professor Yan: Photonics
- Professor Wu: Membranes, Soft materials
- Professor Wong: Electron Dynamics in Nanoscale Materials
- Professor Min: Polymers, Bioinspired Materials
- Professor Guo: Batteries and Energy Storage
- Professor Abdul-Aziz: Catalysis, Nanotechnology

Incorporate Knowledge and Research in Courses to Ensure Student’s Receive a Highly-rated World-Class Education with Adequate Preparation for Industry and Academia
Chemical Engineering – Nanomaterials Examples

**Electronics**
- Materials that modulate electron conductivity, energy storage

**Pharmaceuticals**
- Nanomedicines for drug delivery and imaging

**Cosmetics**
- Incorporate Materials improve functionality

**Catalysis**
- Used in ~90% of Industrial processes to speed up chemical reactions
Chemical Engineering Major – Nanotechnology Option

- Focuses on the use of materials and nanotechnology in industry or nanoscale processes
- Electives include courses that incorporate the faculty’s specialty/research areas
- CHE 105, CHE 161, CEE 135 (Chemistry of Materials)
- 8 Units of the Technical Elective (Select courses)
  - CHE 102 – Catalytic and Reaction Engineering
  - CHE 131 – Electrochemical Engineering
  - ENVE 133 – Fundamentals of Air Pollution Engineering
  - MSE 160 – Nanostructure Characterization Lab
Chemical Engineering Major

Advanced Materials and Nanotechnology Research Opportunities

Gain hands-on experience by performing world-class research on-campus
Biochemical Engineering & Biotechnology
Prof. Robert Jinkerson
Biochemical engineering & Biotechnology faculty @ UCR CEE

HEALTH
- Xin Ge
- Ashok Mulchandani

FOOD & AGRICULTURE
- Robert Jinkerson
- Yanran Li

INDUSTRIAL/ BIOFUELS
- Ian Wheeldon
- Harvey Blanch
- Charles Wyman

ENVIRONMENTAL
- Yujie Men
- Yun Shen
Photosynthetic organisms impact nearly every aspect of our lives.
Engineering algae to make more biofuels

Each dot = 1 mutant

Normalized barcode reads from all cells
Normalized barcode reads from high lipid cells

Wild Type
Mutants
- Protein phosphatase
- E3 ubiquitin ligase
- Transcription regulator

Scale up growth to evaluate
Engineering coral to be resistant to bleaching

coral

lab model sea anemone

mutants

field evaluation

Reef 2 Reef
What will agriculture look like in space or on Mars?
We are developing plants that minimize the inedible portions to be better adapted for new agriculture environments.

**Wildtype**

*in vitro*

*in soil*

**mutant**

Harvest on the ISS

Collaboration with Martha Orozco-Cárdenas
Water Quality Systems Engineering
Prof. Yun Shen
Water Quality Systems Engineering
Overview

Mission: Promote clean and safe water supply

Faculty members:
- Haizhou Liu
- Jinyong Liu
- Yujie Men
- Yun Shen
Featured course introduction

- ENVE 121 Biological Unit Processes
  - Important biological treatment processes used in water/wastewater treatment.
  - Apply the knowledge to municipal, industrial, and other hazardous waste problems

- ENVE 146 Water Quality Systems Design
  - Application of fluid mechanics to the design of water distribution networks, wastewater and storm water collection systems, and pumps and pump station.

- ENVE 142 Water Quality Engineering
  - Water quality characterization and modeling techniques for natural and engineered systems.
  - Discusses application of chemical equilibrium and kinetic models to water quality.

- ENVE 160C Environmental Engineering Lab
  - Apply principles learned in the classroom to solve practical problems.
  - Design processes, take measurements, analyze the data, and report results from the lab experiments.
Featured course introduction

- ENVE 121 Biological Unit Processes
  - Important biological treatment processes used in water/wastewater treatment.
  - Apply the knowledge to municipal, industrial,

- ENVE 142 Water Quality Engineering
  - Water quality characterization and modeling techniques for natural and engineered systems.

Prepare future leaders in water quality system engineering.

Design
- Application of fluid mechanics to the design of water distribution networks, wastewater and storm water collection systems, and pumps and pump station.

Lab
- Apply principles learned in the classroom to solve practical problems.
- Design processes, take measurements, analyze the data, and report results from the lab experiments.
Research Goals

- Understanding and application of **aquatic chemical processes** to improve water quality, design treatment processes and provide more reliable water supplies.
Research Goals

- Understand and apply reduction reactions and catalysts to treat current and future chemical contaminants with (1) high activity, (2) high robustness, (3) easy preparation, and (4) low cost.
Microbe-Environment Nexus Lab (Dr. Yujie Men)

Minimize the health risks

- Evolution and fate of antibiotic resistant microbes in the environment

Promote application of microbes

- Utilize microbes to treat chemical waste
- Optimize functions of microbes to produce biofuel.

Health

Harmful microbes

Beneficial microbes

Sustainability
Solutions to Health-Environment Nexus Lab (Dr. Yun Shen)

Research Goals

• Elucidate pathogen (including coronavirus) transmission across different media
• Develop engineering solutions to control pathogens and protect public health
Air Quality Systems Engineering
Prof. Don Collins
Some of our undergraduate courses on air quality

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<td>ME 136</td>
<td>Environmental Impacts of Energy Production and Conversion</td>
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Los Angeles suffers worst smog in almost 30 years

By TONY BARBOZA | STAFF WRITER
SEP 10, 2020 | 11:45 AM UPDATE 5:09 PM

Brooks Hubbard with the U.S. Army Corps of Engineers takes photos from the historic North Broadway Bridge over the Los Angeles River Tuesday morning as smoke and ash from the Bobcat fire cloak the area. (Al Seib/Los Angeles Times)
David Cocker’s group uses large Teflon chambers to study pollutant formation from sources like cars and in the complex mixture of species found in the atmosphere.
Air quality research we do in the field

Don Collins’ group uses drones to measure ozone and other pollutants.

Kelley Barsanti’s group collects wildfire smoke samples from aircraft.

Sunni Ivey’s group uses lightweight samplers to study personal exposure.
Air quality research we do with our computers

Sunni Ivey’s group uses regional air quality models to simulate ozone formation and concentrations.

Kelley Barsanti’s group uses laboratory data to improve simulation of atmospheric chemistry.
Many, many others at UCR doing air quality research

Fundamental Interactions
- J. Zhang (Chemistry)
- Davies (Chemistry)
- Bahreini (Env. Sci.)
- Baehrini (Chem. Env.)
- H. Zhang (Chemistry)
- Collins (Chem. Env.)
- Cocker (Chem. Env.)
- Lin (Env. Sci.)

Ensemble Dynamics
- Hopkins (Env. Sci.)
- Ivey (Chem. Env.)
- Li (Env. Sci.)
- Jung (Mech. Eng.)
- Porter (Env. Sci.)
- Allen (Earth Sci.)

Environmental Interactions

Increasing length scale and complexity

Diagram: J.F. Davies and C. Ivey
An exciting addition to our (almost) campus

Southern California Headquarters

CARB is building a new Southern California Headquarters

Under construction on a 19-acre site near the campus of UC Riverside, the approximately 380,000 square-foot facility will be one of the largest and most advanced vehicle emissions testing and research facilities in the world. It will also be the largest ‘net-zero energy’ structure (producing as much energy as it uses) of its type in the nation. The facility will also be designed to achieve Leadership in Energy and Environmental Design (LEED) Platinum certification and meet CalGreen Tier 2 standards. The facility is scheduled to be completed in early 2021.

“This striking design will make CARB’s new Southern California headquarters an immediately recognizable landmark,” said CARB Chair Mary D. Nichols. “It incorporates the highest standards of sustainability in the office and public spaces, and meets the exacting laboratory specifications we need to keep California at the forefront of our world-leading efforts to clean up our air and fight climate change.”
Faculty Q & A Panel

Please submit your questions in the chat!

All specific admissions inquiries may be sent to Mr. Desmond Harvey dharvey@engr.ucr.edu.
Connect With Us!

Chemical and Environmental Engineering

gradcee@engr.ucr.edu
@CEEatUCR
www.cee.ucr.edu

Apply to CEE!
Nov. 30th