California State Polytechnic University, Pomona

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

(ABET accredited)

AY 2023-2024

February 2025

TABLE OF CONTENTS

1 PROGRAM EVALUATION – BS AEROSPACE ENGINEERING

Table 1 provides data associated with high non-passing rates. It is important to note that the numbers reported below are based on filtering the data by major, so only students enrolled as an Aerospace engineering major are included in the counts.

Table 1 – High – DFW's by Non-Pass Rates for 2018-2023[1]

Non-Passing					
Year Term	**Course Code**	**Course Title**	**Enrollment**	**Non-passing Rate**	**Impact**
All Academic Years - Semester	ARO3261	Aerospace Struct Mechanics I	1083	24%	259
All Academic Years - Semester	ARO3271	Aerospace Struct Mechanics II	912	24%	217
All Academic Years - Semester	ARO2150	Vector Dynamics	780	18%	144
All Academic Years - Semester	ARO2041	Engineering Statics	812	18%	143
All Academic Years - Semester	ARO3180	Adv Engineering Mathematics	999	17%	168
All Academic Years - Semester	ARO4050	Aircraft Stability and Control	295	13%	39
All Academic Years - Semester	ARO4140	Rocket Propulsion	421	12%	50
All Academic Years - Semester	ARO3220	Aero Feedback Control Systems	839	10%	86
All Academic Years - Semester	ARO3090	Orbital Mechanics	787	10%	80
All Academic Years - Semester	ARO3011	Fluid Dyn Low-Speed Aerodyn	781	9%	69
All Academic Years - Semester	ARO4360	Mechanics of Comp Materials	109	9%	10
All Academic Years - Semester	ARO4090	Space Vehicle Dyn and Ctrl	371	8%	29
All Academic Years - Semester	ARO4120	Wing Theory	12	8%	1
All Academic Years - Semester	ARO4080	Finite Elmnt Anlys of Structs	182	7%	12
All Academic Years - Semester	ARO4060	Vibrations and Dyn of Aero Sys	709	6%	39
All Academic Years - Semester	ARO4180	Computational Fluid Dynamics	115	5%	6
All Academic Years - Semester	ARO3220L	Aero Feedback Ctrl Systems Lab	773	4%	29
All Academic Years - Semester	ARO3111	Gas Dyn and High-Speed Aerodyn	621	4%	22

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[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 Aerospace courses with the largest equity gaps for URM and non-URM students for all terms from 2018-2023. Figure 2 depicts the Aerospace courses with the largest equity gaps for Pell recipients and non-Pell recipients. The scale uses grades (*1 = D; 2 = C; 3 = B; 4 = A*).

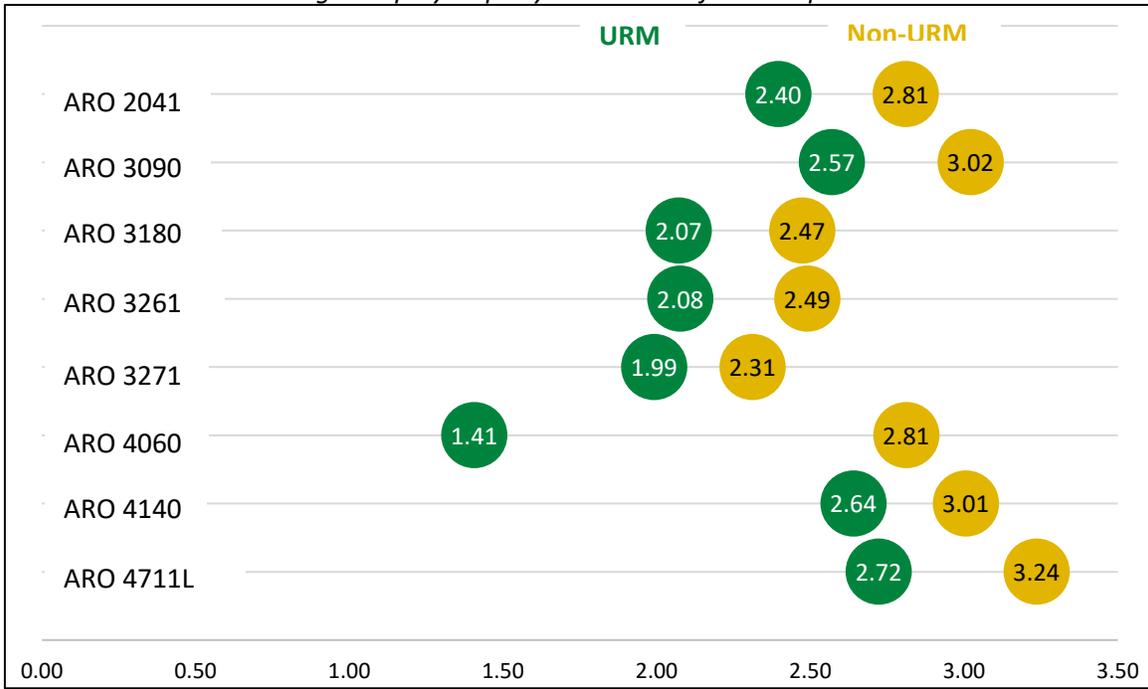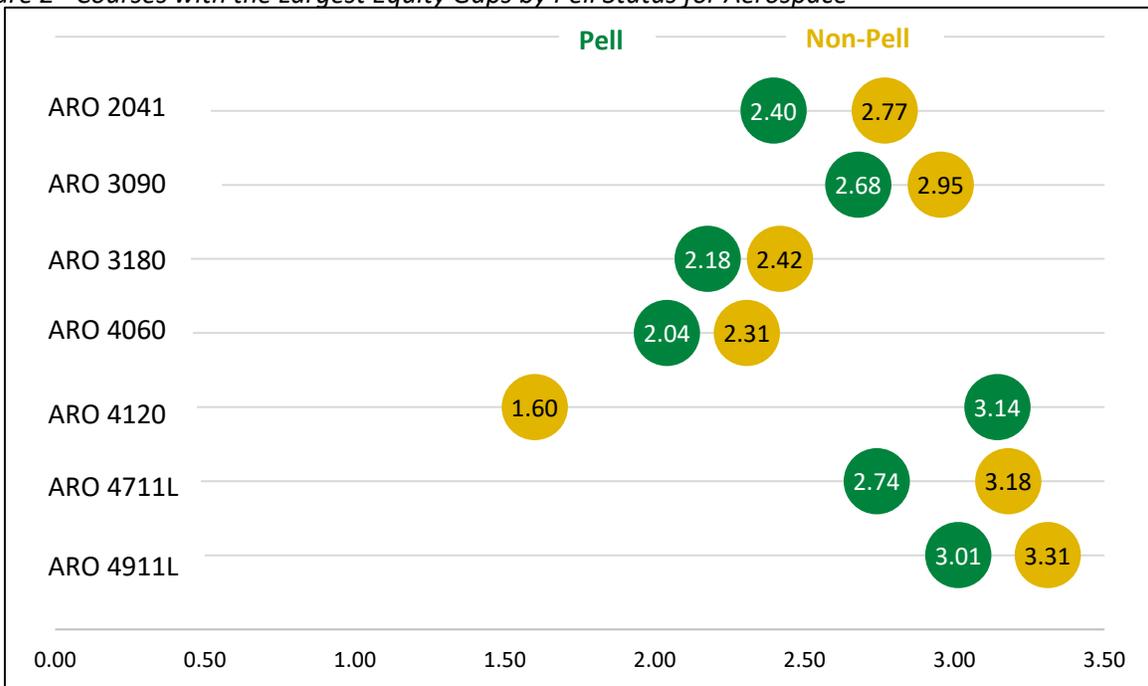*Figure 1– Courses with the Largest Equity Gaps by URM Status for Aerospace[2]*

Figure 2– Courses with the Largest Equity Gaps by Pell Status for Aerospace[3]

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

**Address Bottlenecks and Reduce Impacts of High DFW Courses**

- As a department we offer multiple sections of courses with the highest DFW rates every semester (ARO 2041, ARO 2150, ARO 3261, and ARO 3271)
- We offer summer courses as needed if instructors are available.
- We plan to offer more required courses every semester and during summer, as we hire more tenured line faculties.
- We participate in MEP's SI (Supplemental Instruction) program for courses with the highest DFW rates, and encourage
- We encourage our students to use the campus resources like Learning Resource Center (LRC) and MEP tutoring.
- Our faculty use SPICE grants and external grants (for example CSU CREATE grant to improve ARO 2150) to improve our facilities and create new and innovate resources for students.

2 STUDENTS – BS AEROSPACE ENGINEERING

2.1 Student Retention and Graduation Rates – Graduation Initiative 2025

Figure 3 provides graduation data for students entering the Aerospace 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 Aerospace. The figure below shows that 72.0% of students who started in 2016 graduated in six years or less, 57.0% of students who started in 2016 graduated in five years or less, and 12.9% of students who started in 2016 graduated in four years or less.
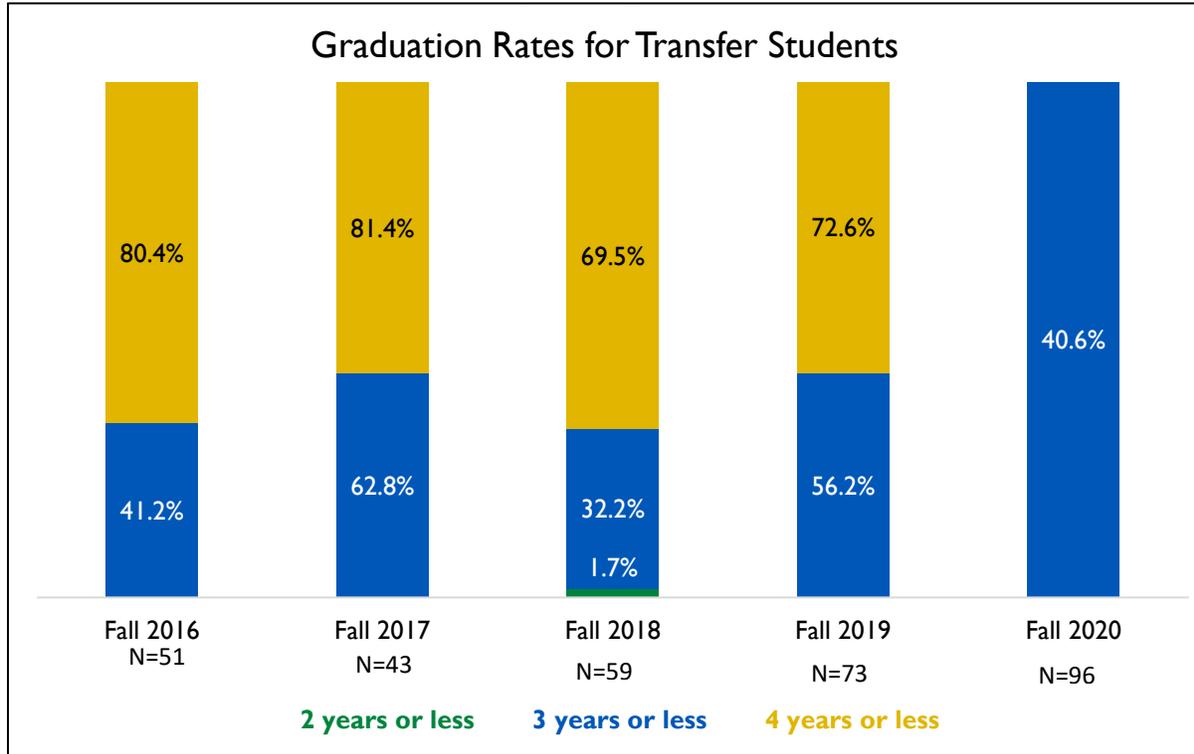
Figure 3 – First-time Freshmen Graduation Rates for Aerospace[4]
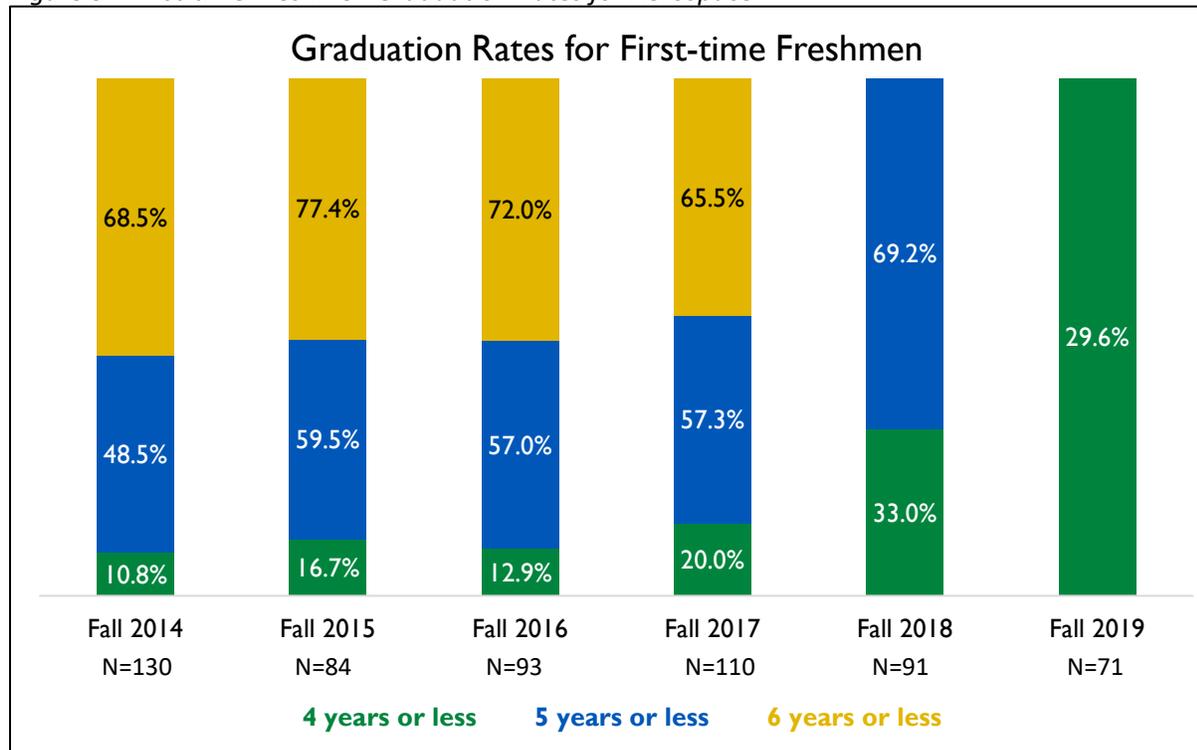
Figure 4 provides graduation data for students entering as an Aerospace major as off-campus fall term Transfers. Any transfers entering in a term other than fall or are on-campus transfers are not accounted for in the Fall Entering Transfer Graduation Rates for the Aerospace program. The figure below shows that 32.2% of transfer students who started in 2018 graduated in three years or less and 69.5% of those who started in 2018 graduated in four years or less.

Figure 4 – Transfer Student Graduation Rates for Aerospace[5]

[5] 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 Aerospace. Figure 5 indicates that 62.9% of URM students and 77.6% 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.

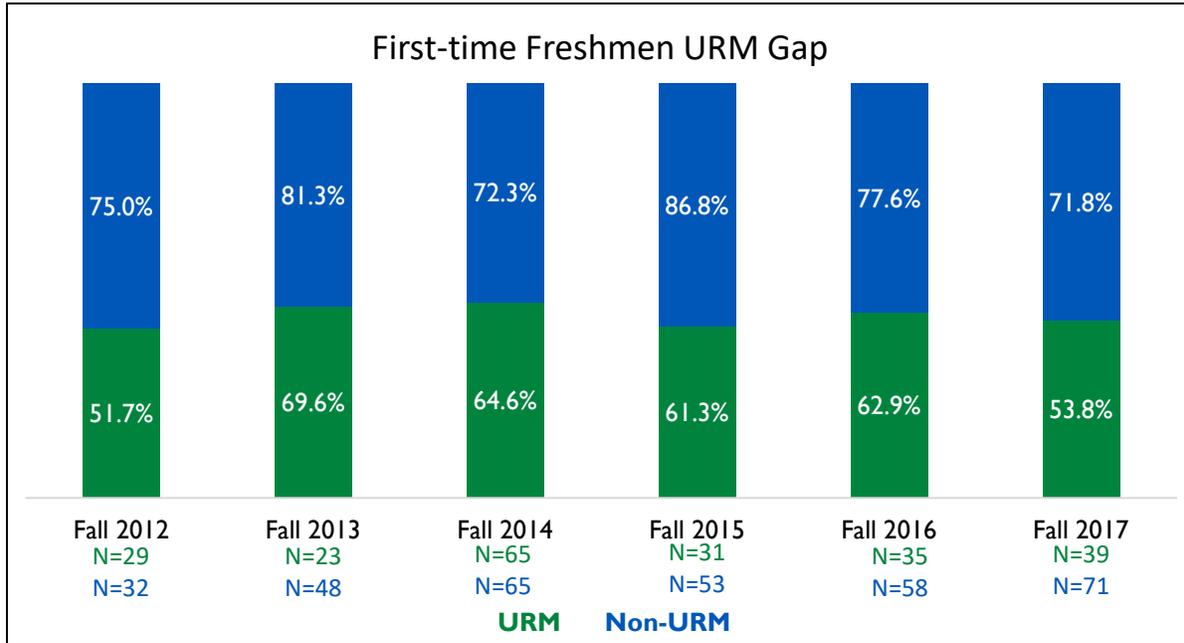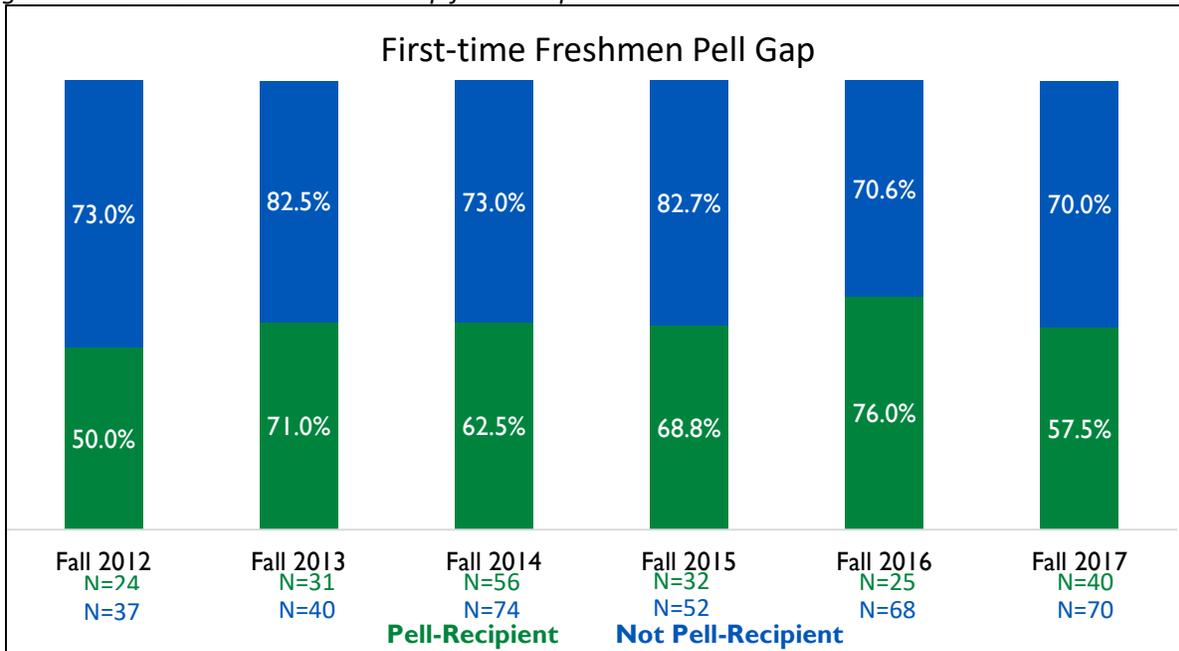*Figure 5 – First-time Freshmen URM Gap for Aerospace*[6]

Figure 6 – First-time Freshmen Pell Gap for Aerospace[7]

Progress on improve student persistence and graduation rates

- Though the College of Engineering Staff Advising Center has provided support to all degree programs, during the ABET visit several reviewers identified a need for additional staff advisors.
- Care center programs are providing our students with needed support to continue their education.

Eliminating URM and Pell Gap

- The department does not have target methods to address graduating rate associated with eliminating URM and Pell graduation gap.
- Additional resources and collective effort are needed from the University to make these efforts more sustainable.
- Individual faculty still encourage our students to use resources such as MEP SI, LRC, and care center.

Changes we would like to make

- We need better alignment between department/college and university efforts such as micro-Internships
- 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.
- Resources and faculty time to redesign our curriculum for data-intesive and AI-focused world.
- Faculty need to better understand how to leverage AI to support retention and graduation.
- Research opportunities for undergraduates and project-based learning experiences has been shown to improve retention and graduation rates. Due to heavy teaching loads faculty are limited in their ability to offer these opportunities. Within our program minimal support is provided.

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/L)	X	X	X	X	X	X	X	X
Participation in Students Competitions	X	X	X	X	X	X	X	X
Student Clubs (e.g., AIAA, UMBRA, and various other Student Chapter)				X		X	X	X
Laboratory-Based Courses	X	X			X			X

The Aerospace Engineering 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) 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 SolidWorks, Ansys, FlightStream, OpenVSP, Advanced Aircraft Analysis to enhance their analysis and design processes. They also used 3-D printing technology to produce parts for their projects.
- 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. All projects 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 all 8 areas. However, it is important to note though that due to available resources and available department support, only some faculty within the department are active with undergraduate research with some 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 local, national, and international conferences, such as CARS, RSCA, SCCUR, AIAA, and ICUAS conferences
- Diverse & Multi-Disciplinary Perspectives – Depending on the research topic explored by students, their investigations may span a wide range of fields (aerodynamics, structural

dynamics, flight mechanics, guidance, navigation, & control, propulsion, and aircraft/spacecraft design), integrating concepts and methodologies from various disciplines including Computer Science, Electrical & Computer Engineering, and Mechanical 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 Technology – Students use technology and software pertinent to their research topics, such as these mentioned above.

- Collaborative Learning – Some projects include multiple students who work on one single topic, or sometimes students build on each other's findings in consecutive semesters.

- Community and Global Engagement – Most of the topics studied stem from actual community needs, some of which serve disadvantaged communities. This allows students to engage with the community in identifying their problems and proposing solutions.

- Professional & Career Readiness – Depending on students' 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's/PhD programs in other universities.

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.

- o Students also work in the lab to develop a foundational understanding of underpinning physics concepts to be able to apply in later classes.
- **Diverse and Multi-Disciplinary Perspectives:**
  - o 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:**
  - o Students use technology to model data and various desktop applications to present various technical projects (posters, presentations, and reports).
- **Collaborative Learning:**
  - o Students work in multidisciplinary groups on each project in the lab and discuss solutions to issues in the lecture in a cross-discipline perspective.
  - o Students are taught how to work in an effective team focusing on valuing learning styles, communication styles, and psychological safety.
- **Community and Global Engagement:**
  - o When possible, students work on real world problems to engage communities (see PolyX).
- **Professional and Career Readiness:**
  - o 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.
  - o 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 the AIAA Student Chapter, UMBRA, Cubesat Club, etc. These clubs provide opportunities for students to engage in hands-on learning, collaborate with peers, and compete in national and international competitions like AIAA Design, Build, and Fly (DBF) Competition, Rocketry Competition, etc. These activities foster professional readiness, critical thinking, and creativity, hallmarks of the PolyX experience.

Participation in Student Competitions

Application of Knowledge: We teach theory 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 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 and Multidisciplinary Perspectives: Competitions provide opportunities for students to gain expertise across various disciplines by requiring them to acquire and apply knowledge and skills from multiple disciplines. Students are provided with the opportunity to engage in real-world challenges and problems that require multidisciplinary knowledge and skills. Competitions also expose students to diverse perspectives and viewpoints, helping them consider alternative arguments.

Career Readiness: Through participation in student competitions, students will apply their theoretical knowledge in a holistic way to a problem of relevance to society and aerospace industry from designing to testing and building. They gain experience for the type of problems they will solve during their career in industry or Government agencies. They also gain extensive networking opportunities by presenting their work at the competitions.

Technology: Students get opportunities to extensively use Aerospace related technologies to participate in competitions such as using advanced finite element method (FEM) and computational fluid dynamics (CFD) program, computer programming, working with advanced aerospace engineering experimental equipment such as 3D printing, advanced sensors, robotics, augmented realities, and analyzing the experimental and numerical data for industry-relevant applications.

Collaborative Learning: Student competitions enhance collaborative learning by encouraging participants to work together toward a common goal, leveraging each team member's strengths and perspectives. Through problem-solving, brainstorming, and decision-making in a competitive setting, students develop effective communication and teamwork skills. These experiences foster mutual respect, creativity, and the ability to navigate group dynamics, ultimately preparing students for real-world collaboration.

Global engagement: Participating in student competitions fosters global engagement by exposing students to global perspectives of aerospace-related challenges. By engaging in community projects and participating in international conferences, students will be exposed to global issues. Students develop critical thinking, adaptability, and a sense of social responsibility. These experiences prepare them to navigate the complexities of an interconnected world and contribute meaningfully to global challenges.

Senior Design Capstone Projects and Senior Symposium:
The Senior Design Capstone sequence (EGR 4810, EGR 4820, EGR 4830) exemplifies an Inclusive Polytechnic Education. These courses require students to apply interdisciplinary knowledge to real-world challenges, often incorporating mentorship from faculty. Students gain

critical thinking and problem-solving skills by working collaboratively in teams to develop innovative solutions. Additionally, the Senior Symposium allows students to present their work to peers, faculty, and industry professionals, emphasizing dissemination and professional readiness as outlined in the PolyX rubric.

Faculty Support for Undergraduate Research and Competitions:
Faculty play a pivotal role by securing external funding from research agencies and aerospace industries and by mentoring students through research projects and competitions. These projects encourage creativity and innovation while integrating advanced technology and community engagement. Faculty-led initiatives culminate in students presenting their work at conferences or publishing findings, ensuring students experience the full cycle of a project.

Commitment to Diversity and Inclusion:
Programs such as Maximizing Engineering Potential (MEP) and faculty participation in training through the Center for the Advancement of Faculty Excellence (CAFE) reinforce the department's commitment to inclusivity. These initiatives provide tailored support for underrepresented students, ensuring equitable access to the benefits of a polytechnic education.

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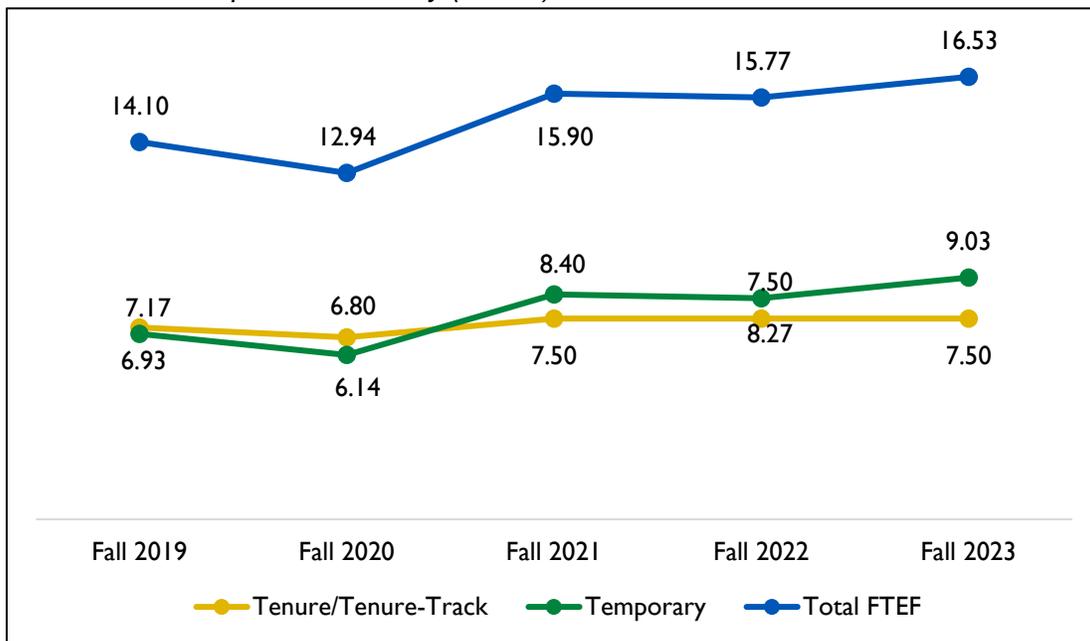
4   FACULTY

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)[8]

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.

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

Figure 8 – Full Time Equivalent-Student (FTE-S)[9]

285.80 | 300.05 | 336.35 | 339.55 | 313.0
2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23
Current FTES Taught
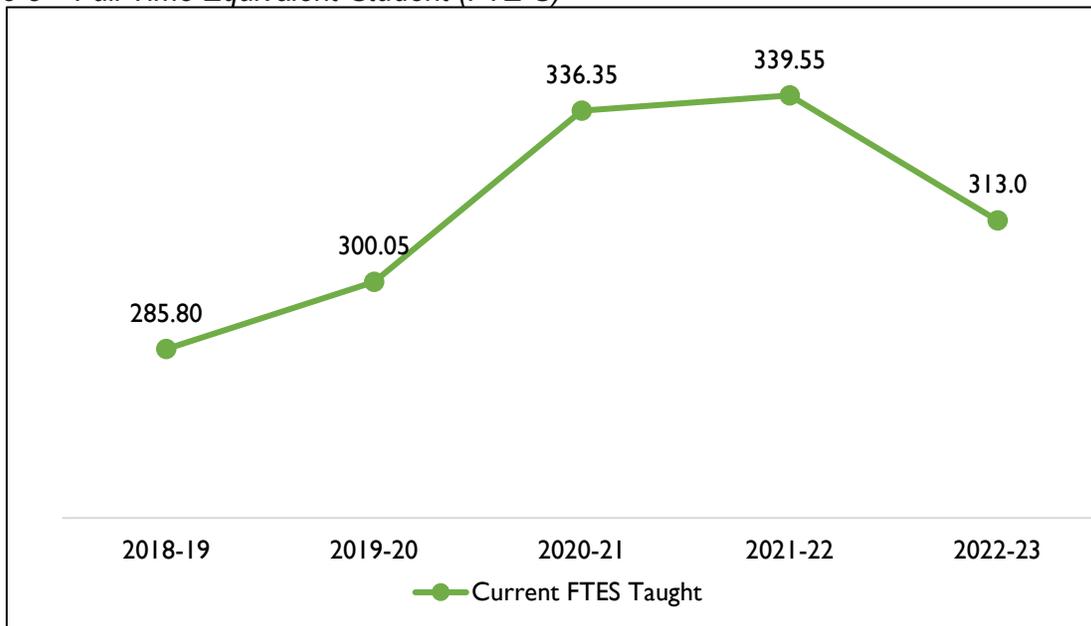
Figure 9 – Student Faculty Ratio (SFR)[10]
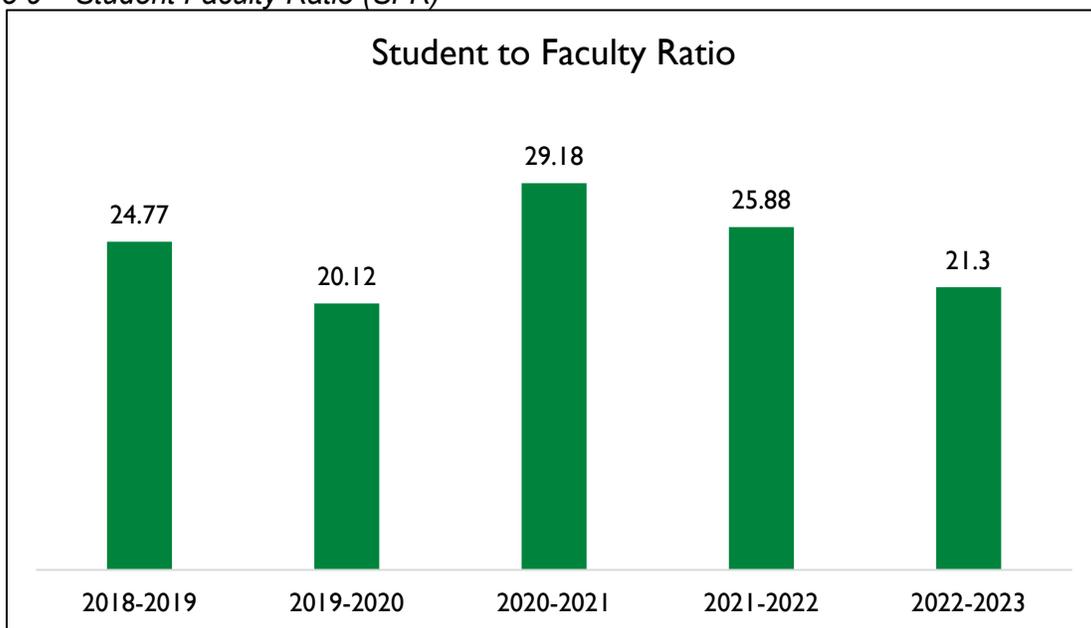
Student to Faculty Ratio

24.77 | 20.12 | 29.18 | 25.88 | 21.3
2018-2019 | 2019-2020 | 2020-2021 | 2021-2022 | 2022-2023

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

Figure 10 - Major to Faculty Ratio (MFR)[11]
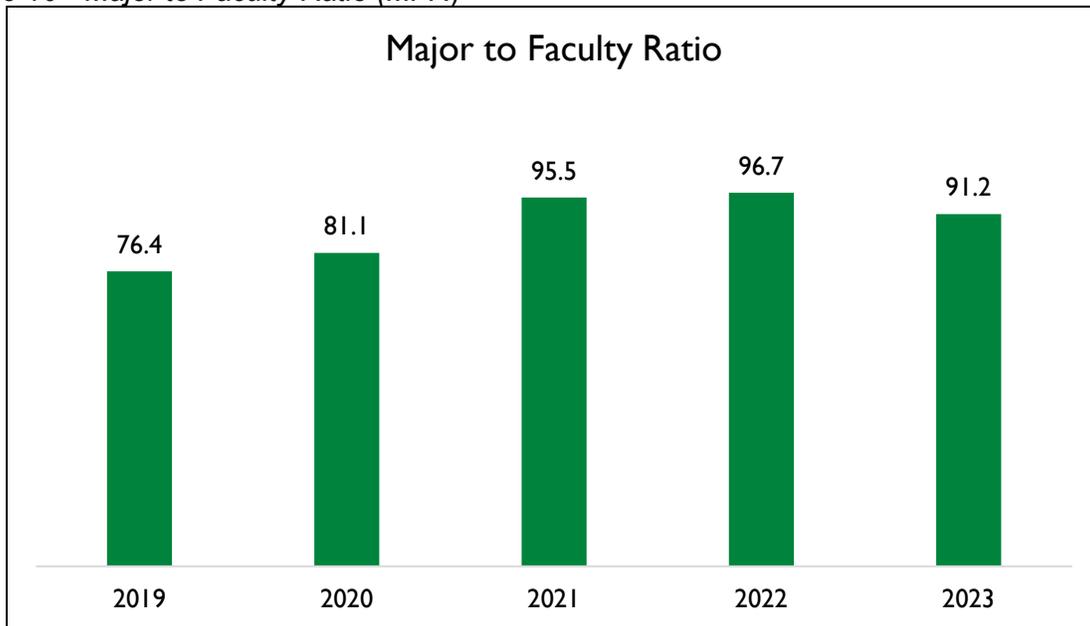
The Aerospace Engineering Department relies heavily on adjunct lecturers to deliver a significant portion of its coursework. These part-time instructors, many of whom are alumni and practicing engineers, bring industry expertise to both lecture and laboratory courses, enriching the educational experience by bridging the gap between academia and real-world applications.

The demand for the Aerospace Engineering program has been increasing over the years. Enrollment in this high-demand major has grown over the past five years, reflecting strong student interest. However, this growth has not been met with a corresponding increase in tenure-line positions. While the FTEF (which includes temporary faculty) has increased, the major-to-faculty ratio continues to rise, placing a heavier teaching, service, and advising burden on tenure-line faculty. We are hiring two new tenure-line faculty this year. If the search is successful, it will improve our major-to-faculty ratio slightly as some tenured faculty have recently started FERPING.

Our capacity for growth is reaching its limits due to the lack of additional tenure-line faculty and other university resources. Without increased support, the department is constrained in its ability to expand enrollment further or implement quality control measures to ensure the highest academic standards. Strategies for accommodating more students without additional resources would include expanding online or hybrid course offerings and increasing reliance on adjunct faculty. However, these approaches may compromise the quality of education and faculty engagement with students.

With additional resources, the department could hire more tenure-line faculty to improve the major-to-faculty ratio, support new program development, and accommodate growing demand while maintaining educational quality. We appreciate the tenure-line faculty positions allocated

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

to us in recent years and urge the university to continue and expand this support. Additional tenure-line hires would allow us to grow enrollment, improve student-faculty interactions, and help the university better meet its enrollment targets.

As the program grows in size, we also will need more access to classroom space. At the moment, we do not have enough classroom space assigned to us to ensure we can schedule all of our classes before intra-college scheduling opens.

5   CONCLUSION

The Aerospace Engineering Department exhibits several key strengths:

1. **Hands-on Learning**: The program emphasizes 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 program offers a comprehensive and rigorous curriculum that covers a wide range of fundamental and advanced topics in Aerospace Engineering. Students gain a strong foundation in the field.
3. **Dedicated and Experienced Faculty**: The program is 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. **Experimental Facilities**: The Aerospace Engineering department has access to some experimental facilities. However, more space is needed for our students to be able to easily access the facilities. Newer and more updated equipment is needed in some areas.
5. **Teamwork and Communication Skills**: The program emphasizes 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 Aerospace Engineering department lie in its hands-on learning approach, comprehensive curriculum, experienced faculty, experimental facilities, and emphasis on teamwork and communication skills. These factors contribute to producing well-rounded graduates who are prepared to excel in various Aerospace Engineering roles and contribute to technological advancements in the field.

Opportunities for Improvement and Planned Actions

While the Aerospace Engineering (ARO) department has significant strengths, there are several opportunities for improvement to address challenges and further enhance the program.
1. **Faculty Resources and Quality Control:**
*   *Opportunity*: The increasing reliance on adjunct faculty, who currently teach more than 50% 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 ARO program, 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 spaces. 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.)

5. **Classroom Modernization:**
   - *Opportunity*: Currently, most engineering classrooms have significant issues that impact the quality of education. For example, in many classrooms the instructor cannot use both the white board and projector at the same time, some classrooms only have a single non-dimmable light switch, and the desks are often too small for students. Students have frequently complained about the quality of lecture classrooms in the department's Senior Exit Surveys.
   - *Action*: The Aerospace Engineering Department does not control facilities maintenance and upgrades. However, the College of Engineering Dean is aware of the issues with classroom space, and he has stated that he has brought the issues to the attention of the university. The department will continue to use Senior Exit Surveys to determine if the issues are being addressed.