20PHD CHE
Chemical Engineering

Department of
Biomedical,
Chemical, and
Environmental
Engineering

College of
Engineering and
Applied Science

2014

Primary Faculty:

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Faculty Committee:

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I. Program Overview

The Chemical Engineering faculty is fully committed to building a nationally and internationally recognized graduate program that trains a diverse student body representative of the society in which we live. Our primary objective is to help these individuals scientists develop fundamental understanding and make breakthrough discoveries in areas of substantial societal impact both now and during the course of their future.

University of Cincinnati Mission Statement

The University of Cincinnati serves the people of Ohio, the nation, and the world as a premier, public, urban research university dedicated to undergraduate, graduate, and professional education, experience-based learning, and research.

We are committed to excellence and diversity in our students, faculty, staff, and all of our activities. We provide an inclusive environment where innovation and freedom of intellectual inquiry flourish.

Through scholarship, service, partnerships, and leadership, we create opportunity, develop educated and engaged citizens, enhance the economy and enrich our University, city, state and global community.

College of Engineering and Applied Science Mission Statement

The mission of the College of Engineering and Applied Science is to provide:

- Excellence in Education—provide a world-class education for our students
- Excellence in knowledge creation and transfer in support of education and community—provide the best education featuring new breakthroughs in science and technology and be able to transfer that knowledge of science technology both to our students and to our local community
- Accessibility—provides a venue where qualified students, who want to come, can come; and provide the support necessary to allow them to be successful.
II. **Program Outcomes**

a. Students will become successful researchers and engineers.
b. Students will be able to identify and articulate the status of research in forms of literature review in a Chemical Engineering area.
c. Students will understand theories, approaches, methods and purpose of a development by a research plan.
d. Students will develop a thesis that will result in completing a proposed research plan and demonstrate the research relevance and uniqueness to Chemical Engineering.
e. Students will learn the process and complete a journal publication about his/her research and present the research at a conference and workshop.
f. Students will have a comprehensive knowledge of chemical reactor design and kinetics, transport phenomena, fluid mechanics, chemical manufacturing, advanced materials and bio and life science applications.
g. Students will be able to understand chemical engineering problems and solve by knowledge taught in coursework.

**Curriculum/Program Map**

Total hours for degree 102-93
9-24 credit hours of electives

Required courses: CHE7077, CHE6043, CHE 6044, CHE6040, CHE9071
Written exams are required of the four core courses CHE6045, CHE6043, CHE6044, and CHE6945
| Key          | CHE9072 | CHE9000 | CHE6090 | CHE6089 | CHE6023 | CHE6024 | CHE6030 | CHE6037 | CHE6045* | CHE6040* | CHE6043* | CHE6044* | CHE6045C | CHE9070 | Dissert  |
|--------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| D: Developing|         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| A: Achieved  |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |

1. Students will become creative researchers and problem solving engineers.

2. Students will be able to identify and articulate the status of research in forms of literature review/critiques in a Chemical Engineering area.

3. Students will understand theories, approaches, methods and purpose of a development by a research plan.
4. Students will develop a dissertation that will result in completing a proposed research plan and demonstrate the research relevance and uniqueness to Chemical Engineering.

5. Students will learn the process and complete a journal publication about his/her research and present the research at a conference and workshop.

6. Students will have a comprehensive advanced knowledge of chemical reactor design and kinetics, transport phenomena, fluid mechanics, chemical manufacturing, advanced materials and bio and life science applications.

7. Students will be able to understand chemical engineering problems and challenges and solve by knowledge taught in coursework.
### I. Methods and Measures: Assessment Measures Aligned with Program Outcomes

<table>
<thead>
<tr>
<th>Program Outcome</th>
<th>Assessment Tools</th>
<th>Course/Experience</th>
<th>Time Line</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will become creative researchers and problem solving engineers.</td>
<td>a. Design or research projects b. Course case study c. Project presentations</td>
<td>a. Electives b. PHD research c. CHE9072*</td>
<td>d. Annually; Spring semester e. Annually, Spring semester</td>
<td>Course Directors</td>
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<tr>
<td>2. Students will be able to identify and articulate the status of research in forms of literature review/critiques in a Chemical Engineering area.</td>
<td>a. NSF style research proposal writing b. Research proposal presentation and defense</td>
<td>a. CHE9071 b. CHE9072</td>
<td>a. Annually; fall, spring and summer</td>
<td>The dissertation advisor and committee.</td>
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<tr>
<td>4. Students will develop a dissertation that will result in completing a proposed research plan and demonstrate the research relevance and uniqueness to Chemical Engineering.</td>
<td>a. Case study in electives b. Middle stage research progress evaluations c. In group presentations d. Dissertation presentation and defense</td>
<td>a. Electives b. CHE9072* c. Dissertation CHE9071</td>
<td>a. Second year (Spring, Fall Summer)</td>
<td>The dissertation advisor and dissertation committee members.</td>
</tr>
<tr>
<td>5. Students will learn the process and complete a journal publication about his/her research and</td>
<td>a. Presentation to peer students, advisor and committee</td>
<td>a. CHE9071 b. CHE9000 c. CHE9072</td>
<td>a. Annually, Fall semester b. Annually,</td>
<td>The dissertation advisor and PHD dissertation advisor.</td>
</tr>
</tbody>
</table>
### III. Assessment Infrastructure

**Program:** Course directors, dissertation advisors and committee members will all be actively involved in working with the student and with each other to ensure that each student has the strongest support and that work throughout the program is evaluated and discussed with the student as they progress. From the initial design of projects to the selection of courses to match the research project to the evaluation of outcomes achieved in the course, students will have clear indications of progress throughout the program and faculty will have evidence of how the program is working and be able to analyze the data to support students’ achievement of those outcomes. Evaluations will include assessing the project presentations, evaluation of dissertations and defense of the dissertation. Faculty teaching the courses, committee members, the student’s advisor will meet on at a minimum on an annual basis to verify outcomes are being achieved as indicated in the program method and measures timeline.

| 6. Students will have a comprehensive advanced knowledge of chemical reactor design and kinetics, transport phenomena, fluid mechanics, chemical manufacturing, advanced materials and bio and life science applications. | a. Written exams are required for all the FOUR cores courses; exams and/or independent projects are required for electives | a. Core courses: CHE6040, CHE6043, CHE6044, CHE 6045. b. 2-5 CHE electives. | Core courses in first year (Spring, Fall and summer) except for provisional students. | The Course Director for each specific course. | spring semester |
|---|---|---|---|---|
| 7. Students will be able to understand chemical engineering problems and challenges and solve by knowledge taught in coursework. | a. The dissertation or special project experience will be used during the year to assess the effectiveness of the program. b. Proposal presentation and defense (qualify) c. Dissertation presentation and defense | a. CHE 9072 b. Dissertation c. PHD research and special projects | Both fall and spring semesters. | The Course Directors, dissertation advisor and committee. | * different from dissertation topic |
College administrative support: At CEAS, programs can obtain support from the Assessment and Continuous Improvement Center (ACIC). The administrative support in the college from ACIC includes the director and the center's members include the department heads and a faculty representative from each department. ACIC provides assistance in the form of consultation, workshops, audits, examples of assessment plans, learning outcomes assessment, development of rubrics and a range of topics related to continuous improvement of programs.

University administrative resource: University support is provided by Center for Enhancement of Teaching and Learning (CET&L). CET&L provides assistance by workshops and besides other summer institutes is offering summer institutes specifically focused on assessment plans.
V. & VI. Findings and Finding Outcomes

We do not have the findings for out listed methods compiled yet but have instituted a more structured process for collecting, reviewing student work and reporting outcome attainment. An example is the following list of publications students have published and are evidence of program outcomes:

1. Students will become successful researchers and engineers.
2. Students will be able to identify and articulate the status of research in forms of literature review in a Chemical Engineering area.
3. Students will understand theories, approaches, methods and purpose of a development by a research plan.
4. Students will learn the process and complete a journal publication about his/her research and present the research at a conference and workshop.

List of Journal Publications in the Past Year (Part of Faculty)

15. Lee, J.-Y.; Kim, Y. J. Hg(0) Removal Using Se(0)-Doped Montmorillonite from Selenite(IV), The Bulletin of the Korean Chemical Society, 2013, 34, 3767.


List of Recent Student Conference Presentations (Part of Faculty)


12. JS. Kim, R. Desch, S.W. Thiel, V.V. Guliants, N.G. Pinto, “Calorimetric study of biomolecule adsorption on mesostructured cellular foam (MCF) silica; Effect of salt and


