

# CHEMISTRY AT URSINUS



Ursinus College

# Chemistry Faculty & Staff



Mark Ellison



Danielle Klein



Brian Pfennig



Amanda Reig



Monica Giancarlo



Victor Tortorelli



Ryan Walvoord



Eric Williamsen



Samantha Wilner



Matt Zrada



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# Chemistry Majors @ Ursinus

- 8-10 per year
- 50:50 Male:Female Ratio
- Double Majors/Minors
  - Languages (French, German, Spanish)
  - Math, Computer Science
  - BCMB, Biology



# Chemistry Curriculum

## Chemistry Major



Track 1: Specialization  
in Chemistry



Track 2: ACS Certified



Track 3: Specialization  
in Chemistry for Allied  
Health



Track 4: Specialization  
in Chemistry for  
Science Teaching



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# Chemistry Curriculum

- Track 1: Specialization in Chemistry
  - General Chemistry I & II (with labs)  
(or Advanced General Chemistry)
  - Organic Chemistry I & II (with labs)
  - Inorganic Chemistry (with lab)
  - Instrumental Analysis (with lab)
  - Physical Chemistry I & II (with labs)
  - Rhetoric and Responsibility of the Modern Scientist
  - Two Special Topic Courses in Chemistry
  - Senior Seminar
  - Physics I & II (with labs)
  - Calculus II



# Chemistry Curriculum

- Track 2: ACS Certified
  - One semester of Biochemistry
  - 4-credit internship, off-campus research, or on-campus research
- Track 3: Specialization in Chemistry for Allied Health
  - Biology 101 (Ecology & Evolution)
  - Biology102 (Cell Biology)
  - One semester of Biochemistry
- Track 4: Specialization in Chemistry for Science Teaching
  - Environmental Chemistry OR Intro to Environmental Studies
  - 9 Education Courses



# Chemistry Courses

- Introductory courses limited to 35 students
- Upper level courses typically 10-15 students
- Faculty employ active-learning strategies to engage students
  - Clickers
  - Demonstrations
  - Small-group activities



# Advising & Academic Resources

- First-Year Advising & Major Advising
- Summer Online Prep Program (ALEKS)
- Peer Tutoring
  - Small Group
  - Individual





# Opportunities

- Lab Assistant
- Peer Tutor
  - PASS (Peer-Assisted Study Sessions)
  - Individual Tutoring
- Parlee Center for Science and the Common Good and Ulmagine Center for Integrative and Entrepreneurial Studies



# Professional Development

- Robust Seminar Series
- Merck/GSK Externships
- Alumni Career Panels



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# Instrumentation & Facilities

- Pfahler Hall
  - Built in 1936, Major renovation in late 1990s, additional renovations in 2013
- 6 Teaching laboratories
- 7 Dedicated student research laboratories with separate write-up areas



# Instrumentation & Facilities

- State of the art, research grade instrumentation accessible to students
- New Instrumentation:
  - 300 MHz NMR spectrometer
  - IR, HPLC, GC-MS, Fluorometer



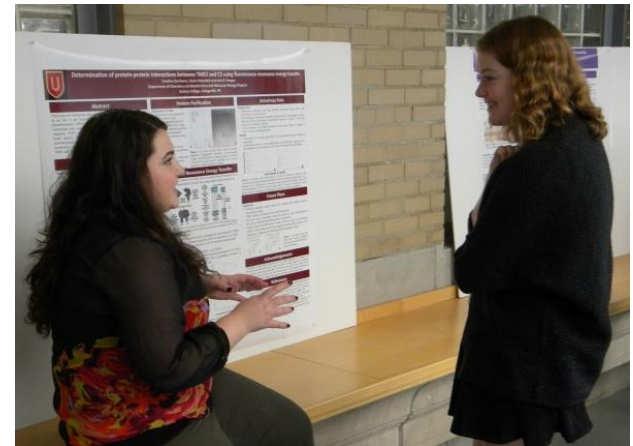
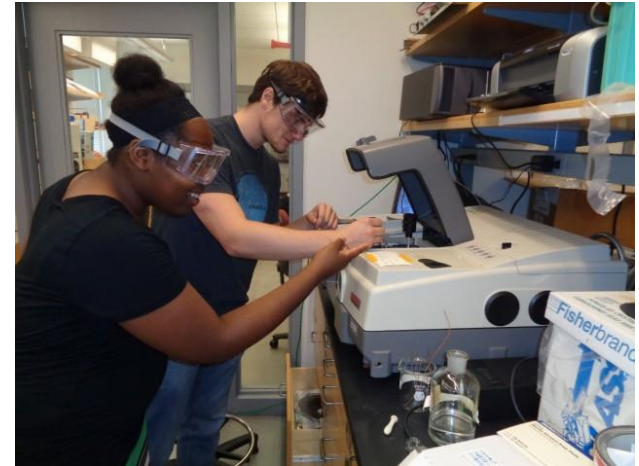
# Independent Research

- Opportunity to work closely with faculty mentor and other students on a research project
- Can begin as early as first semester at Ursinus
- More than 80% of Chemistry Majors participate in Research
- Approximately 30 students are conducting research in chemistry labs each semester



# Academic Year Research

- 1-Credit
  - 3 hr/wk in lab
  - Poster presentation at end of semester
- 2-Credit
  - 6 hr/wk in lab
  - Poster presentation at end of semester
- 4-Credit
  - 12-14 hr/wk in lab
  - Oral presentations and final research paper

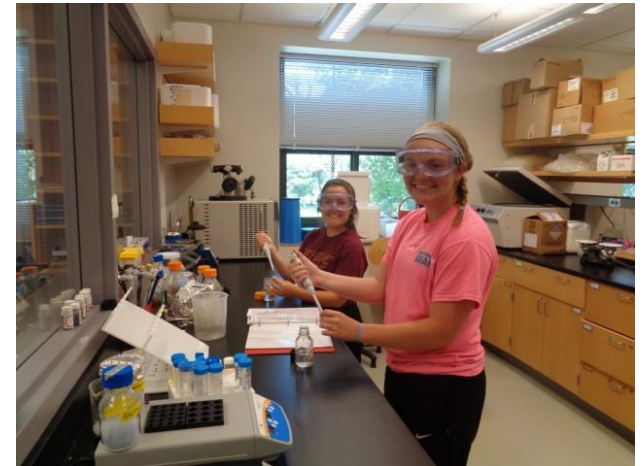


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# Summer Research

- Summer Fellows Program
  - 8 weeks of full-time research (40 hr/wk)
  - \$2500 stipend and free campus housing
  - Culminates in written paper and either oral or poster presentation at campus symposium
  - Sophomores and Juniors eligible to apply

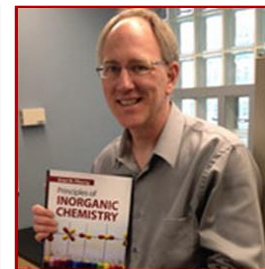


# Research in Chemistry



Dr. Ellison - Physical Chemistry  
Applications of Carbon Nanotubes  
for Medicine and Energy

Dr. Pfennig - Inorganic Chemistry  
Photo-Induced Electron Transfer in Mixed-Valence  
Metal Complexes



Dr. Reig - Inorganic/Biochemistry  
Design and Characterization of Artificial  
Metalloproteins



# Research in Chemistry



Dr. Walvoord – Organic Chemistry  
Synthetic Modification of Fluorescent Materials

Dr. Williamsen – Analytical Chemistry  
Characterizing HPLC Stationary Phases;  
Food Chemistry



Dr. Wilner - Biochemistry  
Biophysics of Membrane Curvature



# Research Accomplishments

- Students Routinely Present at Regional and National Conferences
- Multiple awards for best posters at UMBC Symposium



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# Research Accomplishments

- 17 peer-reviewed publications including 7 Ursinus students

**BIOCHEMISTRY**  
including biophysical chemistry & molecular biology

Article  
[pubs.acs.org/biochemistry](https://pubs.acs.org/biochemistry)

**Systematic Perturbations of Binuclear Non-heme Iron Sites: Structure and Dioxygen Reactivity of *de Novo Due Ferri* Proteins**

Rae Ana Snyder,<sup>†</sup> Justine Betzu,<sup>‡</sup> Susan E. Butch,<sup>‡</sup> Amanda J. Reig,<sup>\*,‡</sup> William F. DeGrado,<sup>\*,§</sup> and Edward I. Solomon<sup>\*,†,||</sup>

<sup>†</sup>Department of Chemistry, Stanford University, Stanford, California 94305, United States

THE JOURNAL OF  
**PHYSICAL CHEMISTRY C**

Article  
[pubs.acs.org/JPCC](https://pubs.acs.org/JPCC)

**Electrokinetic Transport of Methanol and Lithium Ions Through a 2.25-nm-Diameter Carbon Nanotube Nanopore**

Mark D. Ellison,<sup>\*,†</sup> Samuel Menges,<sup>†</sup> Laura Nebel,<sup>†</sup> Gabrielle D'Arcangelo,<sup>†,§</sup> Anna Kramer,<sup>†,§</sup> Lee Drahushuk,<sup>‡</sup> Jesse Benck,<sup>‡</sup> Steven Shimizu,<sup>‡</sup> and Michael S. Strano<sup>‡</sup>

<sup>†</sup>Department of Chemistry, Ursinus College, Collegeville, Pennsylvania 19426, United States  
<sup>‡</sup>Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, United States



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# Research Funding



- National Science Foundation
  - Electrokinetic Transport and Electric Field Control of Ion Motion through the Interior of Single-Walled Carbon Nanotubes; **\$200,217** (Ellison)
  - MRI: Acquisition of a 300 MHz NMR to Enhance Research and Education at Ursinus College; **\$214,284** (Walvoord, Reig, Ellison)



- National Institutes of Health
  - Using De Novo Protein Models to Understand Functional Tuning in Di-Iron Carboxylate Enzymes; **\$221,844** (Reig)
- Howard Hughes Medical Institute
  - Establishment of the Center for Science and the Common Good; **\$800,000**



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# REU Programs

- Research Experiences for Undergraduates at other colleges and universities
- 10 week paid programs
- Recent Programs:



# Internships

- Paid summer research positions
  - Students can also earn course credit
- Recent Companies:



GlaxoSmithKline



**MERCK**



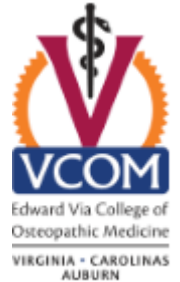
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# Outcomes

| Sector  | 5-Year Average |
|---|----------------|
| Employed in Chemistry or Related Field  | 41%            |
| Graduate School in Chemistry or Related Field   | 33%            |
| Healthcare <ul style="list-style-type: none"><li>• Medical School</li><li>• Veterinary School</li><li>• Dental School</li><li>• Nursing</li><li>• Optometry</li></ul> | 14%            |
| Other <ul style="list-style-type: none"><li>• Teaching</li><li>• Service (e.g. Peace Corps)</li><li>• Non-science employment</li></ul>                                | 12%            |



# Outcomes: Graduate & Medical School



NORTHWESTERN  
UNIVERSITY



TEMPLE  
UNIVERSITY®



RUTGERS



PRINCETON  
UNIVERSITY



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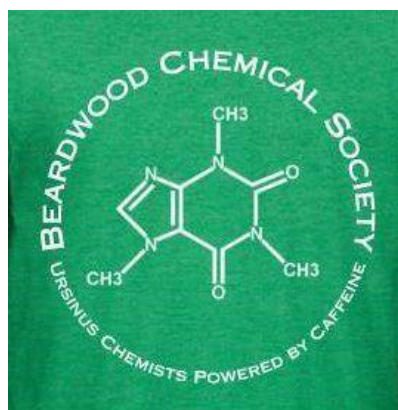
# Outcomes: Employment







# Beardwood Chemical Society

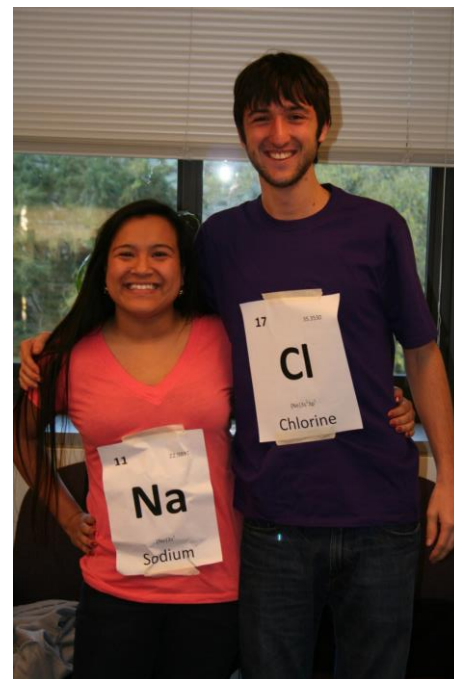


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# Chemistry Teas

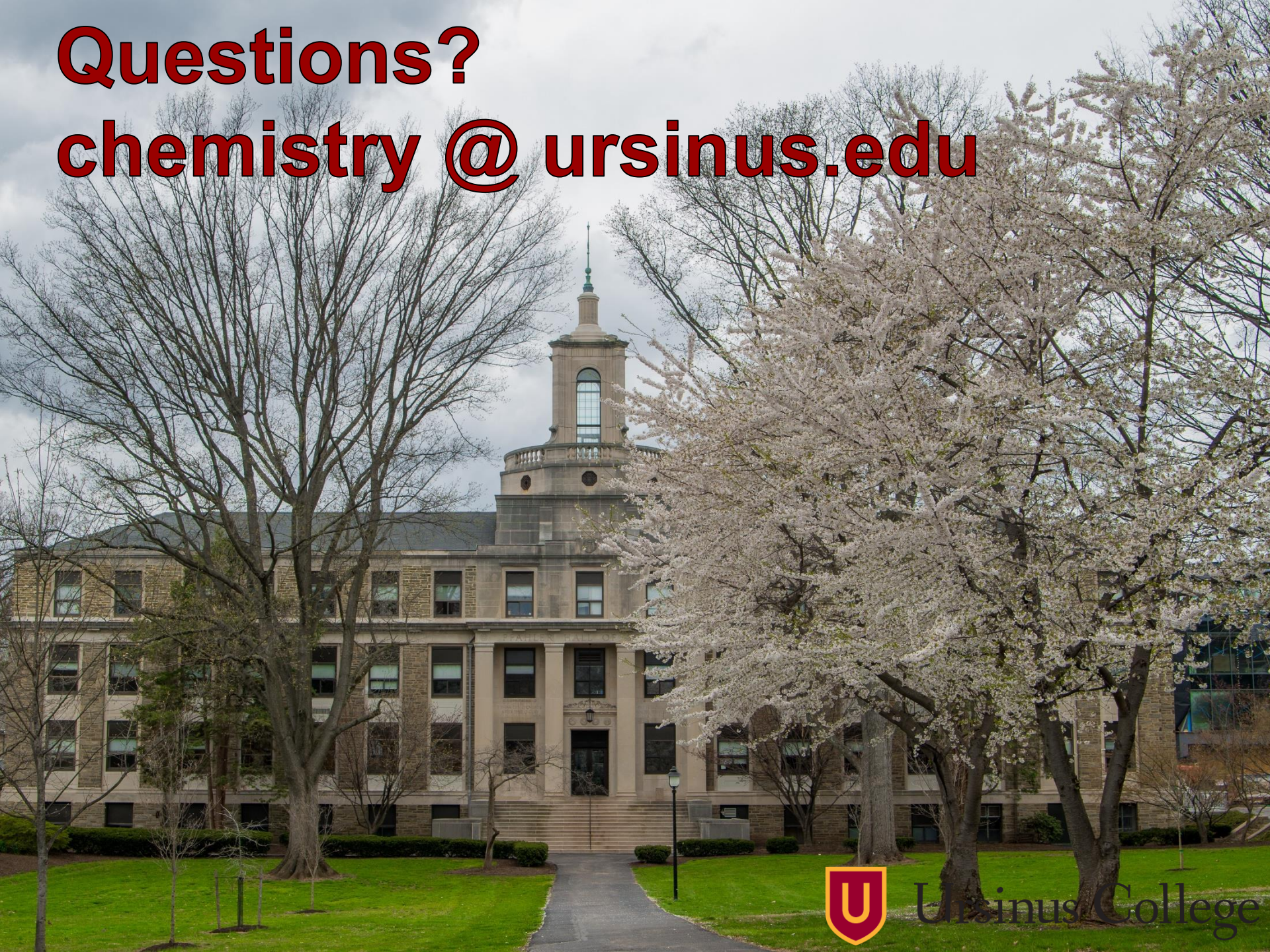
- Monthly Student-Faculty Social Gatherings



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**Questions?**  
**chemistry @ ursinus.edu**



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