California State Polytechnic University, Pomona

Abbreviated Academic Program Review Self-Study
College of Engineering
Department of Chemical Engineering
BS Chemical Engineering

(ABET accredited)

AY 2023-2024

Spring 2025

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1 PROGRAM EVALUATION – BS CHEMICAL ENGINEERING

1.1 Curriculum and Pedagogy – Undergraduate

Table 1 provides data associated with high non-passing (drop/withdraw/fail or DWF) rates. It is important to note that the numbers reported below are based on filtering the data by major, so only students enrolled as a Chemical Engineering (CHE) major are included in the counts.
Note that the courses listed in Table 1 are all chemistry classes; the Chemical and Materials Engineering (CME) Department does not teach these courses.

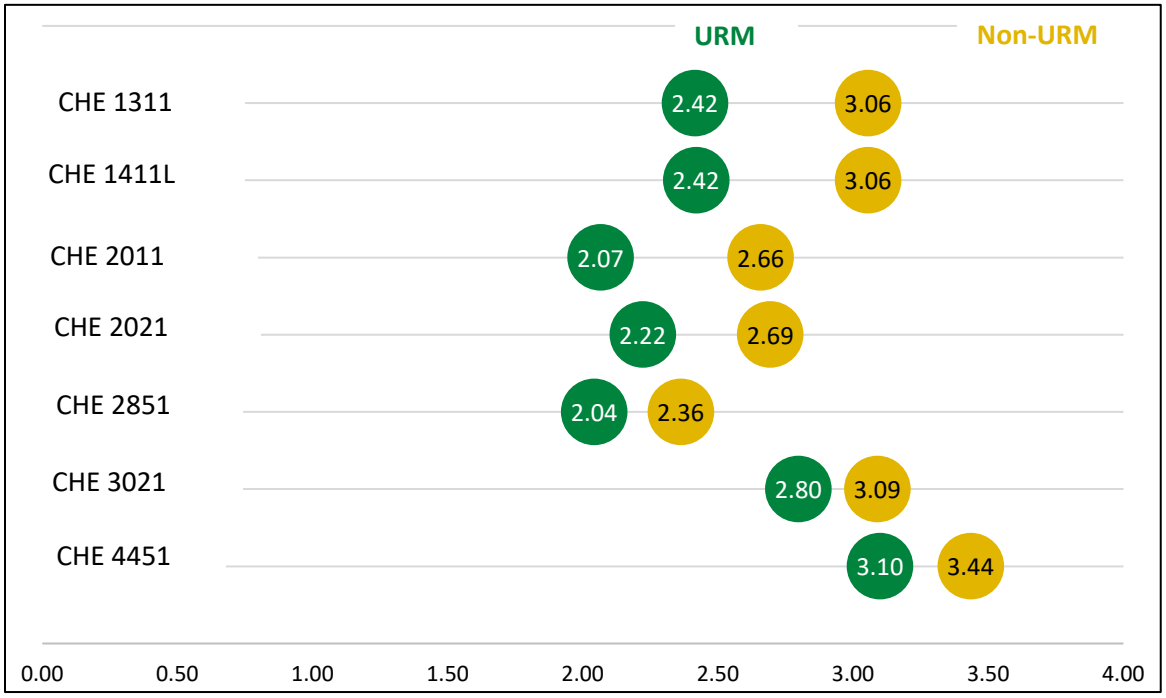
Table 1 – Highest Non–Passing-Rate Courses for 2018-2023[1]

Non-Passing					
Year Term	**Course Code**	**Course Title**	**Enrollment**	**Non-passing Rate**	**Impact**
All Academic Years - Semester	CHM3150	Organic Chemistry II	22	41%	9
All Academic Years - Semester	CHM3140	Organic Chemistry I	45	31%	14
All Academic Years - Semester	CHM2910A	Chemical Communication Act	13	23%	3
All Academic Years - Semester	CHM2010	Elements of Organic Chemistry	453	18%	82
All Academic Years - Semester	CHM1210	General Chemistry I	302	17%	52
All Academic Years - Semester	CHM1220	General Chemistry II	290	17%	49
All Academic Years - Semester	CHM3110	Classical Physical Chemistry	19	16%	3
All Academic Years - Semester	CHM3010	Modeling Fund of Physical Chem	40	15%	6
All Academic Years - Semester	CHM1210L	General Chemistry Laboratory I	293	12%	36
All Academic Years - Semester	CHM3040	Elements of Physical Chem I	49	10%	5
All Academic Years - Semester	CHM1220L	General Chem Laboratory II	288	9%	27

[1] CSU Dashboard "In Which Courses Do They Struggle" Report
https://csusuccess.dashboards.calstate.edu/public/faculty-dashboard/where-do-they-struggle

Figure 1 depicts the Chemical Engineering courses with the largest equity gaps for URM and non-URM students for all terms from 2018-2023. Figure 2 depicts the Chemical Engineering courses with the largest equity gaps for Pell recipients and non-Pell recipients. The scale uses numerical values for the different grades: *1 = D, 2 = C, 3 = B, 4 = A*.

Figure 1– Courses with the Largest Equity Gaps by URM Status for Chemical Engineering[2]



Potential question(s) for analysis by department:

- What changes are being implemented within the department/degree program(s) to reduce the impact bottleneck courses have on students?
- How is the department supporting student success by reducing the impact of high drop/withdrawal/fail (DWF) courses within the department/degree program(s)?
- What role do courses in related areas provide for the department/degree program(s)?

The CME department is actively addressing the bottlenecks and DFW issues in the following ways:

Address Bottlenecks

- The department offers at least one section of all required courses every semester.
- We plan to start offering summer classes for some bottleneck classes if there is enough enrollment

[2] Source: Tableau https://analytics.cpp.edu/#/site/production/views/CourseEquityGaps/EquityGaps?:iid=1

Addressing DFW

- Supplemental instructions through MEP are offered for some high DFW rate courses.
- Students use the MEP tutoring resources
- The department has made pedagogical changes to Freshmen course
- The department is planning to do a curriculum redesign to support students' success.
- Introduction of project-based learning in some courses.

Courses in Related Area

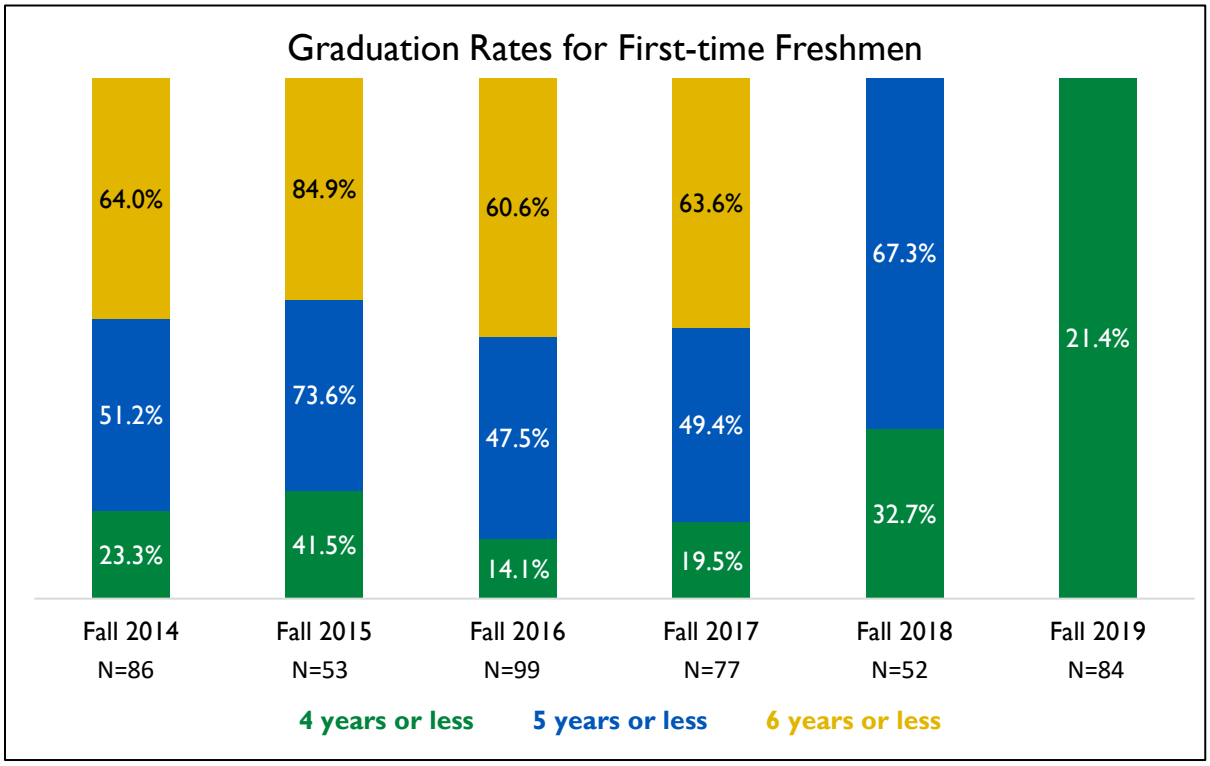
- Students' progress in Math and Science courses significantly affects their graduation rate.

2 STUDENTS – BS CHEMICAL ENGINEERING

2.1 Student Retention and Graduation Rates – Graduation Initiative 2025

Figure 3 provides graduation data for students entering the Chemical Engineering major as First-Time Freshmen only. Any on-campus transfers who started in another major as a freshman are not accounted for in the First-Time Freshmen Graduation Rates for Chemical Engineering. The figure below shows that 60.6% of students who started in 2016 graduated in six years or less, 47.5% of students who started in 2016 graduated in five years or less, and 14.1% of students who started in 2016 graduated in four years or less.

Figure 3 – First-time Freshmen Graduation Rates for Chemical Engineering[3]



[3] Source: Tableau https://analytics.cpp.edu/#/site/production/views/GraduationRatesDashboard/FTFGradRates?:iid=2

The figures below depict six-year graduation rates for underrepresented minorities (URM) and Pell-eligible First-time freshmen majoring in Chemical Engineering. Figure 5 indicates that 52.4% of URM students and 66.7% of non-URM students who started in 2016 graduated in six years or less. Figure 6 below indicates that 76.0% of students who receive the Pell Grant and 70.6% of students who do not and started in 2016 graduated in six years or less.

Figure 5 – First-time Freshmen URM Gap for Chemical Engineering[4]

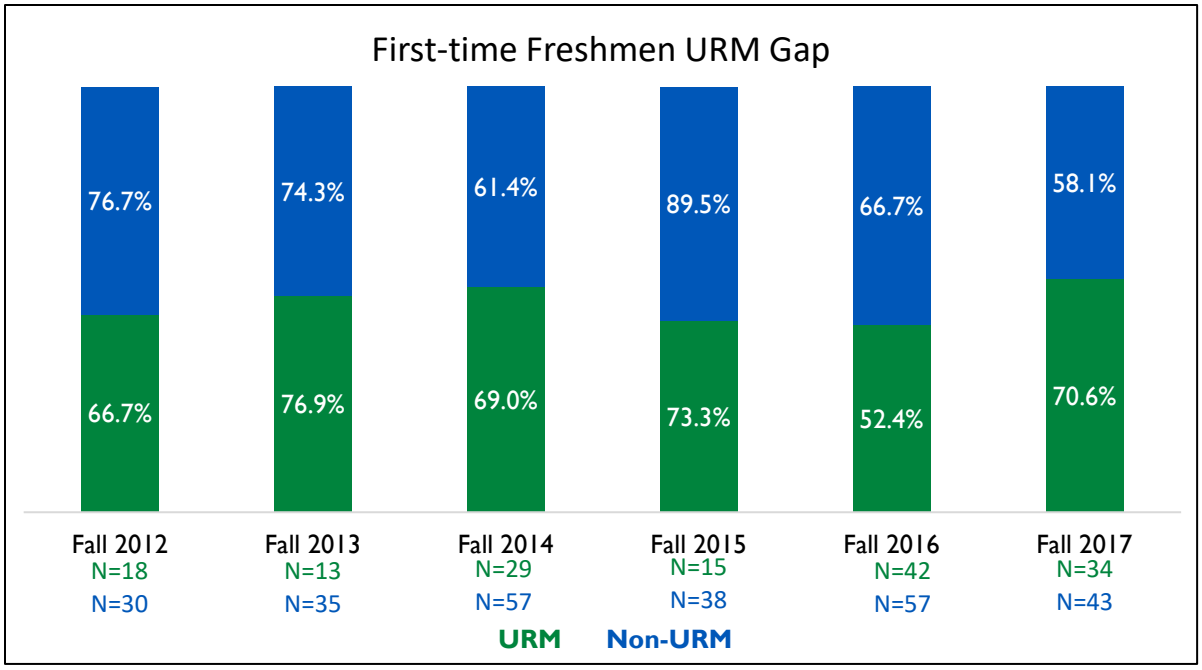
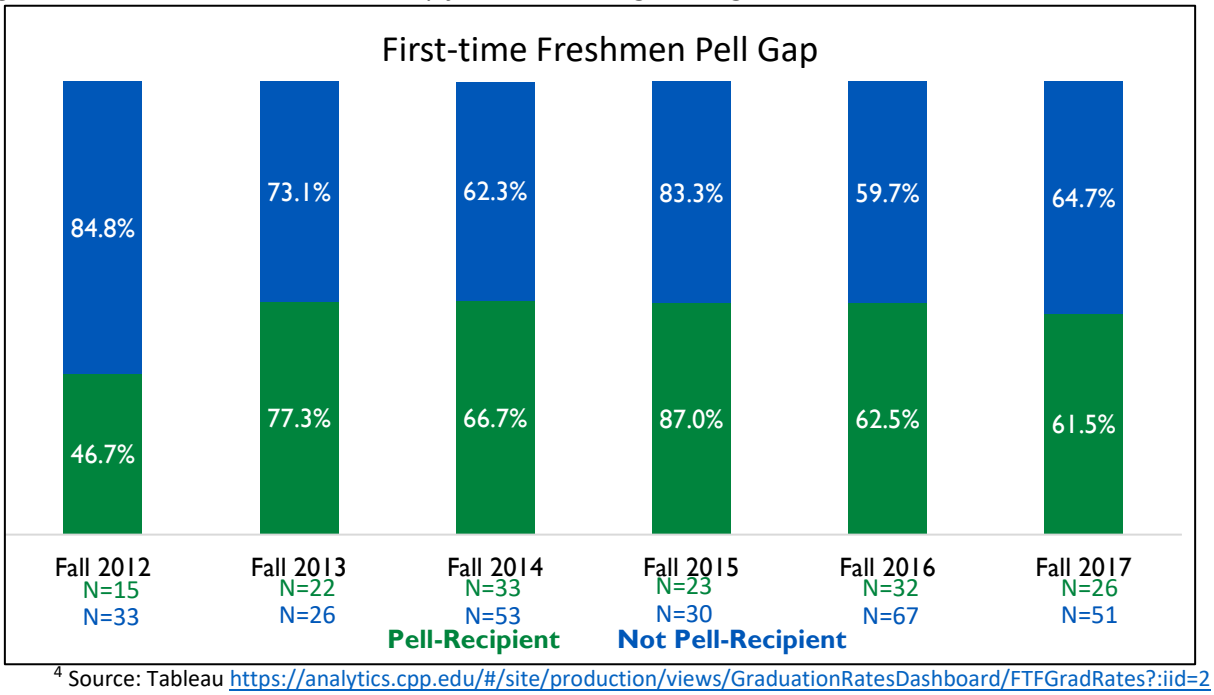


Figure 6 – First-time Freshmen Pell Gap for Chemical Engineering[5]



[4] Source: Tableau https://analytics.cpp.edu/#/site/production/views/GraduationRatesDashboard/FTFGradRates?:iid=2

[5] Source: Tableau https://analytics.cpp.edu/#/site/production/views/GraduationRates_0/FTFPellGap?:iid=2

Required question(s) for analysis by department:

- What is the program currently doing to improve student persistence and graduation rates?
- How is the program eliminating equity gaps for both under-represented minorities (URM) and Pell-eligible students? Please be specific.
- What changes does your program want to make to improve student retention and graduation rates?

Persistence and Graduation

The CME department has been using the following methods to improve persistence and graduation rates for our students.

- Offering at least one section of all required courses every semester.
- Developed a partnership with the CME assigned COE Staff Advisors to enhance students' success
- Faculty include information about campus resources on their syllabus and referring students to the Care programs when necessary.
- Students working in teams with faculty on undergraduate research/projects, which fosters a sense of belonging as well developing required technical skills for industrial work.

Opportunities to continue to improve persistence and graduation

- During the ABET visit it was clear to the reviewers that there is a need for **additional staff advisors** to meet the number of students. These staff advisors need to remain in the CoE to ensure the best communication between all stakeholders (student, faculty and staff).
- Provide more opportunities for faculty to utilize existing university resources and high impact proven practices, such as internship classes, micro-internships in classes, undergraduate research offices, and industry partnerships to support student persistence and graduation.
- Additional tenure track faculty are needed, to offer smaller classes which have been proven to increase retention.
- Research opportunities for undergraduates and project-based learning experiences have been shown to improve retention and graduation rates. Due to heavy teaching loads faculty are limited in their ability to offer these opportunities. The department/college/university needs to develop a sustainable method to support faculty engaged in these initiatives.
- Faculty need to better understand how to leverage AI to support retention and graduation.

Eliminating URM and Pell Gap

- The department does not have enough resources to eliminate URM and Pell graduation gap.
- Course redesign and high impact pedagogical methods used to improve student learning

- The faculty encourage students to explore other resources offered by the university such us LRC, MEP, supplemental instruction, Innovation Incubator, and deans' advisory council

2.2 Student Support, Satisfaction and Services - Undergraduate

2.2.1 Co-Curricular

Student Clubs

The CME department support the following student organizations:

1. American Institute of Chemical Engineers (AICHE): Students engage in networking activities amongst themselves and with industry partners. As well as developing mentorship activities to support each other.
2. AICHE Chem-E-Car Competition (Chem-E-Car): Students engaged in a multi-disciplinary and team-based activity of building a car and competing in the regional and national AICHE annual conference competitions.
3. International Society for Pharmaceutical Engineering (ISPE): Students engage in networking activities amongst themselves and with industry partners. As well as developing mentorship activities to support each other and going on field trips to the pharmaceutical industry.
4. Material Advantage (MA): Students engage in networking activities amongst themselves and with industry partners. Students present their research work at conferences hosted by this organization.
5. Association for Materials Protection and Performance (AMPP): Students engage in networking activities amongst themselves and with industry partners. Students present their research work at conferences hosted by this organization.

Undergraduate Research

As part of the CME department's curriculum, all students must complete a one-year senior project, which involves research work with one of the faculty in the department. As part of the requirement, students must present their work at the College of Engineering Symposium and in some cases at regional, national or international conferences.
Also, all CME students will complete a senior capstone design project which involves the design of a chemical process plant. The design project is reviewed by an industry panel at the end of the fall and spring semesters.
In both cases the students work in teams and are required to submit technical written reports in addition to the presentations as well as individual executive summary reports for the one-year senior project.

Data obtained from your department: Provide the name and number of student organizations supported within the department; number of students within your program/department doing undergraduate research; number of undergraduate students attending conferences, submitting papers, etc.

Possible question(s) for analysis by department:

- Programs/departments with student organization(s): What are the student organizations that reside within the department? How do these organizations support the department's mission and values?
- Programs/departments without student organization(s): What co-curricular experiences does your program offer to support the discipline?
- Describe how undergraduate research, scholarship, and creative activities within the department broaden and deepen students' classroom learning, as well as supports the development of skills necessary for life-long learning?
- How are faculty engaging students in scholarship?

3 INCLUSIVE POLYTECHNIC EDUCATION

Department: Identify department and academic program activities that align to the elements of the Cal Poly Pomona Inclusive Polytechnic Education by completing Table 1 (add additional rows as needed). There is no need to put each class from the curriculum in this table.

Table 1- Alignment of Department Activities to the Inclusive Polytechnic Education

Department Activity (Curricular and Co-Curricular)	Elements of Inclusive Polytechnic Education							
	Application of Knowledge	Critical Thinking & Problem Solving	Creativity, Discovery, & Innovation	Diverse & Multi-Disciplinary Perspectives	Integration of Technology	Collaborative Learning	Community & Global Engagement	Professional & Career Readiness
Senior Design Capstone Projects	X	X	X	X	X	X	X	X
Faculty-Led Research Projects	X	X	X	X	X			X
First Year Experience (e.g. EGR 1000/1000L)	X	X	X	X	X	X	X	X
Participation in Engineering Competitions	X	X	X		X	X		X
Student Clubs (e.g.,ChemE Car Student Chapter)	X	X	X	X	X	X	X	X
Laboratory-Based Courses	X	X			X			X

Question for analysis:

- How does the department and academic program(s) ensure that students receive an "Inclusive Polytechnic Education?" The Office of Academic Innovation has developed definitions and rubrics for evaluating a PolyX experience. Use this tool to evaluate the experience.

The Department ensures students receive an Inclusive Polytechnic Education by integrating hands-on and collaborative learning experiences into both curricular and co-curricular activities. These efforts align closely with the definitions and rubrics developed by the Office of Academic Innovation to evaluate a PolyX experience.

Senior Design Capstone Projects - The Senior Design Capstone sequence (EGR 4810, EGR 4820, EGR 4830, and CHE 4361) is a cornerstone of Inclusive Polytechnic Education, addressing all eight educational areas essential to student development:

- **Application of Knowledge**: Students apply knowledge gained throughout their academic journey to address real-world engineering design problems.
- **Critical Thinking and Problem-Solving**: Through the design process, students integrate critical thinking to identify and analyze issues/problems. They evaluate literature, design manuals, and other resources to develop informed positions and create engineered design solutions.
- **Creativity, Discovery, and Innovation**: The design process connects theory, practice, and research, encouraging students to develop innovative and creative solutions to complex engineering challenges.
- **Diverse and Multi-Disciplinary Perspectives**: Projects incorporate engineering standards and constraints, requiring teams to engage with multi-disciplinary perspectives to achieve comprehensive solutions.
- **Integration of Technology**: Students utilize advanced software tools such as the ones listed below to enhance their analysis and design processes.
    1. Aspen One: Aspen+, Aspen Energy Analyzer, Aspen Capital Cost Estimator, Aspen HYSY, and Aspen EDR
    2. Aveva SimSci: PRO/II, and Aveva Process Simulation
    3. Others: ProSim, HTRI, DYNSIM, VisualFlow, & PipePhase,
- **Collaborative Learning**: Teamwork is integral, with students working in groups and receiving mentorship from faculty advisors and industry partners to guide their projects.
- **Community and Global Engagement**: Teams present their projects to peers, faculty, and industry professionals, fostering stakeholder engagement. Most have connections to industry partners, ensuring real-world relevance.
- **Professional and Career Readiness**: The capstone experience equips students with the skills and confidence necessary to transition seamlessly into their professional careers.

This comprehensive sequence exemplifies the department's commitment to preparing students to achieve a PolyX experience.

Undergraduate Research:

Undergraduate research experience exemplifies an Inclusive Polytechnic Education and covers most areas. All tenure track faculty are active with undergraduate research with students. Below are more details on how each of these areas are reflected in the undergraduate research experience:

- **Application of Knowledge:** Student use information and tools they have learned through their academic experience to identify, formulate, and provide alternative solutions for a research topic, with intense mentorship from their faculty advisors.
- **Critical Thinking and Problem Solving:** Students through these research experiences are provided opportunity to critically think and evaluate alternative solutions within provided constraints (code, standards, regulatory framework, or social constraints)

- **Creativity, Discovery and Innovation:** the undergraduate research experience involves students in a dynamic process of inquiry where they engage with real-world problems, refine their ability to think independently, creatively propose innovative solutions, and contribute to the advancement of knowledge in their chosen fields. With their produced products, many students present their work in locally, national, and international conferences, such as RSCA, SCCUR, AICHE, TEM, AMPP, Materials Advantage conferences.
- **Diverse & Multi-Disciplinary Perspectives:**The faculty in the CME department have different research interests, such as, Materials, Polymer, Pharmaceutical, Plant and Process Design, Water treatment, etc. Any of these research fields require students to explore and incorporate knowledge from multiple disciplines such as Chemistry, Math, Physics, Communication, and Engineering. This approach encourages students to analyze problems from multiple viewpoints, fostering a deeper understanding and innovative solutions that transcend traditional academic boundaries.
- **Integration of Technolog**y: Students use technology and software pertinent to their research topics, such as these mentioned above and others.
- **Collaborative Learning:** Students work in teams of at least two.
- **Community and Global Engagement:** Graduating seniors in CHE 4801A, which is not a project course, work on a community-based type of project to propose a solution to a community need such as water, sanitation, energy, food insecurity etc., for an underprivileged community anywhere in the world. This assignment gives the student a different perspective of the type engineering related problems that they may encounter in the world.
- **Professional & Career Readiness:** Depending on the student's aspirations for graduate school, such research experiences have been proven as high impact practices that prepare them for graduate and academic careers. Some of the students involved in these projects end up joining our master's degree program or master programs in other universities and also pursue PhD.

First Year Experience:
College of engineering freshmen and some transfer students enroll in a one semester lecture and laboratory course, EGR 1000/1000L in which they complete a project work that satisfies all the requirements for First Year Experience. The course aims to engage students in the design cycle, understand an engineer's role in society, explore the various disciplines of engineering, and develop skills that will help them in their academic career both in and out of engineering.

- **Application of Knowledge:**
    - Students apply their knowledge of the design cycle to understand failures and successes and develop engineering solutions to problems.
    - Students apply mathematical skills and critical thinking skills to model data, make statements about trends and performance and make predictions about designs of experiments.
- **Critical Thinking and Problem-Solving**:
    - Students engage in research in their field to develop an understanding of current advancements and where they might find themselves in the field.
    - Students are presented with various multidisciplinary problems and asked to develop

solutions to these problems in teams and judge the success of the solution.

- **Creativity, Discovery, and Innovation:**
  - Students work in multidisciplinary groups to solve community issues in new and unique ways drawing from the holistic composition of the group.
  - Students also work in the lab to develop a foundational understanding of underpinning physics concepts to be able to apply them in later classes.
- **Diverse and Multi-Disciplinary Perspectives:**
  - Every activity in the course is done in a multi-disciplinary group. Students are taught how to gather input for various stakeholders to define the scope of a project and how to best serve all stakeholders with equitable solutions that draw from each discipline.
- **Integration of Technology:**
  - Students use technology to model data and various desktop applications to present various technical projects (posters, presentations, and reports).
- **Collaborative Learning:**
  - Students work in multidisciplinary groups on each project in the lab and discuss solutions to issue in the lecture in a cross-discipline perspective.
  - Students are taught how to work in an effective team focusing on valuing learning styles, communication styles, and psychological safety.
- **Community and Global Engagement:**
  - When possible, students work on real world problems to engage communities (see PolyX).
- **Professional and Career Readiness:**
  - Students learn about each discipline of engineering and how they contribute to society, where the field is leading, and how they can contribute to the field. During this exploration, students learn about the other disciplines and how their discipline with interact with the others.
  - Students work on professional skills such as a resume, and LinkedIn page as well as speaking to potential employers.

Student Club Activities and Competitions:

The department actively supports and encourages participation in student-led engineering organizations such as AICHE, ISPE, ChemE-Car, AMPP etc. All of the clubs are focused on leadership, team building, and networking activities. Some of the clubs like ChemE-Car and AMPP also focus on research and design work that is presented at regional, national, or international competitions. These activities promote hands-on-learning, foster collaboration and professional readiness, improve critical thinking skills and creativity, which are hallmark of the PolyX experience.

- **Application of Knowledge**:
  - Theory is taught through a variety of methods and then reinforce those concepts through active hands-on activities that relate to today's opportunities and challenges.
- **Critical-Thinking and Problem-Solving**:
  - Competitions provide opportunities for students to showcase their skills, talents, and

knowledge. They encourage creativity and teamwork. They strengthen understanding of the subjects matter. Students get opportunities to solve complex engineering problems.

- **Creativity, Discovery, and Innovation**:
    - Student competitions provide students a platform to apply their knowledge in a practical way, encourage them to think outside the box, collaborate with peers, solve real-world and complex problems, do literature review, acquire new knowledge and skills that are not taught in classrooms, and develop solutions that might not be explored in traditional classroom settings. Competitions also help develop entrepreneurial mindset and drive them to discover new ideas and approaches.
- **Diverse & Multi-Disciplinary Perspectives**:
    - Chem-E-Car Competition engages college students in designing and constructing a car that uses chemical reactions to safely run a specific given distance and stop.
    - ChemE-Car is open to all engineering majors allowing students from various disciplines—mechanical, electrical, and computer engineering—to work together.
    - This inclusivity promotes diverse viewpoints in problem-solving and design, enabling teams to approach challenges from multi-disciplinary angles.
- **Integration of Technology**:
    - ChemE Car competition integrates technology from chemical, mechanical, and electrical engineering. The team builds electronics, chassis, control systems etc., in order to design a safe operating car that meets all required criteria for the competition.
- **Collaborative Learning**:
    - Club projects are team-oriented, requiring students to share skills and collaborate to achieve a unified goal, such as building a competition-ready vehicle or a functioning prototype.
    - Members are encouraged to innovate, combining theory and practice to create cutting-edge designs.
    - These experiences foster mutual respect, creativity, and the ability to navigate group dynamics, ultimately preparing students for real-world collaboration.
- **Community and Global Engagement**:
    - Clubs often engage in outreach activities, inspiring the next generation of engineers by hosting workshops or mentoring K-12 students in junior chapters.
    - Community Nights provide opportunities to connect with the local public, demonstrate projects, and discuss the engineering process.
    - Members present their work at national and international competitions and conferences, fostering global awareness and networking with professionals and peers worldwide.
- **Professional & Career Readiness**:
    - Through participation in student clubs and competitions, students apply theoretical knowledge to real-world problems relevant to society and the engineering industry, gaining hands-on experience in design, testing, and building—preparing them to

tackle challenges in their future careers in industry or government agencies.
    - We invite guest speakers, organize industry tours, and collaborate with campus clubs to expose students to various engineering fields and industries.
    - Our technical and professional development workshops provide students with essential technical and soft skills for career success.
    - Social events and networking sessions connect students with fellow engineers and professionals, offering insights into potential career paths.

Laboratory-Based Courses:

The Chemical and Materials Engineering programs consists of lectures and laboratory courses. Laboratory courses are also taught by faculty and geared towards experience in the types of analysis used in real engineering applications. Illustration of the concepts learned in the classroom and familiarization with actual mechanical hardware are also emphasized.

- **Application of Knowledge:**
    - Laboratory corequisites bridge theory and practice by allowing students to apply lecture concepts to hands-on experiments.
    - Students manipulate inputs, observe outcomes, and directly relate results to theoretical principles, reinforcing understanding through experiential learning.
- **Critical Thinking/Problem-Solving:**
    - Students are challenged to anticipate experimental results using theoretical frameworks, analyze discrepancies, and validate findings.
    - Design-based assignments require synthesis of solutions for complex engineering problems, fostering analytical and creative problem-solving skills.
- **Integration of Technology:**
    - Courses leverage state-of-the-art tools such as MATLAB/Simulink, ANSYS, SolidWorks, Python, and LabVIEW for simulation, modeling, and validation.
    - Hands-on exposure to industry-relevant software prepares students to effectively utilize advanced technologies in professional settings.
- **Professional and Career Readiness:**
    - Experiments and projects align with real-world engineering practices, equipping students with skills directly transferable to industry.
    - Students gain experience in iterative design, testing, and validation processes, mirroring tasks encountered in professional roles.

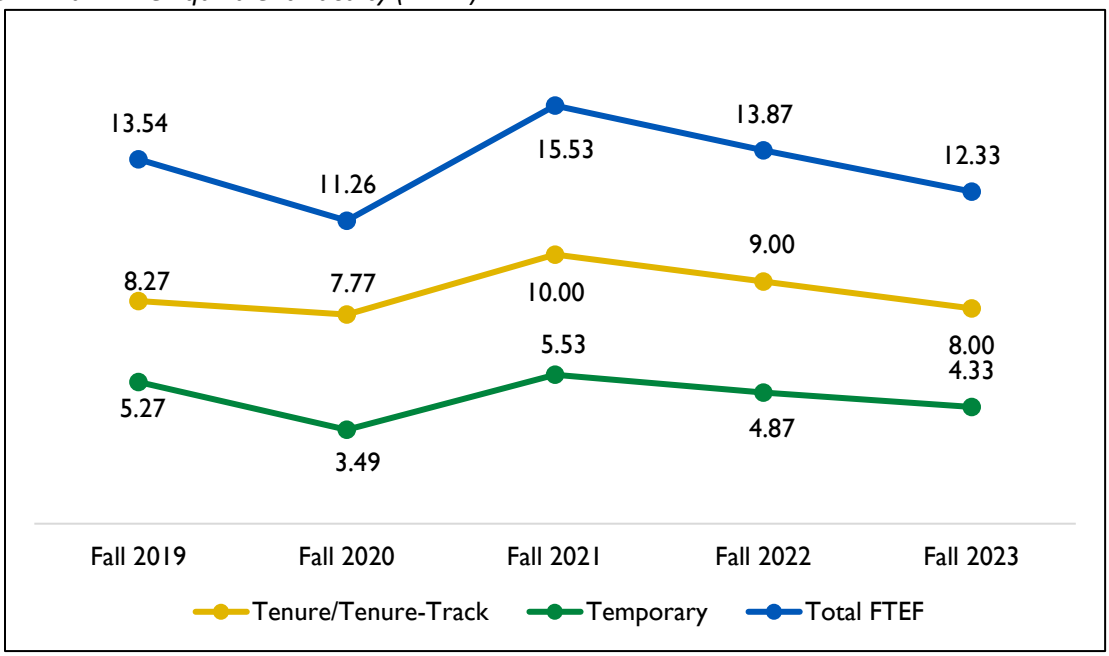
4 FACULTY

4.1 Overview of Faculty

Figure 7 to Figure 10 provide data over 5 years on the historical Full Time Equivalent-Faculty (FTE-F), Full Time Equivalent-Student (FTE-S), Student to Faculty Ratio (SFR), and Major to Faculty Ratio (MFR). The following definitions are from the Office of Academic Resources. Full Time Equivalent-Faculty is an aggregate measure of faculty workload based on payroll appointment fractions. Student to Faculty Ratio is an aggregate measure of students served based on units in course sections and student level. For FTE-S reporting, graduate student (master or doctoral) is considered full-time with 12 units; all others are considered full-time with 15 units. Student Faculty Ratio is FTE-S divided by FTE-F. Lastly, Major Faculty Ration is the number of stateside degree-seeking students enrolled at census by the FTE-F for tenure-line faculty in the department.

Please note that the data for the following contains information for both undergraduate and graduate programs.

Figure 7 – Full Time Equivalent-Faculty (FTE-F)[6]



[6] AR "FTE-Faculty with Status Detail Tenure-Track and Temporary Faculty" https://www.cpp.edu/academic-resources/budget-and-finance/faculty-reports.shtml

The Office of Academic Resources no longer provides a break down the FTE-S data for Tenure/Tenure-track and Temporary faculty at the time our office conducted the data pull.

Figure 8 – Full Time Equivalent-Student (FTE-S)[7]

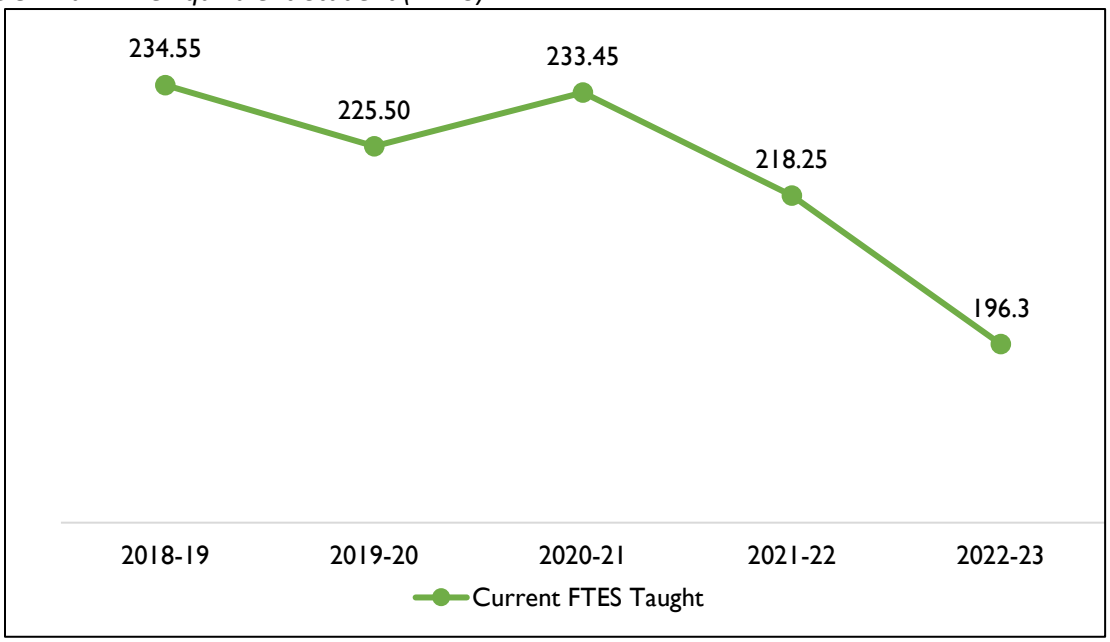
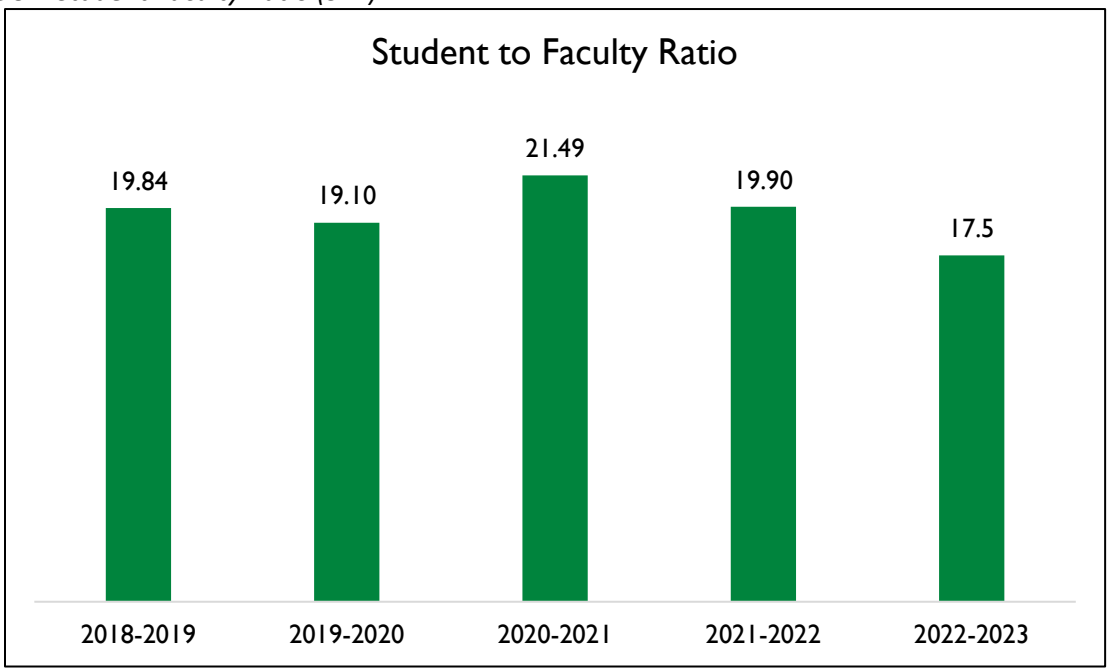


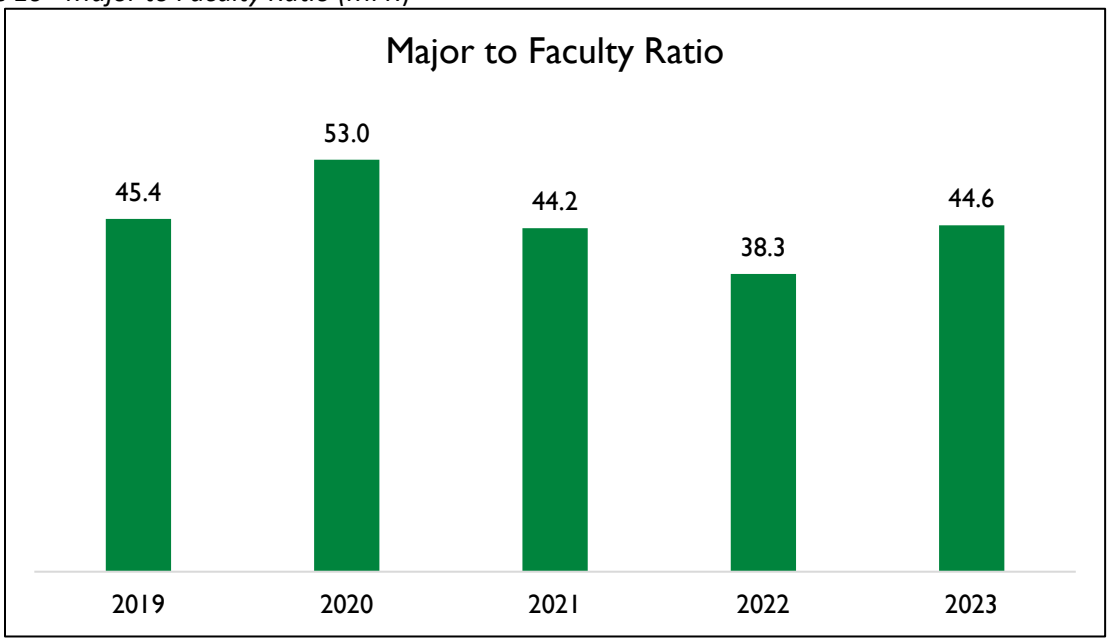
Figure 9 – Student Faculty Ratio (SFR)[8]



[7] AR "Student to Faculty Ration Reports" https://www.cpp.edu/academic-resources/budget-and-finance/faculty-reports.shtml

[8] AR "Student to Faculty Ration Reports" https://www.cpp.edu/academic-resources/budget-and-finance/faculty-reports.shtml

Figure 10 - Major to Faculty Ratio (MFR)[9]



Possible question(s) for analysis by department:

- What portion of your course work is taught by adjunct lecturers?
- What role do student graders, teaching assistants, adjunct and part-time faculty play within your department?
- Is demand for your major increasing, decreasing, or stable?
- What is your capacity for growth to accommodate more students? Consider strategies you could undertake with and without additional resources.

Adjunct faculty teach a significant portion of our course work at all levels. These part-time and full-time instructors, some of whom are alumni and practicing engineers, bring industry expertise to both lecture and laboratory courses, enriching the educational experience by bridging the gap between academia and real-world applications. However, adjunct faculty do not teach some key components of our curriculum, such as the senior project courses, which are exclusively led by tenure-line faculty.

Data has shown that Chemical Engineering Programs have cyclical Enrollment Trends, and we have been in the trough from 2021 to 2023. Our Enrollment has picked up again in 2024. We have capacity for growth, and we are working on recruitment strategies that will increase our numbers.

[9] ARAR "Major to Faculty Ratio", https://www.cpp.edu/academic-resources/budget-and-finance/faculty-reports.shtml

5 CONCLUSION

Required **reflective questions to address based on the self-study:** In looking at the various data sources for your program(s) (e.g., graduate rates, attrition rates, budget, etc.):

- What are the strengths of the program(s) and department?
- What are the opportunities for improvement for the program(s) and department? What actions will you take to improve? What evidence will you utilize to determine if your actions were successful?

The CME Department exhibits several key strengths:

1. **Hands-on Learning**: The programs emphasize a hands-on approach to learning. Students engage in laboratory work, design projects, and experiential learning opportunities. This practical experience enables them to apply theoretical concepts to real-world engineering problems, enhancing their problem-solving and critical thinking skills.
2. **Comprehensive and Rigorous Curriculum**: The programs offer a comprehensive and rigorous curriculum that covers a wide range of fundamental and advanced topics in Chemical and Materials Engineering. Students gain a strong foundation in the field.
3. **Dedicated and Experienced Faculty**: The programs are supported by a highly qualified and experienced faculty who are dedicated to student success. The faculty members are actively involved in research, industry collaborations, and professional organizations, providing students with valuable insights and mentoring.
4. **Fundamental Facilities**: The university offers several facilities and well-equipped laboratories that reflect the latest advancements in Electrical and Computer Engineering. Students have access to equipment and software tools, enabling them to conduct experiments, simulations, and projects using industry-standard technology.
5. **Teamwork and Communication Skills**: The programs emphasize teamwork and effective communication, preparing students to collaborate successfully in multidisciplinary and diverse engineering environments. Through group projects and presentations, students develop strong interpersonal and communication skills, which are vital in the professional world.

In summary, the strengths of the CME department lie in its hands-on learning approach, comprehensive curriculum, experienced faculty, state-of-the-art facilities, and emphasis on teamwork and communication skills. These factors contribute to producing well-rounded graduates who are prepared to excel in various Electrical and Computer Engineering roles and contribute to technological advancements in the field.

Opportunities for Improvement and Planned Actions

While the Electrical and Computer Engineering (ECE) department has significant strengths, there are several opportunities for improvement to address challenges and further enhance the programs.

1. **Faculty Resources and Quality Control:**

- *Opportunity*: The increasing reliance on adjunct faculty, who currently teach about 70% of courses, poses challenges in maintaining consistency and quality across all courses, especially with growing enrollment.
- *Action*: Advocate for additional tenure-line faculty positions to better balance the major-to-faculty ratio and strengthen mentorship and quality control in both lecture and laboratory courses. Additionally, implement standardized course materials and periodic reviews of adjunct-taught courses to ensure alignment with program objectives.

2. **Supporting Student Success and Reducing Equity Gaps:**

- *Opportunity*: Despite strong overall performance, underrepresented minority (URM) students and Pell-eligible students face equity gaps in retention and graduation rates.
- *Action*: Expand support services such as tutoring, mentoring, and outreach through programs like *Maximizing Engineering Potential (MEP)*. Strengthen faculty participation in inclusive teaching workshops and develop targeted interventions for at-risk students, such as early alert systems and proactive advising.

3. **Capacity for Growth:**

- *Opportunity*: With increasing demand for the ECE programs, the department is nearing its capacity to accommodate more students without compromising quality.
- *Action*: Collaborate with the university to secure additional resources, such as tenure-line faculty positions, upgraded facilities, and expanded classroom and laboratory space. In the interim, explore innovative strategies to manage enrollment growth efficiently.

4. **Student Engagement and Career Readiness:**

- *Opportunity*: Although students benefit from hands-on learning, greater emphasis on industry engagement and interdisciplinary experiences can further enhance their career readiness.
- *Action*: Strengthen partnerships with industry to increase internship and co-op opportunities and integrate real-world projects into the curriculum. Expand student involvement in interdisciplinary competitions and collaborative projects across engineering disciplines. Student achievements can be monitored to track the effectiveness of the action (i.e. club competitions, papers published/presented, internships attended…etc.)