CSUF | Mechanical Engineering
COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

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PROGRAM PERFORMANCE REVIEW
Self-Study Report

Master of Science in Mechanical Engineering

California State University, Fullerton

Spring 2023

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BACKGROUND INFORMATION

A. Department Contact Information

Dr. Chean Chin Ngo, Department Chair of Mechanical Engineering, is the primary contact person for the Program Performance Review (PPR) of the Master of Science in Mechanical Engineering degree program.

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B. Department Background

The College of Engineering and Computer Science consists of four departments:

1. Department of Civil and Environmental Engineering
2. Department of Computer Science
3. Department of Electrical and Computer Engineering
4. Department of Mechanical Engineering

The Department of Mechanical Engineering currently offers the following degree programs:

1. Bachelor of Science in Mechanical Engineering (BSME): The BSME degree program is accredited by the Engineering Accreditation Commission of ABET (https://www.abet.org/) with the next general review and visit scheduled for 2026.
2. Master of Science in Mechanical Engineering (MSME): The MSME degree program was last reviewed through the PPR process in Spring 2016. The PPR process shall be conducted at least once every seven years.

The primary delivery modality for both mechanical engineering programs is through traditional in-person classes. Most classes are offered during the week, usually on either a Monday/Wednesday schedule or a Tuesday/Thursday schedule. Some classes are offered once a week, including on Friday or Saturday. Most 400-level technical electives applicable for graduate credit and 500-level graduate classes are offered in the evening after 5 PM. All classes are offered at the Cal State Fullerton campus.

I. DEPARTMENT MISSION, GOALS AND ENVIRONMENT

A. Department Mission and Goals

Learning is preeminent at California State Fullerton. Consistent with the University's commitment and mission to student learning, the Department of Mechanical Engineering strives to offer affordable undergraduate and graduate programs and provide quality teaching and research to prepare Titan mechanical engineering graduates for challenging professions and fulfilling careers.

The Mechanical Engineering (ME) Department has established the following Program Educational Objectives (PEOs) for our programs:
PEO 1: Technical Growth - Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.
PEO 2: Professional Skills - Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and enjoy career success and satisfaction.
PEO 3: Professional Attitude and Citizenship - Graduates will become productive citizens with high ethical and professional standards, make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.

The ME Department last reviewed the PEOs in 2018 through 2020 timeframe by engaging our primary constituents (i.e., faculty, students, industrial advisory board, and alumni) in the periodic review process to ensure currency and relevance of our PEOs with the University mission and goals while meeting the needs of constituencies. There is no change to the PEOs since the last PPR visit.

According to Cal State Fullerton Graduate Learning Goals, as appropriate to the discipline and the degree program, graduate students should be able to demonstrate:
GLG-01: Intellectual Literacy - Knowledge, skills, and professional dispositions including higher order competence in disciplinary perspectives and interdisciplinary points of view.
GLG-02: Critical Thinking - The ability to access, analyze, synthesize, and evaluate complex information from multiple sources and in new situations and settings.
GLG-03: Communication - Advanced communication skills.
GLG-04: Teamwork - The ability to work independently and in collaboration with others as artist, practitioners, researchers, and/or scholars.
GLG-05: Community Perspective - The ability to apply appropriate methods and technologies to address problems that affect their communities.
GLG-06: Global Community - Social responsibility within diverse communities and in interdependent global community.

Table I.1. Consistency of Mechanical Engineering PEOs with the Mission of the Institution

Program Educational Objectives (PEOs)	Graduate Learning Goals					
	GLG-01	GLG-02	GLG-03	GLG-04	GLG-05	GLG-06
PEO 1: Technical Growth	X	X		X	X	X
PEO 2: Professional Skills	X	X	X	X	X	
PEO 3: Professional Attitude & Citizenship		X	X	X	X	X

Table I.1 above demonstrates the alignment between the Mechanical Engineering PEOs with the graduate learning goals of Cal State Fullerton.

B. Changes and Trends in the Discipline and Department's Response

The popularity of a degree major is typically driven by the demand for labor in the job market and the salary. Based on the U.S. Bureau of Labor Statistics (BLS) on the Occupational Employment Statistics in 2021, the top five metropolitan areas with the highest employment level in mechanical engineers (52,930 jobs) were: Detroit, Philadelphia, *Los Angeles-Long Beach-Anaheim (8,470 jobs)*, Chicago, and New York. The BLS also estimates that mechanical engineer jobs will increase by 2% from 2021 to 2031. The annual average wage of mechanical engineers in the Los Angeles-Long Beach-Anaheim metro areas was $113,360 in May 2022. Mechanical Engineering programs in the Orange County-Los Angeles areas remain well positioned to fill the education to workforce pipeline in the area.

Mechanical Engineering is one of the broadest engineering disciplines. It features diverse specializations from product development, manufacturing, mechatronics, design, robotics, thermal-fluids, to energy and power. Mechanical engineers are hired in different industries including aerospace, automotive, biomedical, and energy sectors. Orange County is recognized as the hub for medical device industry. Manufacturers such as Allergan (now part of AbbVie), Edwards Lifesciences, Alliance Medical Products (part of Siegfried) and Applied Medical are based in Orange County. The department's recent strategic hiring has allowed the department to add courses such as EGME 458 Biomaterials, EGME 441 Engineering Biomechanics, EGME 442 Computational Cardiovascular Engineering and EGME 481 Human Center Design to our curriculum. These new courses are also supporting the Bachelor of Science in Engineering (General) with Biomedical Device Option program. New courses in advanced manufacturing such as EGME 484 Additive Manufacturing and EGME 561 Advanced Manufacturing Processes have also generated many interests from our students. One ME faculty recently also started working on a biomanufacturing certification program as part of the CSU Biomanufacturing Consortium involving CSUF, CSULB, and CSULA.

C. Department Priorities

The Mechanical Engineering Department will continue diversifying the areas of specializations and courses through faculty recruitment, extending the focus areas to emerging fields such as artificial intelligence and energy storage/electric vehicle areas to better prepare our graduate students in the workforce after graduation. Our focus will be integrating the high-impact practices in mechanical engineering into the graduate curriculum. The program will be modified and adjusted based on the trends in employment and demand in different areas of mechanical engineering.

Artificial Intelligence (AI) is one of the emerging technology industries in Orange County. According to the 2021 Orange County Workforce Indicators Briefing, the top 10 most in-demand occupations with "Artificial Intelligence" in the online job posting profiles include architectural and engineering managers, industrial engineers, and mechanical engineers. The University of Southern California (USC) also recently announced a comprehensive $1 billion initiative by forming a new School of Advanced Computing to expand the education and research in advanced computing including artificial intelligence and machine learning. The department will investigate how to incorporate AI into the ME curriculum. The energy storage and electric vehicle field is another area that the department wants to include in the curriculum. According to Governor Newsom's Executive Order N-79-20, all new cars and light trucks sold in California by 2035 will be zero-emission vehicles (ZEV), including plug-in hybrid vehicles. CA legislature has approved billions of investments in ZEV adoption recently to ramp up the efforts to achieve this ambitious goal.

Another priority for the department is to invest resources to better market our degree programs to recruit and retain high-quality diverse graduate students. More outreach programs are needed to attract both international and domestic students to our MSME degree program. The department will need to revamp the program website and improve the design of our program brochures, handbooks and flyers/posters for effective marketing strategy.

D. Special Sessions and Self-Support Programs

The Mechanical Engineering Department does not have special sessions and self-support programs.

II. DEPARTMENT DESCRIPTION AND ANALYSIS

A. Curricular Changes Since Last Review

There have been no substantial curricular changes since the last program performance review. Some of the notable changes are described below.

Course Changes: Table II.1 provides a summary of the course changes for the MSME degree program since the last review. Five 400-level courses and one 500-level course have been retired due to the lack of student demand and interest. The MSME degree program has added 9 new courses including disciplines such as aerospace, biomaterials, and alternative energy areas. In addition, the ME faculty have proposed 7 special experimental courses in the areas of bioengineering, advanced manufacturing, and design. We anticipate most of these experimental courses to be added to the MSME degree program by going through the new course proposal approval process.

Table II.1 MSME Course Changes since Last Review

Retired Courses
EGME 418: Space and Rocket Engineering
EGME 447: Piping Selection and Piping Network Design
EGME 457L: Intelligent Systems Laboratory
EGME 486: Introduction to Electronic Packaging
EGME 487: Thermal Control of Electronic Packaging
EGME 554: Applied Optimal Mechanical Design
Newly Approved Courses
EGME 402: Analytical Dynamics
EGME 430: Introduction to Continuum Mechanics
EGME 433: Aerodynamics
EGME 434: Combustion
EGME 435: Propulsion Systems
EGME 458: Biomaterials
EGME 531: Random Vibrations of Mechanical Systems
EGME 563: Human Kinematics in Advanced Mechanical Design
EGME 571: Alternative Energy Technology and Systems
Newly Approved Special Courses (Experimental Courses)
EGME 441: Engineering Biomechanics
EGME 442: Computational Cardiovascular Engineering
EGME 481: Human Centered Design
EGME 484: Addictive Manufacturing Engineering
EGME 490: Creative Research and Problem Solving through Design Thinking
EGME 561: Advanced Manufacturing Processes
Newly Proposed Special Course (Experimental Course)
EGME 436: Introduction to Computational Fluid Dynamics

Study Plan Requirement Changes: The department started implementing the Titan Degree Audit for graduate students effective Fall 2022 in lieu of a study plan. Students no longer are required to complete a study plan before they complete 13 units of graduate course work. The Titan Degree Audit lays out the degree requirements clearly for graduate students to follow.

Graduation Writing Assessment Requirement (GWAR) Changes: In February 2021, the California State University Chancellor's Office issued a memorandum to suspend the Graduation Writing Assessment Requirement (formerly Executive Order 665) temporarily for all CSU campuses. In March 2022, the CSU updated the GWAR policy requiring completion of an upper-division writing requirement to apply to baccalaureate students only. This is no longer a requirement for graduate students.

B. MSME Degree Program Structure

Graduate Admission: To qualify for admission to a conditionally classified standing, students must meet the CSU requirements for admission to a master's degree program. To meet the minimum requirements for admission, applicants must have completed a baccalaureate degree from an institution accredited by a regional crediting association (e.g., Western Association of Schools and Colleges Senior College and University Commission-WSCUC) and be in good academic standing at the last institution attended, and have attained a minimum cumulative grade-point-average of 2.50 (4 point system) from an ABET accredited program or 3.00 from a non-ABET accredited program.

Conditionally Admitted Students: Students not meeting the above requirements may be admitted at the discretion of the graduate program advisor and may be required to take additional units of advisor-approved prerequisite coursework. The student must demonstrate potential for graduate study by earning a grade point average of 3.0 or higher in these courses.

Any student entering the Master of Science degree program without a B.S. in Mechanical Engineering will also be required to complete courses in the areas where the student is deemed to be deficient, prior to beginning of coursework for the master's degree. At the minimum, they must have completed the undergraduate mathematics and science requirements before admission. Typically, the Mechanical Engineering Department assigns no more than 15 units of advisor approved, undergraduate bridge courses for BS degree holders that is not in Mechanical Engineering. Table II.2 provides a sample recommendation of bridge courses for students interested in the mechanical system design and thermal-fluids disciplines. These courses are typically taken in the first year of their graduate studies to strengthen the foundation before taking more advanced graduate-level mechanical engineering courses.

Classified Standing: Students who completed all prerequisite work (i.e., bridge courses), specified by the mechanical engineering graduate program advisor, with a "B" average or better will be advanced to classified standing.

Table II.2 Bridge Courses Recommendation for Conditionally Admitted MSME Students

Recommended Bridge Courses (12 to 15 units)	
Mechanical System Design (15 units)	**Thermal-Fluids (12 units)**
EGCE 201: Statics	**EGME 304:** Thermodynamics
EGCE 302: Dynamics	**EGME 322L:** Introduction to Computer-Aided Design
EGME 322L: Introduction to Computer-Aided Design	**EGME 333:** Fluid Mechanics
EGME 331: Solid Mechanics	**EGME 407:** Heat Transfer
EGME 335: Kinematics of Mechanisms	

Degree Requirements: Coursework for the degree must be completed with an overall grade-point-average of 3.0 or better. All courses must be completed with a grade of "C" or better. At least half the units must be approved graduate 500-level courses. The Graduate Regulations section of the University Catalog presents all the policies and procedures for graduate students, and some of them are summarized here on the Office of Graduate Studies website: https://www.fullerton.edu/graduate/academics/policies.php

The degree requirements of the MSME degree program are given in Table II.3. The only required course in the program is a mathematic course requirement. Students may choose either EGME 438 or EGME 538. They may also choose to take both mathematic courses. Students may then take 21 to 27 units of mechanical engineering and elective courses according their discipline interest (e.g., robotics, controls and automated manufacturing, design and materials for manufacturing, thermal and fluids engineering, power and energy, etc.). Among the 27 units of elective courses, pending the approval of the graduate program advisor, up to 6 units may be taken outside of the Mechanical Engineering Department (e.g., other engineering or computer science graduate courses), of which up to 3 units can be non-engineering graduate course work. All courses in our MSME degree program were developed and approved as in-person classes with the exception of EGME 563 being in the hybrid modality.

Culminating Experience: Subject to the approval by the graduate program advisor, students must select one of the following three options to fulfill the culminating experience of their master's degree:

- Comprehensive Examination: This is a comprehensive written examination covering five selected courses, at least three of which are 500-level classes.
- EGME 597 Project (1-6 units)
- EGME 598 Thesis (1-6 units)

Students enrolling in less than six units of EGME 598 Thesis or EGME 597 Project will be required to take a Comprehensive Examination. Students enrolling in six units of EGME 598 Thesis or EGME 597 Project may defend their thesis or project work with an oral examination, limited to their thesis/project work, instead of taking a Comprehensive Exam. The format and policy of the written comprehensive exam has been revised since the last review to allow for partial passing (effective Fall 2016).

Table II.3 MSME Degree Program Requirements

Required Course (3 units)	
EGME 438: Analytical Methods in Engineering OR	**EGME 538:** Advanced Engineering Analysis
Mechanical Engineering and Elective Courses (21-27 units)	
EGME 402: Analytical Dynamics	**EGME 508:** Advanced Inviscid Fluid Flow
EGME 410: Introduction to the Finite Element Method and Applications	**EGME 511:** Advanced Mechanical Vibrations
EGME 411: Mechanical Control Systems	**EGME 512:** Advanced Mechanical Design and Management
EGME 417: Computational Heat Transfer	**EGME 516:** Advanced Radiation Heat Transfer
EGME 422: Advanced Computer-Aided Design	**EGME 520:** Advanced Viscous Fluid Flow
EGME 424: Data Acquisition and Instrumentation	**EGME 526:** Advanced Convective Heat Transfer
EGME 426: Design of Thermal and Fluid Systems	**EGME 530:** Advanced Strength of Materials
EGME 430: Introduction to Continuum Mechanics	**EGME 531:** Random Vibrations of Mechanical Systems
EGME 433: Aerodynamics	**EGME 536:** Advanced Conduction Heat Transfer
EGME 434: Combustion	**EGME 540:** Computer Applications in Engineering Design
EGME 435: Propulsion Systems	**EGME 541:** Finite Element Method for Mechanical Engineers
EGME 451: Heating, Ventilating and Air Conditioning Systems	**EGME 563:** Human Kinematics in Advanced Mechanical Design
EGME 452: Fluid Machinery	**EGME 571:** Alternative Energy Technology and Systems
EGME 454: Optimization of Engineering Design	**EGME 576:** Advanced Dynamics and Control of Mechanical Systems
EGME 456: Intro. to Mechatronics for Engineers	**EGME 599:** Independent Graduate Study
EGME 458: Biomaterials	
EGME 459: Plastics and Other Non-Metallics	
EGME 460: Failure of Engineering Materials	
EGME 461: Manufacturing Processes (Formerly: Fabrication Methods)	
EGME 462: Composite Materials	
EGME 463: Introduction to Robotics	
EGME 475: Acoustics and Noise Control	
EGME 480: Human Factors in Engineering	
EGME 483: Computer-Integrated Manufacturing	
Culminating Experience (0-6 units)	
EGME 597: Project (1 to 6 units) OR	**EGME 598:** Thesis (1 to 6 units)
Comprehensive Examination (no units)	

C. Student Demand for the MSME Degree Program

The MSME degree program applications, admissions and enrollment data is presented in Table II.4 below. The number of students enrolled after admission was around 25 to 35 students with the yield being around 30% to 45% for the past few years. Our program had an increase of international applications from AY 2013-14 to the peak of 465 applications in AY 2014-15 through AY 2015-2016. To manage the enrollment growth and maintain the quality of our graduate education, the college changed the minimum admission requirement of grade-point-average from 2.50 to 3.00 for non-ABET accredited programs. The number of applications has been relatively stable with around 100 to 150 applications with the acceptance rate ranged from 43% to 74% since 2016. We noted that the number of international applications decreased over the Covid-19 pandemic, but it has gradually increased over the past two semesters. The number of MSME degrees awarded since AY 2015-16 is shown in Figure II.1. We awarded 16 to 43 degrees for the past five years. It's worth noting that the number of degrees awarded from 2010 through 2015 (before the spike in enrollment) was around 15 to 25 students per academic year. The graduate enrollment for Mechanical Engineering has remained stable and manageable for the past few years. For the past two semesters, we offered three graduate classes per semester with around 15 to 30 students enrolled per class.

Table II.4 MSME Degree Program Applications, Admissions, and Enrollment

Fall	# Applied	# Admitted	# Enrolled	% Admitted/Applied	% Enrolled/Admitted
2015	341	100	34	29%	34%
2016	143	61	26	43%	43%
2017	132	79	35	60%	44%
2018	101	61	25	60%	41%
2019	116	70	30	60%	43%
2020	104	77	32	74%	42%
2021	138	94	30	68%	32%

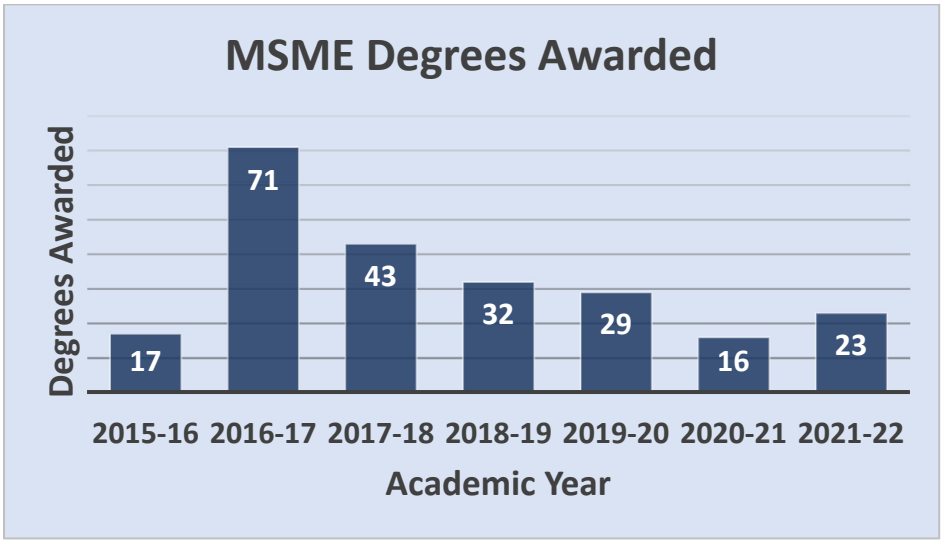

Figure II.1 MSME Degrees Awarded

Table II.5. Graduation Rates for MSME Students

All MSME Students Entered in Fall	Cohort	% Graduated		
		In 2 Years	In 3 Years	In 4 Years
2014	52	17.3%	40.4%	42.3%
2015	34	29.4%	61.8%	70.6%
2016	26	42.3%	76.9%	80.8%
2017	35	28.6%	57.1%	57.1%
2018	25	32.0%	56.0%	64.0%
2019	30	10.0%	33.3%	N/A
2020	32	6.3%	N/A	N/A

Table II.5 shows the graduation rates for our MSME students. Our 2-year graduation rate has decreased from around 30% to 6% since 2017. Only 33% from the 2019 cohort graduated in 3 years, and the percent of cohort graduating in 4 years seems low as well. The decrease in graduation rate can be attributed partly to the student population. More domestic students are now in the MSME degree program compared to international students. International students must be enrolled as full-time students to maintain their F-1 Visa status. However, our domestic graduate students often are working full-time while attending classes part-time. At times, they may only take one course per semester. The department will need to closely monitor and analyze this data to investigate if any factors and potential obstacles that may be causing graduate students needing more time to graduate and earn the MSME degree.

D. Enrollment Trend for the MSME Degree Program

Figure II.2 shows the MSME degree program enrollment by headcount since 2015. The graduate enrollment had a spike of international student applications and enrollment in AY 2014-15 with 163.5 students enrolled (not shown in the figure). The enrollment has gradually decreased from the spike, and it has been relatively stable for the past few academic years with around 80 to 90 graduate students. Through informal marketing and recruitment workshops, our graduate student population is now more diversified in the MSME degree program, including many graduates from our BSME degree program. The current graduate enrollment is adequate for faculty to engage our graduate students in research. Typically, our graduate students take 6 to 9 units per semester. 6 units of graduate coursework is considered as full-time for our MSME degree program. The FTES per headcount for our graduate program is around 0.6.

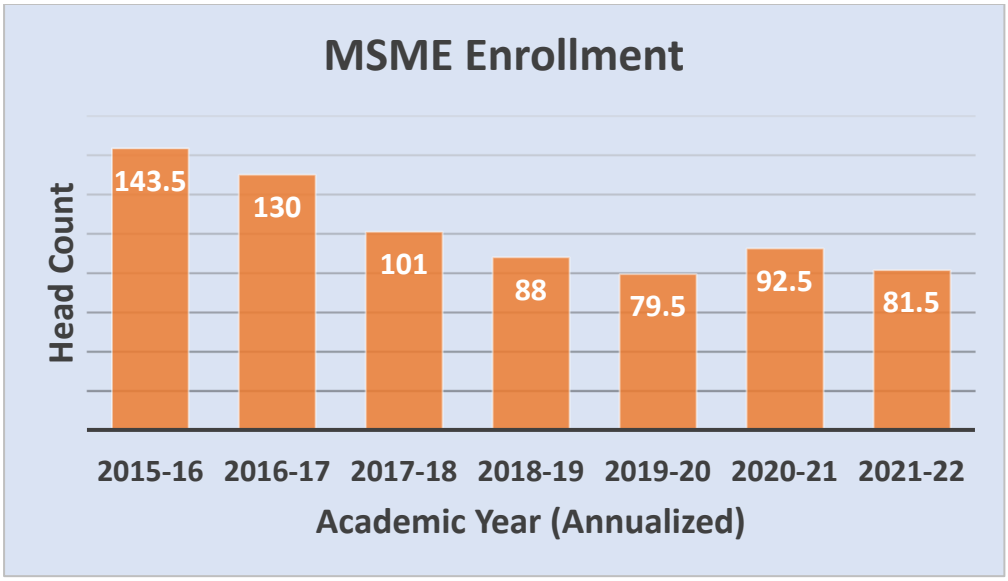

Figure II.2 MSME Degree Program Enrollment by Headcount

E. Future Plans for Curricular Changes

Currently there is no substantial curricular change in our plan. With a new faculty joining in Fall 2023, and an approved search for two positions with Fall 2024 start, the department anticipate new faculty to develop new courses in their areas of research expertise in the next three years.

Recently, our college has formed an ECS Online Instruction Committee with a faculty representative from each program to strategically envision the offering of ECS classes in online or hybrid modality. Depending on the outcome and recommendation of this college committee, each program may then examine their own to explore the modality change possibility and the impact on their program.

F. Special Sessions and Self-Support Programs

The Department of Mechanical Engineering does not have special sessions and self-support programs.

III. DOCUMENTATION OF STUDENT ACADEMIC ACHIEVEMENT AND ASSESSMENT OF STUDENT LEARNING OUTCOMES

A. Department Assessment Plan

Consistent with the university assessment process, the Department of Mechanical Engineering also follows the **six steps of assessment process** as outlined by the Office of Institutional Effectiveness and Planning. Prior to the last program performance review, the department did not have a systematic assessment plan. The assessment process was carried out in the academic year immediately before the previous PPR. The department has since adopted a systematic and periodic assessment for our programs.

Our undergraduate BSME degree program is accredited by ABET. In 2017, the ABET Engineering Area Delegation approved the changes to the Student Outcomes (SOs) of the general criteria for accrediting baccalaureate level programs. Eleven previous SOs (a) through (k) were updated to seven new SOs (1) through (7). The department in turn reviewed and revised the Student Learning Outcomes (SLOs) for our MSME degree program to reflect some of the SO changes for the baccalaureate programs by ABET. We also ensured that the newly revised SLOs align with the university's mission and graduate learning goals. The department then developed a timetable for assessment plans by including both direct and indirect assessments. The expected level of attainment (achievement target) of SLOs was identified. The department collected and analyzed the data and discussed the implementation of improvement actions. The assessment activities were documented and reported annually via AMS. The department has a standing Assessment and Continuous Improvement committee.

B. Student Learning Outcomes and Assessment

The MSME degree program has revised and adopted the following Student Learning Outcomes (SLOs) since the last program performance review:

SLO 1: An ability to apply knowledge of advanced mathematics, science & engineering to identify, formulate and solve advanced engineering problems
SLO 2: Ability to communicate effectively
SLO 3: An ability to use the techniques, skills and modern engineering tools necessary for engineering practices
SLO 4: A knowledge of contemporary issues

As illustrated from Table III.1, attainment of the SLOs is closely linked to achieving the PEOs of our degree programs. In addition, the program SLOs are also aligned with the graduate learning

goals of the university as shown in the mapping from Table III.2. The Mechanical Engineering assessment plan from 2017 through 2023 is summarized in Table III.3.

Table III.1. Relationship between Mechanical Engineering PEOs and SLOs

	Program Educational Objectives		
Student Learning Outcomes	**PEO 1: Technical Growth**	**PEO 2: Professional Skills**	**PEO 3: Professional Attitude & Citizenship**
SLO 1: Math, Science, Engineering for Engineering Solutions	X		
SLO 2: Communicate Effectively		X	X
SLO 3: Modern Engineering Tools	X	X	
SLO 4: Contemporary Issues	X	X	X

Table III.2. SLO Mapping with University Graduate Learning Goals

	Graduate Learning Goals					
Student Learning Outcomes	**GLG-01**	**GLG-02**	**GLG-03**	**GLG-04**	**GLG-05**	**GLG-06**
SLO 1: Math, Science, Engineering for Engineering Solutions	X	X				
SLO 2: Communicate Effectively	X		X			
SLO 3: Modern Engineering Tools	X					
SLO 4: Contemporary Issues	X				X	

Table III.3. Mechanical Engineering Assessment Plan

Year	Activities
AY 2017-18	Assessment of Student Learning Outcomes (Cycle 1)
AY 2018-19	Assessment of Student Learning Outcomes (Cycle 1)
AY 2019-20	Assessment Data Analysis/Evaluation/Continuous Improvement
AY 2020-21	Assessment of Student Learning Outcomes (Cycle 2)
AY 2021-22	Assessment of Student Learning Outcomes (Cycle 2)
AY 2022-23	Assessment Data Analysis/Evaluation/Continuous Improvement, Program Performance Review (PPR) Self-Study Preparation

Indirect Assessment: SLOs achievement in Mechanical Engineering program is assessed through a variety of both indirect and direct measures (Table III.4). The indirect assessment includes the course surveys and exit surveys. We conduct the course surveys for all 500-level graduate courses at the end of every semester and the exit survey at the end of the Spring semester. The course surveys are designed to ask students to evaluate the course relative to how well it prepared them to achieve the relevant SLOs. Students provide both objective ratings as well as suggestions for improvement. The department used to conduct the paper surveys but switched to online surveys via SurveyMonkey since the pandemic. Table III.5 provides the mapping of the SLOs with our 500-level graduate classes. Although direct assessments are often considered to be a more reliable method of assessing student learning than indirect assessments such as surveys, surveys have the advantage of allowing for both objective rating of outcomes, as well as constructive subjective comments that are useful in interpreting the data and better understanding possible underlying contributors to high or low ratings. Thus, the department considers both indirect and direct assessment measures. We consider both measures to be important in our decision-making process about program planning and improvement actions.

Table III.4. Mechanical Engineering Assessment Methods

Methods	Activities
Direct Assessment	Direct assessment of student learning outcomes is accomplished through the direct evaluation of students' work (e.g., projects, homework, exam questions, etc.) by faculty
Indirect Assessment	Indirect assessment of student learning outcomes is accomplished through some of the following surveys such as: (a) course evaluations, (b) exit survey

Table III.5. MSME Student Learning Outcomes Course Mapping.

Student Learning Outcomes	500-Level Graduate EGME Classes															
	508	511	512	516	520	526	530	531	536	538	540	541	561	563	571	576
SLO 1: Math, Science, Engineering for Engineering Solutions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SLO 2: Communicate Effectively			X										X		X	
SLO 3: Modern Engineering Tools	X	X	X	X	X	X	X	X	X		X	X	X			X
SLO 4: Contemporary Issues		X						X				X	X		X	X

Direct Assessment: Direct assessment of SLOs is accomplished through the direct evaluation of students' work (e.g., projects, assignments, and exam questions) from 500-level graduate courses. Each SLO is addressed in multiple courses. Direct assessment is conducted and collected by the course instructor. The course instructor identifies a particular assignment, project, or exam question that best reflects the SLO achievement. Table III.6 below illustrates an example of mapping SLOs 2, 3, and 4 with an appropriate assessment source in EGME 561 Advanced Manufacturing Processes.

Table III.6. Example of SLOs Assessment Source

SLOs Assessment for EGME 561	Source of Assessment
SLO 2: Communicate Effectively	Project: Part A
SLO 3: Modern Engineering Tools	Project: Part B
SLO 4: Contemporary Issues	Assignment 1 & 2

After identifying the source of assessment, the course instructor then assesses individual student's attainment of each SLO based on a scale of 1-5:

5: Outstanding; **4**: Good; **3**: Average; **2**: Needs Improvement; **1**: Insufficient
Or interchangeably the following 5-point scale:
5: Excellent; **4**: Above Average; **3**: Average; **2**: Below Average; **1**: Poor

Table III.7 below shows an example of assessment scoresheet for a particular course. All the scoresheets of individual courses are then collected and compiled to determine the SLOs attainment scores for the degree program.

Expected Level of Attainment for SLOs: For assessment and evaluation purposes, the expected level of attainment set by the ME faculty is to obtain an average score of 3.5 or better on a 5.0 scale for all direct and indirect measures and to achieve 80% ratings in top three assessment scales (i.e., Excellent, Above Average and Average ratings).

Table III.7. Example of Assessment Scoresheet

Student Names	SLO 2	SLO 3	SLO 4
Student A	4	3	2
Student B	1	1	2
Student C	4	3	3
Student D	3	2	4
Student E	5	4	4
Student F	4	5	4
Student G	2	3	3
Student H	5	4	5
Student I	3	5	4
Student J	4	2	3
Average	**3.5**	**3.2**	**3.4**

Frequency of Student Learning Outcomes Assessment: According to the department assessment plan (Table III.3), the goal is to collect assessment data based on both direct and indirect measures at least twice in a period of six years with assessment data analysis and improvement action plans discussion and implementation in between the assessment cycles. The indirect measure of using course surveys is conducted every year. The direct assessment activities are summarized in Table III.8a and Table III.8b for Assessment Cycle 1 (Fall 2017 – Spring 2019) and Assessment Cycle 2 (Fall 2020 – Spring 2023), respectively. The table cell in orange indicates the direct assessment conducted for a particular SLO in a particular course. The department conducted direct assessment in eleven courses during the first assessment cycle. Some courses were assessed multiple times in that period. The department lost the assessment momentum slightly due to the pandemic. The direct assessment was conducted in only five classes for Assessment Cycle 2. Nevertheless, each SLO is addressed in multiple courses with the exception of SLO 1. In addition to EGME 538 (Spring 2021 and Spring 2022), the department also explored the use of comprehensive exam question of EGME 438 and EGME 538 for the assessment (more on this topic later).

Table III.8a. Direct Assessment of SLOs for Assessment Cycle 1 (Fall 2017 – Spring 2019)

Direct Assessment Cycle 1 (Fall 2017 – Spring 2019) Student Learning Outcomes	500-Level Graduate EGME Classes															
	508	511	512	516	520	526	530	531	536	538	540	541	561	563	571	576
SLO 1: Math, Science, Engineering for Engineering Solutions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SLO 2: Communicate Effectively			X										X		X	
SLO 3: Modern Engineering Tools	X	X	X	X	X	X	X	X	X		X	X	X			X
SLO 4: Contemporary Issues		X						X				X	X		X	X

Table III.8b. Direct Assessment of SLOs for Assessment Cycle 2 (Fall 2020 – Spring 2023)

Direct Assessment Cycle 2 (Fall 2020 – Spring 2023) Student Learning Outcomes	500-Level Graduate EGME Classes															
	508	511	512	516	520	526	530	531	536	538	540	541	561	563	571	576
SLO 1: Math, Science, Engineering for Engineering Solutions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SLO 2: Communicate Effectively			X										X		X	
SLO 3: Modern Engineering Tools	X	X	X	X	X	X	X	X	X		X	X	X			X
SLO 4: Contemporary Issues		X						X				X	X		X	X

Summary of Assessment Results: The assessment results are summarized in Figure III.1a & 1b (Cycle 1) and Figure III.2a & 2b (Cycle 2) with the averages listed in Table III.9. For indirect assessment data received from graduate student surveys, all assessment indicators suggest that student achievement on these SLOs meets the expected target (average of 3.5 and above, 80% of top three assessment score scales). However, according to the direct assessment of student work, SLO 1 does not meet the target for both cycles. Only 73% and 67% of student attainment

of SLOs are in the top three assessment scales in the first and second cycle of assessment, respectively. The averages were around 3.1 to 3.3, slightly lower than the expected target of 3.5 average. As for SLO 2, the direct assessment indicators do not meet the target with only 65% in the top three assessment scales and 2.8 average in the first cycle of analysis. However, the direct assessment indicators for the second assessment cycle suggest that students attain the expected achievement target (91% in top three assessment scales and 4.2 average). The continous improvement action plans are discussed in the next section.

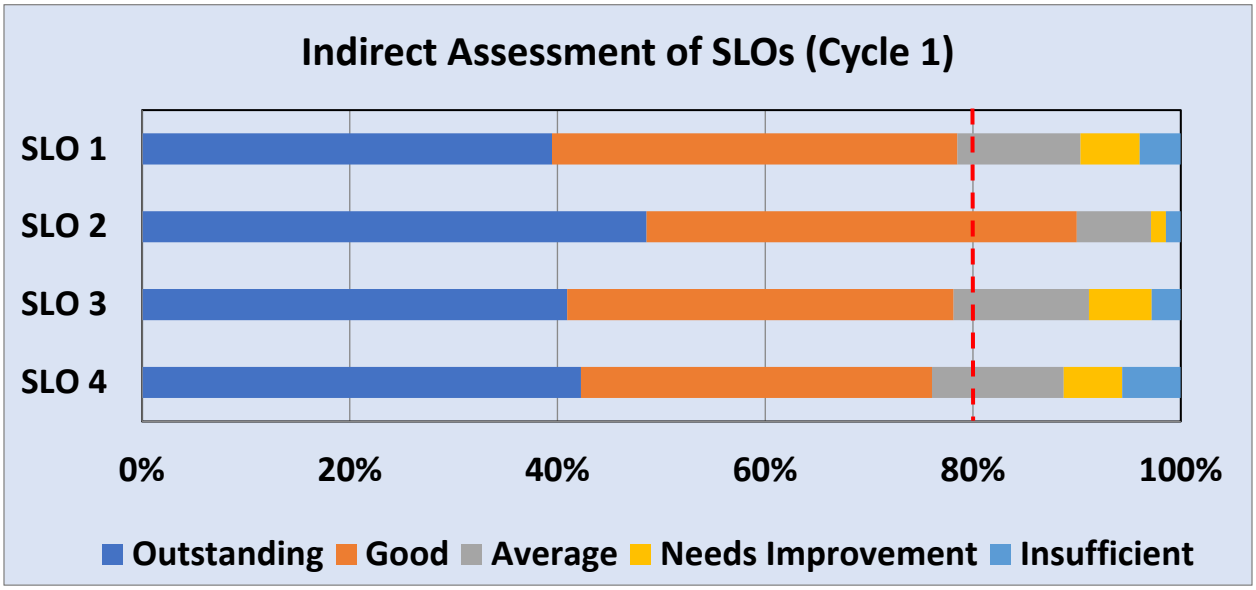

Figure III.1a. Summary of SLOs Indirect Assessment for Cycle 1 (Spring 2018 – Spring 2019)

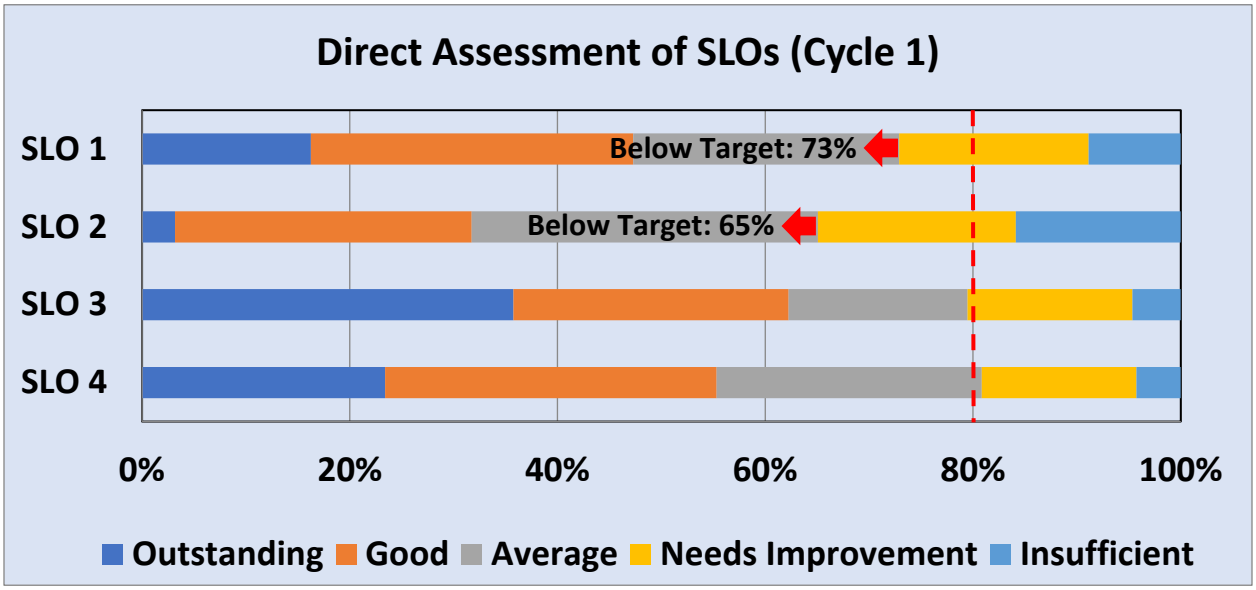

Figure III.1b. Summary of SLOs Direct Assessment for Cycle 1 (Fall 2017 – Spring 2019)

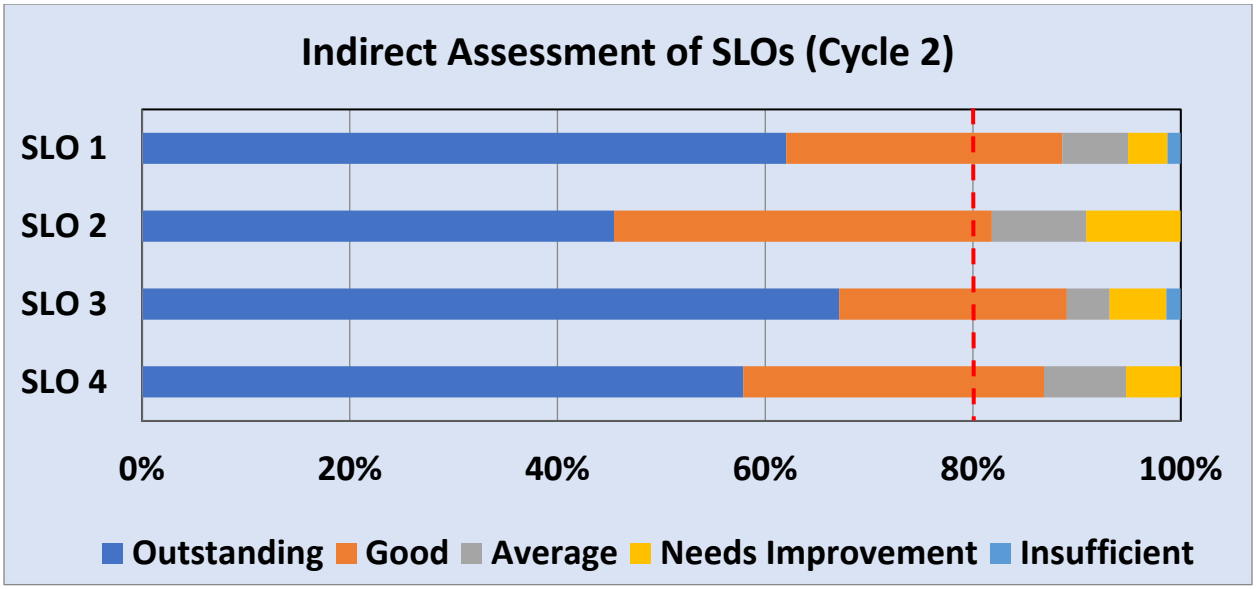

Figure III.2a. Summary of SLOs Indirect Assessment for Cycle 2 (Fall 2020 – Fall 2022)

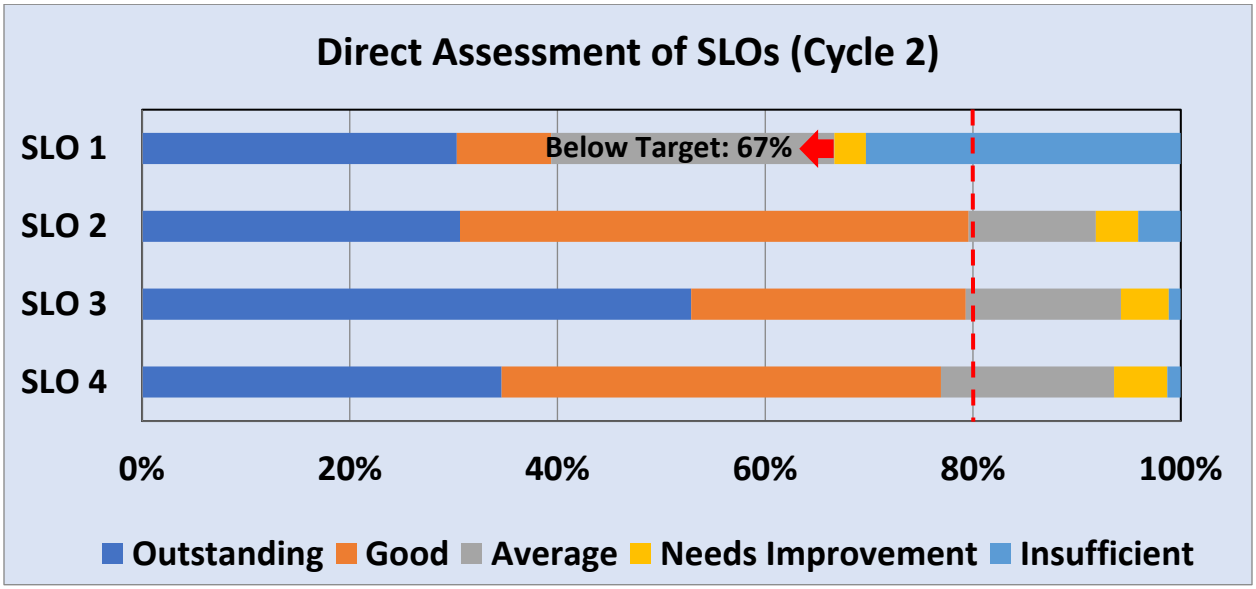

Figure III.2b. Summary of SLOs Direct Assessment for Cycle 2 (Fall 2020 – Spring 2023)

Table III.9. Summary of Average SLOs Assessment Scores

SLOs	Direct Assessment		Indirect Assessment	
	Cycle 1	Cycle 2	Cycle 1	Cycle 2
SLO 1: Math, Science, Engineering for Engineering Solutions	3.3	3.1	4.0	4.4
SLO 2: Communicate Effectively	2.8	4.0	4.3	4.2
SLO 3: Modern Engineering Tools	3.7	4.3	4.1	4.5
SLO 4: Contemporary Issues	3.6	4.0	4.0	4.4

C. Continuous Improvement

Corresponding to the assessment outcomes, the continuous improvement plans are given next:
SLO 1: The direct assessment indicators do not meet the expected standards for both assessment cycles. Based on the indirect assessment measures, the graduate students' perception on the attainment of SLO 1 is high. However, the faculty have higher expectations than students on their ability to apply knowledge of advanced mathematics, science & engineering to identify, formulate and solve advanced engineering problems. For the second assessment cycle, we explored using EGME 438 or EGME 538 question of the comprehensive examination for the assessment of SLO 1. We recognize that the comprehensive examination may not be the best assessment measure source. Students tend to solve the mathematics question last in their comprehensive exam, leaving them little time for or not attempting the problem at all. The assessment results often exhibit an inverted normal distribution. We should continue with the use of multiple courses in assessing the attainment of SLO 1 and not use the comprehensive exam in the next assessment cycle.

Graduate students' lack of strong foundation in mathematics, science, and engineering may be attributed to not meeting the SLO 1 expected standards. To aid the mastery of prerequisite materials in EGME undergraduate courses, in summer 2022, several ME faculty developed videos covering the prerequisite materials and important course materials for mechanical engineering foundation courses such as EGME 205 Digital Computations, EGME 304 Thermodynamics, EGME 331 Solid Mechanics and EGME 333 Fluid Mechanics. The Department of Civil and Environmental Engineering also developed videos for EGCE 201 Statics and EGCE 302 Dynamics. The videos were available for student use starting AY 2022-23. Some of these videos may be used to serve as the review and refresher course for our graduate students. If needed, more videos made be developed for additional topics. It may be beneficial to consider a pre-assessment at the beginning of the semester to better understand graduate students' prerequisite knowledge. The department plans to explore the implementation of this improvement action plan for SLO 1 in the next academic year.

SLO 2: The direct assessment indicators do not meet the expected standards for the first assessment cycle but meet the target for the second assessment cycle. Although we use direct assessment from two different courses to evaluate the attainment of students' ability to communicate effectively, we recognize that more assessment indicators may be incorporated in the assessment measures. Since most of our graduate students now have the culminating experience of project or thesis, we plan to implement a systematic and consistent ways for faculty to evaluate students' attainment level of SLO 2 using EGME 597 Project and EGME 598 Thesis for both written and oral communication. The Assessment and Continuous Committee will examine ways to conduct the direct assessment.

SLO 3: All assessment indicators suggest that student achievement on SLO 3 meets the expected standards. The graduate students have the ability to use the techniques, skills and modern enigneering tools necessary for engineering practices. No further action is recommended at this time. We will continue to monitor through each assessment cycle.

SLO 4: All assessment indicators suggest that student achievement on SLO 4 meets the expected standards. The graduate students have the knowledge of contemporary issues.
No further action is recommended at this time. We will continue to monitor through each assessment cycle.

D. Other Quality Indicators for Assessment

The department does not currently use any other quality indicators for assessment. The department may look into a systematic way of using culminating experience (e.g., comprehensive exam, project, or thesis) or job placement data for assessment.

E. Alternate Course Offering Format and Modality

All courses in the MSME degree program are in-person classes. EGME 563 is the only approved hybrid class in the program. The college has formed an ECS Online Instruction Committee to explore the feasibility and effectiveness of modality change for some of our EGME classes.

IV. FACULTY

A. Faculty Changes Since Last Review

The Department of Mechanical Engineering at the time of our previous review in Spring 2016 had 10 tenured and tenure-track faculty members: 3 tenured and 7 tenure-track faculty. Table IV.1 shows a summary of the ME faculty changes since our last program performance review. Currently, the department has 11 tenured and tenure-track faculty members: 2 full professors, 6 associate professors, and 3 assistant professors. The faculty vitae of full-time faculty are given in Appendix D. The current faculty are well-qualified to cover a wide range of mechanical engineering sub-disciplines, including thermal-fluid sciences, dynamics, robotics, control, design, materials, manufacturing, and bioengineering. Since our last program performance review, we hired six tenure-track faculty members; one faculty became our college associate dean; two faculty members retired, and two separated from Cal State Fullerton. Table IV.2 outlines the changes of tenure density and the distribution among academic ranks from 2017 through 2021. Due to retirement and separation, the department now only has an FTEF of 12.9 as of Fall 2021 compared to a recent peak of 14.5 FTEF. The faculty changes have not affected the program's academic offerings as qualified part-time faculty have been recruited to fill the gap. The department hiring priorities are discussed next.

Table IV.1 Faculty Changes since Last Review (Active ME Faculty with Orange Tabs)

Faculty Names	Spring 16	Spring 23	Notes
Dr. Darren Banks			Joined in Fall 2016
Dr. Andy Bazar			Retired
Dr. Sagil James			
Dr. Jin Woo Lee			Joined in Fall 2019
Dr. Salvador Mayoral			
Dr. Hossein Moini			Retired
Dr. Chean Chin Ngo			
Dr. Sang June Oh			Current MPP: ECS Associate Dean
Dr. Yong Seok Park			Joined in Fall 2016
Dr. Joseph Piacenza			Separated
Dr. Nina Robson			
Dr. John Sanders			Joined in Fall 2017, Separated
Dr. Siheng Su			Joined in Fall 2017
Dr. Justin Tran			Joined in Spring 2019
Dr. Haowei Wang			
Dr. Hope Weiss			
Total Number	**10**	**11**	

Table IV.2 Faculty Composition from 2017 through 2021

Fall	Tenured	Tenure-Track	Actual FTEF
2017	4	8	13.5
2018	5	7	13.5
2019	5	9	14.5
2020	5	8	14.5
2021	7	6	12.9

B. Priorities for Additional Faculty Hires

Table IV.3 summarizes the faculty recruitment activities in the department from 2015 to present. The department has been successful in our faculty searches from 2015 through 2019, and we have hired six faculty in that period. The momentum was hindered by the pandemic as the department had to suspend the search in Spring 2020 due to budget uncertainty. Due to the recent retirement and separation of three faculty, the department sees these faculty changes as opportunities for us to fill the vacant positions with emerging areas in mechanical engineering. The new hires can then develop new courses in their areas of research expertise to prepare our students to learn the modern and current technology and to meet the demand of industry. The department has resumed our faculty recruitment effort to fill the vacant faculty lines this academic year. One new hire will be joining the department in Fall 2023. In addition, the department has been approved for two positions for Fall 2024 start. We are planning to fill the positions in the emerging areas such as bioengineering, integrated artificial intelligence and computational design, advanced manufacturing, renewable energy, and energy storage.

Table IV.3 Faculty Searches since Last Review

Faculty Searches	Outcome
AY 2015-2016	2 New Faculty Hires Joined in Fall 2016
AY 2016-2017	2 New Faculty Hires Joined in Fall 2017
AY 2017-2018	1 New Faculty Hire Joined in Spring 2019
AY 2018-2019	1 New Faculty Hire Joined in Fall 2019
AY 2019-2020	Faculty Searches Suspended in Spring 2020 Due to the Pandemic (Budget Uncertainty)
AY 2022-2023	1 New Faculty Hire Joining in Fall 2023
AY 2023-2024	Two Positions Approved for Fall 2024 Start

Mechanical Engineering has very broad disciplines, and mechanical engineers are needed and hired in different industries. Hiring faculty in the emerging areas in mechanical engineering will be beneficial to the students, existing faculty, and our industry partners in the region. The current faculty may rejuvenate their research by collaborating with new faculty with new ideas and emerging technologies. For example, the integration of artificial intelligence in design and manufacturing is an evolving field. The new hire in this field can collaborate with the existing faculty on research proposals and scholarly activities and co-advise senior design projects. The ME Department may also consider another faculty in the advanced manufacturing area. This faculty can help the department from covering the more traditional machine shop classes to

innovative smart manufacturing courses. This strategic hire may strengthen our program in the manufacturing and biomanufacturing area and better prepare our students for the manufacturing sectors. Hiring faculty in biomedical device engineering may also strengthen our partnership with the local cooperate partners and prepare students for this industry. Orange County is widely recognized as the nation's hub for biomedical devices, with numerous biomedical device companies in proximity of Cal State Fullerton such as Edwards Lifesciences and Applied Medical.

Another emerging field in mechanical engineering is in renewable energy and energy storage. According to the "California Blueprint" recently presented by Governor Gavin Newsom, the state is committed to spend billions of dollars to address the climate crisis and to electric vehicle related initiatives. By having a faculty expert in energy storage/EV battery, our program can engage students in research to develop a smaller, more affordable, longer-lasting, and faster-charging battery for EVs through student projects and coursework in this area, and perhaps it will open more job opportunities for our students with automakers such as Tesla and Rivian. Hiring more faculty in these areas may also increase the funding opportunities with the federal and state agencies as well as private foundations as more research funds and opportunities are available in these emerging frontiers in mechanical engineering. The emerging areas that we propose for this line of positions also align well with the research clusters that the college envisions to have in our ECS Innovation Hub, a proposed expansion of the ECS campus infrastructure.

Faculty recruitment is a critical program continuous improvement opportunity for our programs, and it will help our mechanical engineering graduates to attain one of our program educational objectives related to the technical growth: Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation. We may also anticipate a renewed interest from our BSME graduates to come back for the MSME degree program due to the newly added courses in our curriculum and increase the graduate enrollment.

C. Role of Faculty in Curriculum and Academic Offerings

Full-time faculty in the department take ownership of our curriculum and courses. We are responsible for the periodic review and improvement of our degree requirements and courses to ensure the attainment of student learning outcomes (SLOs) and achievement of the program educational objectives (PEOs). They are three standing departmental committees related to curriculum: Undergraduate Program Committee, Graduate Program Committee, and the Assessment and Continuous Improvement Committee. All proposed changes and new course proposals are originated by the full-time faculty. All proposals submitted via Curriculog will be discussed and reviewed by all faculty in our faculty meeting, and then routed through different tiers of review and approval steps. Full-time faculty also provide the informal mentorship of our part-time faculty and teaching associates by sharing teaching experiences, best practices, and course materials.

The Department of Mechanical Engineering currently has 12 part-time faculty members and 3 teaching associates in Spring 2023. The current part-time faculty and teaching associates are given in Table IV.4. The ME part-time faculty are from industries such as the Boeing Company, Edwards Lifesciences, Marathon Petroleum Logistics, PBF Energy, and Raytheon. The teaching associates are obviously not teaching any of the courses in the MSME degree program, and they are primarily teaching freshmen introductory and lab courses in our BSME degree program. Mr. Osman and Mr. Rudisill are teaching EGME 102 Engineering Graphics while Ms. Artinger is teaching EGME 306B Fluids and Thermal Laboratory this Spring. For Spring 2023, in terms of the weighted teaching units (WTUs), 102 WTUs are taught by the full-time faculty (57%), 64 WTUs by part-time faculty (36%), and 12 WTUs by the teaching associates (7%). All three 500-level classes offered in Spring 2023 are taught by faculty with a Ph. D. degree.

Table IV.4 Part-Time ME Instructors in Spring 2023

Part-Time Faculty	Teaching Associate
Dr. Medhat Azzazy	Ms. Jessica Artinger
Dr. Edward Gao	Mr. Ahmed Osman
Mr. Habib Gharavi	Mr. Alexander Rudisill
Mr. Michael Haddadin	
Mr. Chacphet Limsakoune	
Mr. Patrick Mannion	
Mr. Peter Mignosa	
Mr. Wally Portacio	
Mr. Pradeep Sharma	
Dr. Erica Tseng	
Mr. Hugo Valverde	
Dr. Bing Zhang	

D. Special Sessions and Self-Support Programs

The Department of Mechanical Engineering does not have special sessions and self-support programs.

V. STUDENT SUPPORT AND ADVISING

A. Graduate Student Advising

All graduate study matter including graduate student advising is handled by the graduate program advisor getting 3 WTUs assigned time per semester. Typically, the first in-person advising is conducted immediately following the New Graduate Student Orientation during the program breakout session. Students are informed of all the university graduate policies and degree requirements in that advising session. The graduate program advisor provides periodic advising to ensure students making adequate progress in completing the degree requirements and performing graduation check in their anticipated graduation term. For students who are on academic notice (formerly known as academic probation), at times facing academic disqualification, the graduate program advisor carefully monitors the student's academic progress, and if necessary, recommends students to take a special workshop offered by the Office of Graduate Studies. Due to the increase of international students in ECS, our college has also added a new College International Student Advisor position since the last review. The Office of Graduate Studies also offers support through the Graduate Studies Center and programs such as the Project upGRADS Initiatives (funded by U. S. Dept. of Education's Hispanic Serving Institution) and Pa'lante Fellowship Program.

B. Research and Internship Opportunities for Graduate Students

Prior to the last review, the majority of the graduate students in our MSME degree program chose comprehensive exam as the culminating experience. Due to the addition of new faculty, our faculty members have been actively engaged graduate students in their research and scholarly activities. Now, around two thirds of our graduate students have chosen either the project or thesis option as their culminating experience. 63 students have enrolled EGME 597 Project from Fall 2016 through Spring 2023 as listed on Table V.1 while 80 students have signed up for EGME 598 Thesis in the same time period (Table V.2). The tremendous improvement in offering of high-impact practice opportunities attributes to the commitment of ME faculty in mentoring our students. Very often, the research findings are disseminated through conference proceedings or journal publications with students. Our graduate students have been actively participating in the annual statewide CSU Student Research Competition (SRC). Many MSME graduate students have been recognized in this competition. For example, Mehrshad Mazaheri was awarded second place at the 2022 competition virtually hosted by San Francisco State University. Jo Wang Dickinson was the recipient of 2021 Outstanding Student Scholarly and Creative Activities Award recipient.

Table V.1 MSME Student Enrollment of EGME 597 Project (Fall 2016 through Spring 2023)

EGME 597 Project Enrollment from Fall 2016 through Spring 2023: 63 Students		
Acosta, Luis	Lai, Yui Yan	She, Jun
Ahmed, Marwan	Le, Duke	Shrestha, Sam
Ahmed, Mohammed Taqi	Lee, Aaron	Soufi, Mouhamed
Alrabah, Hmad	Lewis, Eric	Theologidy, Mariah
Bartels, Andrew	Martinez, Irving	To, Brandon
Buddine, Brian	Masone, Kevin	Tolentino, John
Corona, Jeanette	Nabilsi, Seham	Tran, Andy
Dagher, Hussein	Ng, Jonathan	Tran, Leon
Dang, Christopher	Nguyen, Anh	Vargas, Israel
De La Luz, Lenny	Nguyen, Jonathan	Vepuri, Dheeraj
Dhindsa, Inderpal	Oliver, Eric	Vest, Louis
Dickinson, Jo Wang	Patel, Purvam	Waliullah, Muhammad
Dwivedi, Ashutosh	Perez, Alexander	Wang, Li
Farooqui, Mohammed	Phan, Jonathan	Wang, Liyu
Fernandez, Aaron	Phan, Tuan	Wanser, Blake
Garcia, Sarah	Ramanujapuram, Adarsh	Woodland, Jonathan
Hernandez Quezada, Mario	Rudisill, Alexander	Wu, Sharon
Hernandez, Marilyn	Sanchez, Daniel	Yanagihara, Adam
Hernandez, Severino	Saroop, Ram	Younis, Anthony
Kabariya, Urvesh	Serrato, Samuel	Zagal, Emmanuel
Khorasani Kerdkohi, Elahe	Shah, Sudip	Zhang, Yufei

Table V.2 MSME Student Enrollment of EGME 598 Thesis (Fall 2016 through Spring 2023)

EGME 598 Thesis Enrollment from Fall 2016 through Spring 2023: 80 Students		
Ahir, Vishalkumar	John Bernard, Ankith	Parikh, Karan
Al Edhari, Ahmed	Jones, Noah	Parmar, Mayur
Alanzi, Abdulaziz	Joshi, Aneesh	Pashpuleti, Rahul
Albarhami, Bahaa	Kakadiya, Sharadkumar	Patel, Divyakumar
Attibele Shivakumar, Thilakraj	Khader, Syed	Patil, Aakash
Bhavsar, Shripal	Khorasani Kerdkohi, Elahe	Pham, Aryanna
Birar, Shubham	Kingsley, Emily	Phelan, Patrick
Caballero, Rachel	Kouchaki, Armin	Portillo, Jonathan
Cervantes, Alejandro	Lin, Sean	Qazilbash, Agha
Chavez, Brianda	Lona, Louis	Rajanna, Prashanth
Chen, Binyun	Louie, Scott	Roy, Ambarneil
Chetan, Chirag	Mahajan, Anurag	Shah, Karan
Contractor, Rinkesh	Martinez, Ronald	Shetty, Anupam
Dooraghi, Mehdi	Matthys, Kory	Sonate, Abhishek
Dousti, Niayesh	Mazaheri, Marshall	Sunilkumar Kollamole, Kelvin
Ebeid, Mary	Menon, Vivek	Tandel, Ravikumar
Eckert, George	Mhawesh, Mustafa	Tavakoulnia, Navid
Edirisinghe, Chandana	Mistry, Vinit	Truong, Nguyen
Fernandez, Ivan	Moawad, Mina	Valverde, Hugo
Garcia, Erik	Mohammad Nejadian, Shayan	White, Michael
Garcia, Fernando	Montesdeoca, Liliana	Wiechert, Jonathan

Hindson, William	Mulgaonkar, Samir	Yim, Eric
Iravantchi, Ideen	Munoz, Eduardo	Zagal, Emmanuel
Jamison, Corey	Narkhede, Mayur	Zarate, Joel
Jamshidi, Negar	Navarro, Cris	Zhang, Yufei
Jamshidi, Niloofar	Nikam, Sanjana	Zhou, Linlin
Jaquez, Arnoldo	Panchal, Sagar	

University Career Center provides a variety of services to Engineering and Computer Science students. We have a Career Specialist designated to the college. There is also a career fair event specifically tailored to ECS students. The career fairs/expos are represented by the local industries in Orange County and southern California, and students have the opportunity to meet employers who are here to recruit students for jobs and internships.

VI. RESOURCES AND FACILITIES

A. State and Non-State Support and Resources

Table VI.1 below lists the state and other resources received by the ME Department since the last review. The state support column only includes the consolidated course fees (formerly known as the miscellaneous course fees). The dollars received through the development foundation in the last column do not include the gifts-in-kind.

Table VI.1 Department Resources Received

Year	State Support	Faculty Startup	Grants/Contracts	Development
2016-2017	$29,995	$90,000	$404,809	$12,536
2017-2018	$65,831	$80,000	$573,888	$2,910
2018-2019	$196,874	$45,000	$44,870	$2,407
2019-2020	$46,399	$45,000	$432,540	$5,690
2020-2021	$63,820	-	$50,000	$7,600
2021-2022	$22,916	-	$15,000	$20,700
Total	$425,835	$260,000	$1,521,107	$51,843

In addition to the resources listed in Table VI.1, some of our courses are also supported through the Instructionally Related Activities (IRA). The following programs are funded by the IRA:

Mechanical Design I and II: EGME 414 and EGME 419
Manufacturing Training Program: EGME 461
3D Printing Education Program: EGME 484

The equipment in the machine shop is now worth more than $1 million. Minor equipment repair work is done by the laboratory technicians with the support of the Engineering and Computer Science Machine Shop, equipped with state-of-the-art CNC machining center. In addition, the Department Information Technology Technician/Consultant receives support from the Division of IT to maintain, upgrade and operate computing facilities. If the need arises for upgrade or replacement of tools, equipment, or computing resources by the faculty or staffs of the department, it is brought to the immediate attention of the department chair. The department chair then discusses the direction of upgrades or replacement with the relevant faculty. After consultation, the department will then discuss the proposal for upgrade or replacement with the College of ECS Dean for the request and approval.

B. Equipment/Facilities and Recent Upgrades

The ME Department classrooms/laboratory facilities occupy approximately 17,500 square feet of total space. The ME Department has one classroom E-201 with a capacity of 70 students (Figure VI.1) and two Computer-Aided Design Labs (Rooms CS-304 with 62 students and CS-309 with 38 students as shown in Figure VI.2). In addition, the ME Department also has two general-

Figure VI.1 ME Classroom E-201

Figure VI.2 Computer-Aided Design Classroom CS-309

use classrooms: E-SE-022 (36 students) and E-NE-42 (33 students). Overhead projectors and screens are standard equipment in each classroom. There have been several classroom upgrades since last program review that included "Smart Classroom" features. This type of classroom features multimedia equipment and instructional computer that include DVD player, multiple projectors, speakers, Apple Airplay, internet access, etc.

ME Classrooms and Computer Labs

Two Computer-Aided Design Labs (Rooms CS-304 with 62 students and CS-309 with 38 students) are used in several graduate courses (e.g., EGME 410, 417, 422, 424, 456, 483, 540, and 541). They support students' studies on modeling, analysis, simulations, and design of systems/components. In addition to being available for regular course offerings, the labs are accessible for work on student projects. These labs are continuously updated with top-of-the-line workstations and latest versions of industry-standard software.

In 2016, the college of ECS expanded the CS-304 computer lab to better accommodate students' needs. The capacity of CS-304 was increased from 48 students to 62 students ($11,106). CS-304 is currently one of the largest computer lab in CSUF with 62 computers. The Audio/Video equipment in CS-304 was also upgraded in AY 2016-17 ($22,374). More recently, we upgraded the computer systems in both CS-304 and CS-309 (102 computer systems) for around $213,554 in AY 2021-22. The computer systems in the ME labs now feature the Dell Precision 3650 Tower Intel Core i7-10700 CPU @ 2.90 GHz with 32GB of RAM, 512GB of solid state hard drive, and 27-inch Dell P2719HC LED monitors. We also upgraded the entire Audio/Video equipment in E-201 in AY 2021-22 to Epson powerlife Pro G7500U projectors and TT-12W STEM-CAM Visual Presenter (document reader). This project cost was around $32,664.

Engineering Machine Shop

The Engineering Machine Shop serves all the departments in the College of ECS. It is well equipped with conventional and CNC machine. Staffed by a full-time machinist experienced in prototype as well as production processes, the Machine Shop provides fabrication tools and hands-on experience to ME undergraduate and graduate students through instructional classes,

capstone design projects and student projects. The machine shop is equipped with 10 CNC machines worth more than one million. These machines include two TL-1 models (conventional/CNC lathes), two TM-2 models (conventional/ CNC mills), one TM-1 models (conventional/ CNC mill), one ST-10Y (Live turning Center: lathe with auto tool changer, live tooling, and 4 axis), one VF-2Y model (vertical machining center: 3-axis milling machine), one VF-3 model (vertical machining center: 5-axis milling machine), one Foam Lynx Router (Large scale router with extended Z axis), and one Flow International Mach 100 (4"x4" waterjet cutter). Figure VI.3 and VI.4 show some of the Haas CNC machines.

Since 2014, the college of ECS has invested $336,761 in the machine shop to upgrade and purchase new equipment. Some of the new equipment included Haas VF-2Y CNC Mill (Figure VI.5), Foam Lynx 3D router with extended Z axis (Figure VI.7) and Flow International Mach 100 WaterJet Cutter (Figure VI.9). These machines introduce students to production manufacturing technology and prepare them to consider many facets of machining that could not be taught using conventional machines.

To augment the CNC machines, the Machine Shop also houses numerous conventional machines to ensure the various needs of the campus are meet. These machines include mills and lathes, sheet metal equipment, welding equipment, and numerous miscellaneous machines to complement the abilities of the shop. These machines are also available to the students to increase their knowledge in manufacturing, but also to ensure the ability to meet their project needs. Figure VI.6 shows a newly added conventional mill purchased to meet demand in the shop. In addition, students create prototypes or finished parts using three Airwolf 3D printers available in the shop (Figure VI.8). In addition to the three located in the shop, there are over 2 dozen 3D printers located in ECS to provide students with 3D printing capabilities.

Figure VI.3 Haas TL1, TM2, and VF-3 CNC Machines

Figure VI.4 Haas TL-1 Conventional/CNC Lathe

Figure VI.6 Acer Knee Mill ($12,548)

Figure VI.5 Haas VF-2Y CNC Mill ($120,000)

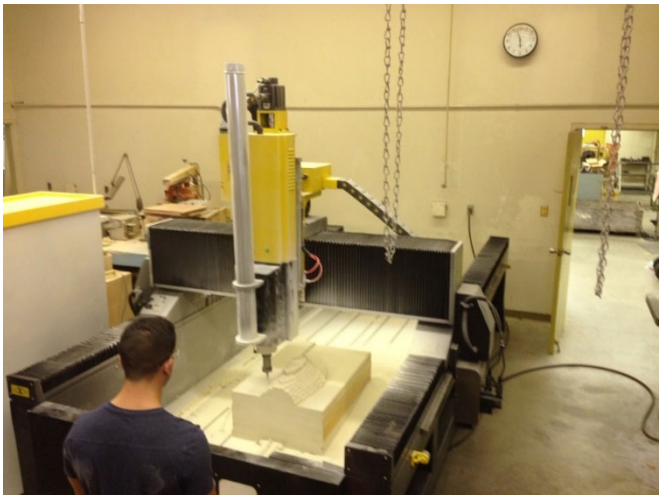

Figure VI.7 Foam Lynx 3D Router with Extended Z Axis ($44,000)

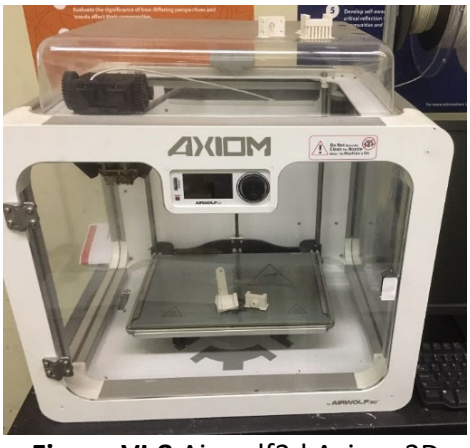

Figure VI.8 Airwolf3d Axiom 3D Printer ($24,961)

Figure VI.9 Flow International Mach 100 WaterJet ($135,252)

Instructional and Faculty Research Labs

The Solid Mechanics Engineering Laboratory in E-NE-44 is primarily used for the instruction of EGME 306A Solid Mechanics Laboratory. The purpose of this introductory measurement laboratory is to support student education in the areas of materials, mechanics, and dynamics. The lab has four computer workstations with National Instruments data acquisition boards and LabVIEW software, providing capabilities for computer-aided testing, measurements and signal processing. Additional computers, running Microsoft Office, are also available for students' use to perform data processing and analysis for the experiments, and to prepare reports. Students have access to the following equipment in this lab:

MTS Insight 50 Testing Machines: to conduct tensile/compression and deflection/bending tests.

Charpy Impact Test Machine: to perform impact testing and investigate the ductile to brittle transition temperature for various materials at different temperatures.

Column Testing Machines: to study the crushing and buckling behavior of columns under axial compressive loading and determine the critical loads of columns.

Some undergraduate and graduate students also use this lab for their projects. In AY 2020-21, we upgraded the MTS computer systems and software for $41,273, and the calibration of MTS machines was $9,986.

The ME Department also has three other instructional laboratories: Fluids and Thermal Laboratory, Dynamic Systems and Controls Laboratory, and Energy and Power Laboratory. Since the equipment used in these ME labs are for undergraduate instructional purposes and not for undergraduate or graduate research, the details are omitted in this PPR report. In addition to the instructional labs, we also have the following ME faculty research labs (or shared research space) such as advanced computing, advanced manufacturing, aerodynamics and wind tunnel, biomaterials, combustion, design, heat transfer, laser, and robotics labs.

The research space needs remain a potential concern and challenge for faculty recruitment, but the department has been strategic in working with faculty to address their research space needs.

The department repurposed several rooms, originally intended for student clubs, to faculty research. For example, Room E-21B was renovated for a design research laboratory; and Rooms E-24A and E-24B were combined and renovated for a biomaterials research laboratory. The department also reconfigured the use of laboratory space for instruction to make room for an advanced manufacturing laboratory in E-24C. The collegiate department culture has allowed us to accommodate new faculty research space need through shared research space. Most faculty that the department hired recently have managed to get their research program initiated at Cal State Fullerton. We are hopeful that the proposed ECS Innovation Hub will alleviate the limited research and project space challenge that our college faces.

Recent Laboratory/Equipment Upgrade and Priorities

Since the last PPR review, the ME Department and the College of ECS budgets have provided over half a million dollars in funding to maintain and upgrade laboratory equipment and classroom/computing facilities. Some of the maintenance and upgrades were made possible through the Consolidated Course Fees. These fees (based on student enrollment) are available each fiscal year, and they must be used for instructional activities before year-end. The balance cannot be rolled over to the next fiscal year. For more expensive upgrades/equipment, a special request may be proposed to the Dean's Office or the Provost Office. A philanthropic fund may also be used if available. Below is a list of notable ongoing approved upgrade projects for our labs and classrooms since the last review.

Table VI.2 provides a list of major upgrade projects (e.g., construction/renovation, new equipment, etc.). Only items above $2,500 are listed here. Smaller supplies, maintenance and annual software subscription costs are not included here. The annual software renewal cost for ME Department is around $13,000. It is worth noting that the college and department invested in several renovation projects during the pandemic while we had to be away from the campus during the remote operation period. The Engineering Offices on the first floor of the Engineering Building were renovated. The university also assisted the college and departments with the cost and installation of two new service windows for the Department of Mechanical Engineering and Department of Civil and Environmental Engineering. The service windows are now equipped with a motorized rolling shutter system. The department also installed an acrylic wall display in the ME Office to enhance the office aesthetics while displaying the student work and activities. The department also received HEERF II Fund to install metal shelters in the engineering yard areas to increase the storage space and thus work area for student projects. The college and department have managed to turn the pandemic crisis into an opportunity for improvement.

Information Technology Support and Services

In addition to the computer classrooms (CS-304 and CS-309) maintained by the college and department, the campus central Information Technology (IT) (https://www.fullerton.edu/it/) provides extensive services to students and faculty. Information Technology at the university level at Cal State Fullerton are abundant, ubiquitous and cutting-edge. The College of Engineering and Computer Science has an exceptionally close relationship with Campus IT, as this operation is affectionately called. Engineering and Computer Science students benefit from such close

working relationship. First, IT helps the college obtain special volume purchase "deals" from computer and other IT vendors by making college purchases part of larger orders. Second, IT understands the special needs of this college and works with faculty and technicians in planning and operating our laboratories.

Table VI.2 Examples of Major Upgrades and Costs

Description		Amount
AY 2016-17:	Expansion of CS-304 (48 to 62 Systems)	$11,106
	Upgrade of Audio/Video equipment in CS-304	$22,374
	E-21B Lab Renovation	$6,691
AY 2017-18:	Storage Cabinet/Container	$5,549
	Refrigerating and Heating Circulators	$11,302
AY 2018-19:	Flow International Mach 100 WaterJet Cutter	$135,252
	Digital Hydraulic Bench	$6,734
	Security Systems (Card Swipe)	$6,947
	Flammable Storage Cabinets	$6,514
	10 Computer Systems for Senior Design Projects	$8,271
	Desktop Demonstration Modules for Fluid Mechanics	$2,507
	E-24A & 24B Lab Renovation	$16,490
AY 2019-20:	Raise 3D Printer	$6,140
	Ultimaker 3D Printer	$3,941
	Campbell Scientific Data Acquisition Device	$4,255
	Engineering 1st Floor Suite Renovation (Cost Sharing, ME Portion)	$10,443
AY 2020-21:	Upgrade of MTS Computer Systems and Software	$41,273
	Calibration of MTS Machines	$9,986
	Upgrade of Audio-Video Equipment in E-201	$32,664
AY 2021-22:	Computer Systems Upgrade for CS-304 and CS-309	$213,554
	Piping Systems Apparatus	$16,040
	Handheld Scanners	$2,715
	Acrylic Wall Display (Cost Sharing, ME Portion)	$3,372
	Metal Shelters for Outdoor Storage (HEERF II Fund)	$25,000
AY 2022-23:	Form 3+ 3D Printer	$2,693
	TurboGen Repair and Retrofit with New Software	$8,806
	50kN Wedge Action Grips	$7,413
	Wedge Set	$2,769
	MTS Extensometer	$6,151
	Piping Systems Apparatus	$15,863
		$652,815

Information Technology Facilities: The following are some of the resources provided by IT:
Student Genius Center (https://www.fullerton.edu/it/students/sgc/index.php)
Campus Computer Labs (https://www.fullerton.edu/it/students/computerlabs/)
Innovation/Makerspace Center (https://www.fullerton.edu/it/innovation_makerspace_center/)
Data Visualization Center (https://www.fullerton.edu/it/services/data_visualization_center/)

Interdisciplinary College Collaboration Space (http://www.fullerton.edu/it/students/computerlabs/iccs.php)
Center for Equitable Digital Access (CEDA) (https://www.fullerton.edu/ceda/)
Academic Technology Center (ATC) (https://www.fullerton.edu/it/atc/)

Information Technology Support: The following are some of the support provided by IT:
IT Help Desk (https://www.fullerton.edu/it/students/helpdesk/index.php)
Virtual Computer Lab (https://www.fullerton.edu/it/services/virtual_labs/ecs.php)
iFullerton: The Official CSUF Mobile App (http://www.fullerton.edu/it/students/ifullerton/)
IT DIY: Do-it-Yourself Services (http://www.fullerton.edu/it/students/diy/index.php)
Device Requests (https://www.fullerton.edu/it/services/device-requests/)
Software (http://www.fullerton.edu/it/students/software/)

C. Library Resources

The Paulina June and George Pollak Library provides a full range of services to faculty, students, and community users. Designed to facilitate the delivery of recorded knowledge and information in support of instruction and faculty research, the Library serves as the hub of the University's information and instruction network. The Library also participates in the University's instruction programs and shares its commitment to lifelong learning. The Library's Web site (http://www.library.fullerton.edu) serves as a gateway to information about library resources and services as well as a vital component of the library's extensive instruction program. The Pollak Library holds over 1,400,000 books, which include just over 770,000 physical books and over 690,000 electronic books. In addition, the library provides access to over 200 databases. Table VI.3 includes a list of database examples of particular interest to the College of Engineering and Computer Science.

Table VI.3 Databases

Databases of Particular Interest to Computer Sciences and Engineering:	
ACM Digital Library	**SpringerLink Journals**
IEEE Xplore	**OmniFile Full Text Mega**
Web of Science	**Academic Search Premier**
ScienceDirect	**Wiley Online Library**

The Pollak Library has over 500 computers available located throughout the North and South buildings. Wireless access and docking stations are available throughout the buildings. Electronic resources for the visually disabled are also available. The library is also home to the **Research Center**, a main hub for research activities located on Library North first floor. A service desk at the Research Center is staffed by the Reference Team (e.g., reference librarians, subject consultant librarians, library

staff, etc.), while the **Student Genius Center** is staffed by the Information Technology staff. Both assist users with research needs and technical support.

The Pollak Library houses the **Innovation/Makerspace Center** on the second floor of Library North. This center enhances creativity, innovation and talent through advanced technology such as virtual reality, augmented reality, 3D printing, Microsoft Surface Hub, Raspberry Pi, and high-end computing, (https://www.fullerton.edu/it/innovation_makerspace_center/). In addition, a **Data Visualization Center**, for analyzing and displaying data, is located adjacent to the existing Innovation/Makerspace Center, (https://www.fullerton.edu/it/services/data_visualization_center/). The Pollak Library also has an **Interdisciplinary College Collaboration Space** on the 2nd floor of Library North (http://www.fullerton.edu/it/students/computerlabs/iccs.php). Students may find specialized software that they need for their majors in that space.

Reference and Instruction Services: The Pollak Library's reference and instruction services are designed to teach students to be information literate, critical thinkers, and intelligent researchers. The mission of the Library's Instruction program is to prepare CSUF students to be successful information seekers in a rapidly changing technological environment. The Library's Reference team at the Research Center provides services using a variety of methods such as telephone reference, chat reference, library answers via email, and Instant Messaging (IM) Reference. Research consultation sessions are also available by appointment with the librarian subject specialists. Librarians on the Engineering and Computer Sciences/Natural Sciences and Mathematics (ECS/NSM) Instruction Team provide library instruction to students in the program upon the request of the course instructor. This approach ensures students in need of research support are served through instruction sessions targeted to their specific course and delivered to meet the needs of specific research assignments or requirements. Instruction librarians also create web portals that are tailored to each individual class that is brought into the library. These library guides provide information to students that is relevant to their assignments. A complete list of guides is available here: http://libraryguides.fullerton.edu/browse.php

Circulation: Students and faculty check out materials using their Titan cards. Most library materials circulate for 10 weeks. However, checked out materials are subject to recall after 10 days if requested by another borrower. Students and faculty can check out up to 100 items. Renewal of library materials can be done in person, via the telephone or online at the Library's Website. For additional details, see
http://www.library.fullerton.edu/about/guidelines/privileges.php

Course Reserves: The Library maintains a course reserves collection of supplementary course materials provided by faculty in support of course curriculum. The Library accommodates reserves in several formats. Digitized copies of print or audiovisual materials are accessed using course management software available to students and faculty via the campus portal site. Digitized reserves can be accessed at any time. Support for using Titanium, our campus course management software, is provided by The Faculty Development Center (assistance to faculty) and IT Help Desk (assistance to students). Reserves in any format (books, textbooks, sample projects, etc.) can be borrowed from the course reserves desk during the hours the Library is

open. Complete information regarding course reserves can be found on the Library's Website at http://www.library.fullerton.edu/services/course-reserves.php.

Interlibrary Loan: ILLiad, a web-based interlibrary loan system, allows students and faculty to request articles, books, and other materials online. ILLiad is used when the requested materials are not in the library. Interlibrary loan staff may obtain requested items from libraries worldwide. Most materials can be borrowed free of charge. Detailed information regarding the Library's Interlibrary Loan services is maintained at the Library's Website at https://www.library.fullerton.edu/services/interlibrary-loan.php

The Library also maintains reciprocal borrowing arrangements that allow CSUF students, faculty, and staff to go directly to other libraries and borrow the resources they need in person. Reciprocal arrangements exist among the sister institutions in the California State University system and with several institutions in the local area, including Biola, Cerritos College, Hope International University, Marymount College, Santiago Canyon College, and the Southern California University of Health Sciences.

Library Collections: As mentioned above, the Library has a significant collection of materials that support the study and research required by the College of Engineering and Computer Science. The Library welcomes input from faculty on the selection and purchasing of resources and materials that support the curriculum and, as funds permit, the research needs of the faculty. The 23-campus California State University system now uses an integrated platform – Ex Libris Alma with the Ex Libris resource discovery system, Primo. This has provided an increased efficiency and equity for sharing of items among campuses.

Through collaboration with the California State University system as a whole, as well as local subscriptions, the Library provides access to resources essential to the study of Engineering and Computer Science, such as the ACM Digital Library, IEEE *Xplore*, Web of Science, and others listed above. Through an established approval plan, a Demand-Driven Acquisition (DDA) program, selections by the Engineering librarian, and faculty requests, books in both print and electronic formats are added regularly. Current monograph holdings are given in Table VI.4 as follows:

Table VI.4 Monograph Holdings

Pollak Library Print and Electronic Book Collections for Engineering and Computer Science		
	Current Collection Holdings (Print & E)	**Electronic DDA**
Engineering: Call Numbers T – TP	25,200 (17,639 & 7,561)	5,787
Chemistry: Call Number QD	7,633 (6,376 & 1,257)	1,047
Math & Computer Science: Call Number QA	20,791 (16,481 & 4,310)	4,359
Physics: Call Number QC	10,433 (7,958 & 2,475)	1,886
Technology: Call Number TS	1,306 (1,095 & 211)	122

The Library also maintains a number of journal subscriptions relevant to Engineering and Computer Science as shown in Table VI.5:

Table VI.5 Journal Collections

Pollak Library Journal Collections for Engineering and Computer Science	
	Current Collection Holdings
Engineering and Computer Science (including all subcategories, some of which are included below)	8,485
Civil Engineering	1,083
Electrical Engineering	2,209
Mechanical Engineering	1,198
Chemistry	1,455
Math & Computer Science	5,425
Physics	2,570
Technology	310

VII. LONG-TERM PLANS

A. Department's Long-Term Plans

The department's long-term plans are summarized as follows:

- Recruitment and retention of high-quality diverse faculty.
- Diversification of curriculum and courses in emerging areas of mechanical engineering.
- Effective marketing strategy and outreach to recruit high-quality diverse graduate students.
- Explore the feasibility and effectiveness of different modality in course delivery for working professionals.
- Monitor graduate students' time to degree and identify any potential obstacles.
- Continuous revision of SLOs assessment indicators and implementation of improvement action plan.
- Support and contribute to the research clusters envisioned for the proposed ECS Innovation Hub.
- Establish the department as one of the top choices for master's program in mechanical engineering in Orange County and southern California.

B. Long-Term Plans on Implementation of University and Departmental Missions and Goals

The long-term plans of the department are directly aligned with the University's and the Mechanical Engineering Department's mission and goals. Our long-term plans directly align with University's Goals and Strategic Plan 2018-2023:

- Recruit and retain high-quality and diverse staff and faculty.
- Provide a transformative educational experience and environment for all students.
- Strengthen opportunities of student completion and graduation

As Cal State Fullerton wraps up the 2018-2013 Strategic Plan and develops the new **Fullerton Forward 2024-2029** strategic plan, the department will ensure that we review our missions, goals, and plans periodically to ensure alignment with university missions and goals.

C. Measures of Goals Achievement

The evidence of success in implementing the program goals will be measured through various indicators including both indirect and direct measures involving our constituents. The faculty productivity through teaching and research, students' attainment of student learning outcomes

and time to degree, alumni data on job placement are examples of indicators that may be used to measure the department's status in pursuit of the goals. Data will be collected and analyzed periodically to monitor the status and progress of the department.

D. Long-Term Budget Plan

As part of the California State University (CSU) system, the primary source of university financial budget comes from the State of California General Fund and student tuition revenue. The funding allocation comes from the Governor and the State Legislature to the CSU System. Then the CSU Chancellor allocates a portion to CSUF, one of the 23 campuses within the system. The allocation is loosely based on the number of Full Time Equivalent Students (FTES) for the campus. There is always some uncertainty about the funding availability for a given fiscal year as it is based on student enrollment (i.e., depending on if the enrollment target is met or not). Due to the uncertainty in budget allocation, it is challenging for department unit to make long-term budget plans, but to rely on the historical data for expense forecasting. However, despite the challenge, the department has been successful in meeting the needs of operating and improving our programs. The department will continue working closely with the ECS Dean's Office in addressing our program needs using state fund and other resources such as development foundation or grants and contracts.

VIII. APPENDICES

Appendix A: Undergraduate Degree Program (Not Applicable)
Appendix B: Graduate Degree Program
Appendix C: Faculty
Appendix D: Full-Time Faculty Curriculum Vitae
Appendix E: Resources

APPENDIX A: UNDERGRADUATE DEGREE PROGRAM (NOT APPLICABLE)

This program performance review does not include our BSME undergraduate degree program. The BSME degree program is reviewed and accredited by ABET.

APPENDIX B: GRADUATE DEGREE PROGRAM

The following tables are the required raw data on our graduate degree program provided by the Office of Institutional Effectiveness and Planning:

Table 5. Graduate Program Applications, Admissions, and Enrollments

Fall	# Applied	# Admitted	# Enrolled
2015	341	100	34
2016	143	61	26
2017	132	79	35
2018	101	61	25
2019	116	70	30
2020	104	77	32
2021	138	94	30

Table 6. Graduate Program Enrollment by Headcount and FTES

Academic Year (Annualized)	Headcount	FTES	FTES per Headcount
2015-2016	143.5	86.6	0.60
2016-2017	130	73.4	0.56
2017-2018	101	55.3	0.55
2018-2019	88	47.5	0.54
2019-2020	79.5	45.1	0.57
2020-2021	92.5	53.8	0.58
2021-2022	81.5	45	0.55

Table 7-A. Graduation Rates for Master's Programs

All Master's Entered in Fall:	Cohort	% Graduated		
		In 2 Years	**In 3 Years**	**In 4 Years**
2014	52	17.3%	40.4%	42.3%
2015	34	29.4%	61.8%	70.6%
2016	26	42.3%	76.9%	80.8%
2017	35	28.6%	57.1%	57.1%
2018	25	32%	56%	64%
2019	30	10%	33.3%	N/A
2020	32	6.3%	N/A	N/A

Table 8. Graduate Degrees Awarded

College Year	Degrees Awarded
2015-2016	17
2016-2017	71
2017-2018	43
2018-2019	32
2019-2020	29
2020-2021	16
2021-2022	23

APPENDIX C: FACULTY

The following table is the required raw data on our faculty provided by the Office of Institutional Effectiveness and Planning:

Table 9. Faculty Composition[1]

Fall	Tenured	Tenure-Track	Sabbaticals at 0.5	FERP at 0.5	Full-Time Lecturers	Actual FTEF
2017	4	8	0.0	1.0	2	13.5
2018	5	7	1.0	1.0	2	13.5
2019	5	9	0.0	1.0	1	14.5
2020	5	8	0.0	0.5	2	14.5
2021	7	6	0.0	0.5	0	12.9

[1] Headcount of tenured, tenure-track, sabbaticals at 0.5, and FERP at 0.5 includes full-time and part-time faculty. Headcount of lecturers only includes full-time faculty, as consistent with the IPEDS HR definition. It does not represent the number of full-time lecturer lines assigned to the department.

APPENDIX D: FULL-TIME FACULTY CURRICULUM VITAE

The following full-time faculty curriculum vitae are included in Appendix D:
Dr. Darren Banks
Dr. Sagil James
Dr. Jin Woo Lee
Dr. Salvador Mayoral
Dr. Chean Chin Ngo
Dr. Yong Seok Park
Dr. Nina Robson
Dr. Siheng Su
Dr. Justin Tran
Dr. Haowei Wang
Dr. Hope Weiss

Dr. Darren Banks

Name & Academic Rank
Darren Banks, Associate Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, University of California, Riverside, CA, 2015
B.S., Mechanical Engineering, University of California, Riverside, CA, 2010

Academic Experience
California State University Fullerton, Associate Professor, 8/2022-Present, Full Time
California State University Fullerton, Assistant Professor, 8/2016-8/2022, Full Time
University of California, Riverside, Postdoctoral Researcher, 8/2015-8/2016, Full Time

Honors and Awards
Open Educational Resources Certificate, CSUF FDC, 2020
IMPACT Certificate, CSUF FDC, 2019
University Teaching Certificate, UCR, 2015
Outstanding Teaching Assistant, UCR, 2015

Service Activities
ECS Assessment Liaison, 2022-23
COACHE Task Force, 2022-23
Department Personnel Committee, 2022-23
Undergraduate Program Committee, 2020-22 Chair, 2022-23
Department ABET Co-coordinator, 2020-21
Assessment & Continuous Improvement Committee, 2016-17, Chair, 2017-22
Faculty Search Committee, 2018-19, 2022-23
Reviewer for various journals, 2015-present

Principal Publications and Presentations (Most important from past 5 years)

1. Bin Zhang, **Darren Banks**, Vicente Robles, Luis Felipe Devia-Cruz, Guillermo Aguilar, "High resolution optical investigation of laser intensity and solution temperature effects on thermocavitation", Experimental Thermal and Fluid Science, 136, (2022)

2. Vicente Robles, Enoch Gutierrez-Herrera, Luis Felipe Devia-Cruz, **Darren Banks**, Santiago Camacho-Lopez, Guillermo Aguilar, "Soft Material Perforation via Double-Bubble Laser-Induced Cavitation Microjets", Physics of Fluids, 32, (2020)

3. **Darren Banks**, Vicente Robles, Bin Zhang, Luis Felipe Devia-Cruz, Santiago Camacho-Lopez, Guillermo Aguilar, "Planar laser induced fluorescence for temperature measurement of optical thermocavitation", Experimental Thermal and Fluid Sciences, 103, (2019)

Most Recent Professional Development (Past 5 years)

- Completed OER Certificate offered by CSUF Faculty Development Center (FDC) - June 2020
- Completed Intro. to Teaching Online Using QLT for Summer, CSUF Academic Technology Services, June 2020
- Completed the IMPACT Certificate offered by the CSUF FDC –June 2019
- Completed the OpenFOAM Foundation course, ESI, March 13-14, 2018

Dr. Sagil James

Name & Academic Rank
Sagil James, Associate Professor of Mechanical Engineering

Education
- Ph.D., Mechanical Engineering, University of Cincinnati, Cincinnati, Ohio, 2015
- M.S., Mechanical Engineering, University of Cincinnati, Cincinnati, Ohio, 2010
- B.Tech, Mechanical Engineering, National Institute of Technology Calicut, India, 2005

Academic Experience
- California State University Fullerton, Associate Professor, 2021-Present, Full Time
- California State University Fullerton, Assistant Professor, 2015-2021, Full Time

Non-academic Experience
Larsen and Toubro Limited, Mumbai, India, Product Development Engineer, 2005-07, Full-Time

Current Membership in Professional Organizations
- Member – Society of Manufacturing Engineering (SME) (2015-Present)
- Member – Society for the Advancement of Material and Process Engineering (SAMPE) (2019-Present)
- Chair – Society of Manufacturing Engineering (SME) Orange Country/Inland Empire Chapter, (2020-Present)

Honors and Awards
- Recognition of Outstanding Achievements in Service, California State University Fullerton 2020
- Society of Manufacturing Engineers (SME) Distinguished Faculty Advisor 2020
- 2019 Society of Manufacturing Engineers (SME) Journal of Manufacturing Processes (JMP) Outstanding Reviewer of the year 2020
- Faculty Recognition of Outstanding Achievements in Teaching, California State University Fullerton 2019
- Faculty Advisor of Distinction, California State University Fullerton 2019
- Recognition of the Highest Quality Scholarly and Creative Activity, California State University Fullerton 2018
- Faculty Advisor of Distinction, California State University Fullerton 2018

Service Activities
- CSUF Mentoring Connext: Tenured to Pre-Tenured Faculty Mentoring Program 2023
- CSUF Elections Committee 2022-24
- CSUF International Education Committee (IEC) 2022-23
- CSUF Summer Undergraduate Research Academy (SUReA) 2022 Summer'22
- Reviewer - Outstanding Student Scholarly and Creative Activities Spring 2022

- CSUF ECS Annual Projects Showcase & Competition Committee 2021-22
- CSUF ECS At-Large Committee Member 2021-22
- CSUF ME Department Graduate Program Committee Member 2021-22
- CSUF ME Department Task Force for Strategic Communication Chair 2021-22

Principal Publications and Presentations (Most important from past 5 years)

- James, Sagil., and Zarate, J., "*Preliminary Study on Volumetric 3D Printing Using Visible Light*" The International Journal of Advanced Manufacturing Technology, 124, 1245–1251 (2022) https://doi.org/10.1007/s00170-022-10603-7
- James, Sagil., and Mulgaonkar, S., "*Study on Parameter Optimization of 3D Bioprinting of Hybrid Bio-Inks*" The International Journal of Advanced Manufacturing Technology, 119.11 (2022): 7063-7074. https://doi.org/10.1007/s00170-021-08561-7
- James, Sagil., and Dang, C., "*Investigation of shear failure load in ultrasonic additive manufacturing of 3D CFRP/Ti structures*", Journal of Manufacturing Processes, (2020). https://doi.org/10.1016/j.jmapro.2020.04.026
- James, Sagil., and Nejadian, S. M., "*Experimental study on high-speed saw cutting of hybrid composite stacks using nanoparticle-enhanced minimum quantity lubrication",* The International Journal of Advanced Manufacturing Technology, 106.7 (2020): 1-14. https://doi.org/10.1007/s00170-020-06008-z
- James, Sagil., and Patil, A., "*Study on Multiscale Modeling and Simulation of Liquid-Assisted Laser Beam Machining*", The International Journal of Advanced Manufacturing Technology, 106.7 (2020): 3463-3474. https://doi.org/10.3390/vibration3030013
- Panchal, S. and James, Sagil., "*Finite Element Analysis and Simulation Study on Micromachining of Hybrid Composite Stacks using Micro Ultrasonic Machining Process*", Journal of Manufacturing Processes, 48 (2019): 283-296. https://doi.org/10.1016/j.jmapro.2019.10.028
- Mahajan, A., & James, S., "*Analytical Modeling and Experimental Study of Machining of Smart Materials using Submerged Abrasive Waterjet Micromachining Process.*" International Journal of Manufacturing Research, 2019, 14(3), 1. https://doi.org/10.1504/ijmr.2019.10014338
- James, Sagil., and Contractor, R., "*Study on Nature-inspired Fractal Design-based Flexible Counter Electrodes for Dye-Sensitized Solar Cells Fabricated using Additive Manufacturing",* Nature Scientific Reports, 2018, 8(1), p.17032: https://doi.org/10.1038/s41598-018-35388-2

Most Recent Professional Development (Past 5 years)

- CSUF College of ECS Professional Development Workshop Series 2022
- CSUF Equity Pedagogy Module (EPM) Course 2021
- CSUF College of ECS Professional Development Workshop Series 2021
- CSUF Teaching Remotely: Advanced Canvas Certificate from the Faculty Development Center (FDC) 2021
- FDC Peer Observation Protocol (POP) Faculty Learning Community 2021
- CSUF Diversity and Inclusion in Teaching Certificate 2020
- Applying the Quality Matters Rubric (APPQMR) Workshop 2020
- CSUF Accessible Technology Initiative (ATI) Training Certificate 2019

Dr. Jin Woo Lee

Name & Academic Rank
Jin Woo Lee, Assistant Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, University of Michigan, Ann Arbor, MI, 2019
M.S., Mechanical Engineering, University of Michigan, Ann Arbor, MI, 2016
B.S., Mechanical Engineering, Binghamton University, Binghamton, NY, 2014

Academic Experience
California State University, Fullerton, Assistant Professor, 8/2019-present

Non-academic Experience
Schneider Packaging Equipment, Brewerton, NY, CAD Detailer, Assembler, Machinist, 8/2011-8/2012, Full Time

Current Membership in Professional Organizations
American Society for Engineering Education

Honors and Awards
Towner Prize for Outstanding Graduate Student Instructor, UM, 2018
National Institute of Health Microfluidics in Biomedical Sciences Training Program Fellow, UM, 2016
National Science Foundation Graduate Research Fellowship – Honorable Mention, UM, 2016

Service Activities
Undergraduate Advisor, 2022
Academic Senate University Advancement Committee, 2021 - present
Graduate Program Committee, 2020 – 2021
Undergraduate Program Committee, 2019 – present
Mechanical Engineering Task Force for Strategic Communication Committee, 2019 - 2021
Reviewer for various journals and conferences, 2017-present

Principal Publications and Presentations (Most important from past 5 years)
1. **Lee, J. W.**, Daly, S. R., Huang-Saad, A., Rodriguez, G., DeVries, Q., Seifert, C. M., (2021) A solution in search of problems: a cognitive tool for solution mapping to promote divergent thinking. *Journal of Engineering Design 32(6), 300-321.*
2. Swenson, J., Rola, M., Johnson, A., Treadway, E., Nightengale, A., Koushyar, H., **Lee, J.W.**, Wingate, K., (2021) Scaffolding Open-ended Problems: Our Best Practices after Three Years. *Frontiers in Education.*
3. **Lee, J. W.**, Daly, S. R., Huang-Saad, A., Rodriguez, G., Seifert, C. M., (2020) Cognitive strategies in solution mapping: How engineering designers identify problems for technological solutions. *Design Studies, 71,* 100967.

4. **Lee, J. W.**, Daly, S., Huang-Saad, A., Seifert, C. M. (2020) Start With Problems or Solutions? Medical Device Design in Industry and Academia. *IEEE Access 8*, 208623-208642.
5. Schmedlen, R., **Lee, J. W.**, Shekhar, P., Stegemann, J., (2019) The clinical peer mentors program: Student motivations, skills and knowledge acquisition, and influence on career path. *Proceedings of the American Society for Engineering Education*, Tampa, FL.
6. **Lee, J. W.**, Daly, S. R., Huang-Saad, A., Seifert, C. M., (2019) Developing design strategies for solution mapping: Translating expert practices to design tools to support student engineers. *Proceedings of the American Society for Engineering Education*, Tampa, FL.
7. **Lee, J. W.**, Daly, S., Huang-Saad, A., Seifert, C. (2018) Focusing on problem divergence rather than solution divergence: Design processes of academic engineers in microfluidics. *Proceedings of the ASME 2018 International Design Engineering Technical Conferences (IDETC)*, Quebec City, Canada.
8. **Lee, J. W.**, Daly, S., Vadakumcherry, V. (2018) Exploring students' product design concept generation and development practices. *Proceedings of the American Society for Engineering Education*, Salt Lake City, UT.
9. **Lee, J. W.**, Ostrowski, A., Daly, S., Huang-Saad, A., Seifert, C. (2018) Idea generation in biomedical engineering courses using Design Heuristics. *European Journal of Engineering Education 4(3),* 360-378.
10. **Lee, J. W.**, Daly S., Huang-Saad, A., Seifert, C., Lutz, J. (2018) Using design strategies from microfluidic device patents to support idea generation. *Microfluidics and Nanofluidics*, *22*(70)

Most Recent Professional Development (Past 5 years)

- Open Education Resources, CSUF, 2022
- Equitable Pedagogy Module, CSUF, 2021
- Ergo Principles Certificate, UM, 2021
- Canvas Workshop, CSUF, 2020
- Attended High Impact Practice workshop, CSUF, 2020
- Engineering Education Research Certificate, UM, 2019
- Graduate Teaching Certificate, UM, 2019
- Preparing Future Faculty, UM, 2018

Dr. Salvador Mayoral

Name & Academic Rank
Salvador Mayoral, Associate Professor of Mechanical Engineering

Education
Ph.D., Mechanical and Aerospace Engineering, University of California, Irvine, Irvine, CA, 2013
M.S., Mechanical and Aerospace Engineering, University of California, Irvine, Irvine, CA, 2010
B.S., Aerospace Engineering, University of California, Irvine, Irvine, CA, 2008
B.S., Material Science Engineering, University of California, Irvine, Irvine, CA, 2008

Academic Experience
California State University, Fullerton, Associate Professor, 8/2020-Present, Full Time
California State University, Fullerton, Assistant Professor, 8/2014-7/2020, Full Time
California State University, Fullerton, Adjunct Professor, 3/2014-5/2014, Part Time

Non-academic Experience
Sonendo Inc., Laguna Hills, CA, R&D Engineer II, R&D Department, 4/2013-11/2013, Full Time
Sonendo Inc., Laguna Hills, CA, R&D Consultant, R&D Department, 9/2012-3/2013, Part Time

Current Membership in Professional Organizations
Society of Automotive Engineers, 2006-present
American Institute of Aeronautics and Astronautics, 2008-present
American Society of Mechanical Engineering, 2015-present

Honors and Awards
Faculty Recognition in Teaching, CSUF, 2016
Recipient of an NSF ASSIST Travel Grant, HEENAC, 2016
Recipient of the 2008 Western Region Award of the Sigma Gamma Tau, Sigma Gamma Tau, 2008

Service Activities
Mechanical Engineering Department, Graduate Program Advisor, 8/2022 – Present
Department Personnel Committee, 2020 – Present
Faculty Search Committee, 2014 – 2016, 2017 – 2019, 2022 – Present
Committee member of the Graduate Program Committee, 2016 - Present
Mentor: CSUF Graduate Student/Faculty Mentoring Program, 2014 – Present
Adviser to senior design projects: Titan Aero, Formula SAE, and Baja SAE, 2017 – present
Faculty Adviser: CSUF chapter of the AIAA, 2015 – 2022
Faculty Adviser: CSUF chapter of the SAE, 2017 – present
Faculty Adviser: Student Aerospace Society, 2014 – 2020
Advisory Board: NSF-funded ITEST Strategies Science, Technology and Engineering Mini-business Incubator Project, 2014 – 2016

Principal Publications and Presentations (Most important from past 5 years)

4. S. Mayoral, A. Linton, H. Yousefi, and J. Huang. "Work in Progress: Implementing Elements of Engineering Design into Calculus". *2021 ASEE Virtual Annual Conference Content Access*, Virtual Online, 2021, July. ASEE Conferences, 2021.

5. B. Kelly, K. Nguyen, Z. Miles, S. Mayoral, S. Piacenza, C. Zhang and J. R. Piacenza, "Exploring Design Trades to Extend Useful Life of Platform Terminal Transmitters on Sea Turtles," Presented: ASME International Design Engineering Technical Conference & Computers & Information in Engineering Conference, Anaheim, CA, Aug. 18-21, 2019.

6. Mayoral, S., Weiss, H., and Edirisinghe*, R., "On the relationship between the vortices from an underbody diffuser in ground effect and the resulting downforce," SAE Technical Paper 2019-01-0650, 2019 (*CSUF Student).

7. Edirisinghe*, R., and Mayoral, S., "The Development of the Rolling Road Addition to the CSUF Wind Tunnel Part 2: Numerical Simulation of the Rolling Road and its effect on Overall Boundary Layer Growth in the Wind Tunnel," SAE Technical Paper 2019-01-0651, 2019 (*CSUF Student).

8. Dousti*, N., Khader*, S. Z., and Mayoral, S., "Effects of Trailing Edge Devices on Acoustic Shielding by a Momentum Wake," AIAA Paper No. 2018-3131, 2018. (*CSUF Student).

9. Piacenza, S., Piacenza, J., Mayoral, S., Kenney, A., and Shields, N., "Design Opportunities for Sea Turtle Satellite Tracking Devices," ASME Paper No. DETC2018-85583, 2018.

Most Recent Professional Development (Past 5 years)

- Attended High Impact Practice workshop at CSUF on 1/24/2020
- Served on the Award Selection Committee at the 2019 Great Minds in STEM Summit.
- Attended an Engineering Early-Career Faculty Development Symposium, 2016 HEENAC Conference

Dr. Chean Chin Ngo

Name & Academic Rank
Chean Chin Ngo, Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, University of Oklahoma, Norman, OK, 2006
M.S., Mechanical Engineering, University of Oklahoma, Norman, OK, 1999
B.S., Mechanical Engineering, University of Oklahoma, Norman, OK, 1997

Academic Experience
California State University, Fullerton, Professor, 8/2022 – Present
California State University, Fullerton, Associate Professor, 8/2017 – 8/2022
California State University, Fullerton, Assistant Professor, 1/2011 – 8/2017
University of North Dakota, Grand Forks, Visiting Assistant Professor, 1/2008 – 12/2010
University of Oklahoma, Norman, Postdoctoral Research Associate, 1/2007 – 12/2007

Current Membership in Professional Organizations
ASME, AIAA, ASEE, ASHRAE, ESA

Honors and Awards
Awardee of 2014 Faculty Recognition: Teaching (Exceptional Teaching Effectiveness)
Faculty-Student Research and Creative Activities Grant, 2012
Named One of 11 Semi-Finalists for 2010-2011 Outstanding Teaching Award at UND

Service Activities (Most important from past 5 years)
Department Chair (August 2017 – Present)
Graduate Program Advisor (April 2012 – August 2022)
Acting Department Chair (August 2016 – August 2017)
Graduation Initiative 2025 Working Group on Academic Experience (Fall 2021 – Spring 2022)
Faculty Senate Instructionally Related Activities (IRA) Committee (2020 – 2022)
Faculty Senate Planning, Resource and Budget Committee (PRBC) (2019 – 2021)
Search Committee, Chair, ECS Administrative Support Coordinator I (Spring 2023 – Present)
Search Committee, Chair, ECS Administrative Support Coordinator II (Spring 2023)
Search Committee, Member, ECS Communication and Marketing Specialist (Spring 2023)
Search Committee, Member, ECS Principal Budget and Financial Analyst (Summer/Fall 2022)
Search Committee, Member, Information Technology Consultant (Spring/Summer 2022)
Search Committee, Member, ECS Administrative Support Coordinator II (Spring 2022)
Search Committee, Chair, ECS Administrative Support Coordinator I (Spring 2022)
College Personnel Standards Review Committee (Fall 2021 – Spring 2022)
Search Committee, Member, ECS International Student Advisor (Summer/Fall 2020)
Search Committee, Member, Associate Vice President for Institutional Effectiveness (Spring 2020)
Search Committee, Member, ECS Associate Dean (Fall 2019)
Search Committee, Chair, ECS Administrative Support Coordinator I (Spring 2019)
Faculty Advisor, Tau Beta Pi: The Engineering Honor Society, CA Chi (Fall 2013 – Present)

Reviewer for Tau Beta Pi Fellowships (Spring 2020) and Scholarships (Spring 2019, 2020)

Principal Publications and Presentations (Most important from past 5 years)
Peer-Reviewed Publications

C. C. Ngo and S. J. Oh, "Mechanical Engineering Education in the United States," *Proceedings of 2020 ASEE Annual Conference & Exposition*.

C. C. Ngo and S. J. Oh, "Current Trends of Mechanical Engineering Undergraduate Curricula in California," *Proceedings of 2019 ASME International Mechanical Engineering Congress and Exposition*, IMECE2019-11511.

C. C. Ngo and A. J. Al Edhari‡, "Heat Transfer from a Row of Heated Pipes in Horizontally Layered Porous Media," *Proceedings of the ASME 2019 Summer Heat Transfer Conference*, HT2019-3598.

Presentations

"Mechanical Engineering Education in the United States," *2020 ASEE Annual Conference & Exposition*, Virtual Conference, June 25, 2020

"Current Trends of Mechanical Engineering Undergraduate Curricula in California," *2019 ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, Utah, November 11, 2019.

"Heat Transfer from a Row of Heated Pipes in Horizontally Layered Porous Media," ASME 2019 Summer Heat Transfer Conference, Bellevue, Washington, July 15, 2019.

Most Recent Professional Development (Past 5 years)

ASME International Mechanical Engineering Education (MEEd) Leadership Summit, San Juan, Puerto Rico, March 22-25, 2023

CSUF Resource and Financial Management Training Workshop Program, Spring 2022

Faculty Success Program Spring 2022, National Center for Faculty Development & Diversity, Online, January 23-April 16, 2022.

ASME International Mechanical Engineering Education (MEEd) Leadership Summit, Virtual Conference, March 18-19, 2021

Beginner Synchronous Remote Teaching in Canvas Workshop, Online, January 5-21, 2021.

ASME iWME: Increasing Women in Mechanical Engineering Conference, Online, January 13-14, 2021

24th Annual CSU (Online) Department Chairs Workshop, September 11, 2020

2020 AAHHE/ETS Latinx Student Success Institute, The Future of STEM: Improving Latinx Students' Access, Retention, and Completion Rates, Costa Mesa, California, March 5, 2020.

Quality Matters Professional Development: Independent Applying the QM Rubric, CSUF, California, January 6-7, 2020.

Dr. Yong Seok Park

Name & Academic Rank

Yong Seok Park, Associate Professor of Mechanical Engineering

Education

Ph.D., Mechanical Engineering, Virginia Tech, Blacksburg, VA, 2014
M.S., Civil Engineering, The George Washington University, Washington, D.C., 2009
M.S., Mechanical Engineering, Sogang University, Seoul, Republic of Korea, 2003 B.S., Mechanical Engineering, Sogang University, Seoul, Republic of Korea, 2001

Academic Experience

Associate Professor, California State University Fullerton, 8/2022-Current
Assistant Professor, California State University Fullerton, 8/2016 - 8/2022

Non-academic Experience

Arizona State University, Postdoctoral Research Associate, 8/2014-8/2016, Full Time
Hyundai-Kia R&D center, Seoul, R&D Researcher, 3/2001-3/2002, Part Time

Current Membership in Professional Organizations

American Scientists and Engineers Association (KSEA), 2019-present
American Society for Engineering Education, 2016-present
American Society of Mechanical Engineering, 2015-present

Honors and Awards

2022 Titan Excellence Award Nomination, 2022
ECS Big Ideas: Human Centered Design Initiative (HCDI), 2021
GI2025 Innovation Grant, 2019-2020
Faculty Advisor of Distinction, 2019
Postdoc Best Practice Award (Postdoc Travel Grant-$1000), 2016
Best Paper Award: ASME 27th International Conference on Design Theory and Methodology (DTM), 2015
The president of Korean Society Association (KSA), 2010-2013
Hyundai-Kia Motors Fellowship, GWU, 2007-2009
George Washington Fellowship in SEAS, 2006-2007

Service Activities

Merit Badge Counselor (MBC) for Engineering Merit Badge in Valencia District, 2022- present
KSEA, Keynote speaker of 2020 Scientists and Engineers Early Career Development (SEED), 2022
KSEA, Section Chair of Dream II Robot Competition, 2020
Assessment and Continuous Improvement Committee, 2018-2019

Undergraduate Curriculum Committee, 2018-2019
Faculty Search Committee, 2016-2018
Faculty Learning Community, 2016-2017
Reviewer for various journals, 2015-2016

Principal Publications and Presentations (Most important from past 5 years)

1. Adam Yanagihara, **Yong S. Park***, "Design of an Eddy Current Brake System for the Use of Roller Coasters Based on a Human Factors Engineering Approach", 14th International Conference on Design Principles & Practices, Pratt Institute, Brooklyn Campus, New York, USA 16–18 March 2020

2. Chris Phan, **Yong Seok Park***, "The Effectiveness of Synthesizing A-Pillar Structures in Passenger Cars", 14th International Conference on Design Principles & Practices, Pratt Institute, Brooklyn Campus, New York, USA 16–18 March 2020

3. John Tolentino, **Yong Seok Park***,"Modeling and Development of a Below-Knee Cycling Prosthetic", 14th International Conference on Design Principles & Practices, Pratt Institute, Brooklyn Campus, New York, USA 16–18 March 2020

4. Sharon Wu, **Yong Seok Park*,** "Safety Assessment and Optimal Design of Motorcycle Crash Bar Using Engineering Design Process", 14th International Conference on Design Principles & Practices, Pratt Institute, Brooklyn Campus, New York, USA 16–18 March 2020.

5. S. Wu, **Yong Seok Park***, Effectiveness of High-Impact Practices (HIPS) in an Engineering Course." ASEE (2019)

Most Recent Professional Development (Past 5 years)

Visiting Scholar at KIST (Korea Institute of Science and Technology), 8/2022-10/2022
ECS Big Ideas: Human Centered Design Initiative (HCDI)-Co. P.I., 2021
Big Idea Proposal (March 6th, 2020)-Co. P.I., 2020
NSF Research Experiences for Teachers (RET)-Co P.I., 2019
GI2025 Innovation Grant, 2019

Dr. Nina Robson

Name & Academic Rank
Nina Robson, Associate Professor of Mechanical Engineering

Education
PhD. in Mechanical and Aerospace Engineering, University of California, Irvine, 2008
M.S. in Mechanical and Aeronautical Engineering, University of California, Davis, 2001
M.S. in Robot and Flexible Manufacturing Systems, Technical University of Sofia, 1996

Academic Experience
California State University, Fullerton, Associate Professor, 08/2018 – Present, Full Time
California State University, Fullerton, Assistant Professor, 08/12 - 08/18, Full Time
Texas A&M University, Assistant Professor, 09/09 - 09/11, Full Time

Non-academic Experience
Advanced Highway Maintenance and Construction Technology Research Center, UC Davis, CA, 1999-2001, Part Time
National Aeronautics and Space Administration (NASA) Ames Research Center, Moffett Field, 2005-2007, Part Time

Certification or Professional Registration
Collision Reconstruction, Texas Engineering Extension Service, Texas A&M, 2012.

Current Membership in Professional Organizations
American Society of Mechanical Engineers (ASME)**,** International Association of Journals and Conferences (IAJC)**,** American Society of Engineering Education (ASEE)

Honors and Awards
Congressional Woman of the 2022 Year Award (recognition of outstanding contributions to our community), awarded from congressman representative Lou Correa for CA 45-th district, 2022
Best Paper Award, 2022 ASME IDETC Mechanisms and Robotics award committee, 2022
STEM-NET Faculty Fellow Award, CSUF Office of Research and Development and CSU Chancellor's Office, 2020-2022
Outstanding Paper Poster Award, ME Division, ASEE Annual Conference, 2019
NSF Early CAREER Development Award, 2018

Service Activities
Associate Editor, Journal of Mechanisms and Robots (JMR), 01/22 - Present
Associate Editor, Bioinspired Robotics, IJARS, 07/21 – Present
ECS Annual Projects Showcase & Competition Committee member, 09/21-Present
Chair, Department Personnel Committee, 09/20 - 05/22
Scientific Committee, Kinematics and Robot Design, MDPI Robotics Journal, 11/19 - Present
Department Personnel Committee, 09/19 – Present
Department Search Committee, 09/19 – Present
College Personnel Standards Review Committee, 09/19 – Present

Scientific Committee, US Committee for Theory of Machines and Mechanisms, 08/19 - Present
Founding Board Member, USCToMM Technical Non-Profit Corporation, 01/19 - Present
Faculty Consensus Group (FCG), CSUPERB, 07/18 – Present
Board of Directors, Chair Elect and Secretary, US Committee for Theory of Machines and Mechanisms (USCToMM) Non-profit Corporation, 01/18 – Present
Mentor, Minority Access to Research Careers (MARC), CSUF, 03/15 – Present
Symposium Organizer, ASME/IDETC 2020 annual conference, 08/15 – Present
Editorial Board, International Journal of Robotics and Automation Technology, 05/14 – Present
Editorial Review Board, International Association of Journals and Conferences, 04/14 - Present
Faculty Advisor, Titan University Rover Challenge, CSUF, 08/13 – Present
Panelist, National Science Foundation (NSF), 2012-Present

Principal Publications and Presentations (Most important from past 5 years) (* students)

1. **Nina Robson**, Jong-Seob Won, 2022, "Natural Hand Posture Determination using Control-oriented Inter-finger Coordination Kinematic Models", International Journal of Mechanisms and Robotic Systems, **DOI:** 10.1504/IJMRS.2022.10044234.
2. Rana Soltani-Zarrin*, Amin Zeiaee*, Reza Langari, John Buchanan and **Nina Robson**, 2021, "Towards Autonomous Ergonomic Upper-limb Exoskeletons: A Computational Approach for Planning Human-like Path", Robotics and Autonomous Systems, Elsevier, ROBOT_103843, PII S0921-8890(21)00128-7.
3. Jong-Seob Won, Reza Langari, **Nina Robson**, 2021, "Numerical Finger Kinematic Models Derived from Virtual Grasping of Various Cylindrical Objects with the Family of Conic Sections", Journal of Mechanisms and Robotics, 13 (1), DOI: 10.1115/1.4048257.
4. S. Ghosh*, **N. Robson**, J. M. McCarthy, 2020, Kinematic Synthesis and Design Evaluation of a Six-Bar Knee-Ankle-Foot Orthosis for Natural Walking Gait Trajectory Tracking and Joint Angle Coordination, ASME Journal of Engineering and Science in Medical Diagnostics and Therapy, (accepted).
5. **Nina Robson**, Binyun Chen*, 2019, "Geometric Design with Multiple Realizable Motion Tasks in the Vicinity of a Planar Mechanism-Environment Contact", Journal of Mechanisms and Robotics, 11 (4), 041007-4.
6. Jong-Seob Won, **Nina Robson,** 2019, "Control-oriented Human Finger Kinematic Model: Geometry Based Approach", Journal of Mechanisms and Robotics, DOI: 10.1115/1.4044601.
7. **Nina Robson**, Shramana Ghosh*, Gim Song Soh, 2019, "Kinematic Synthesis and Design of the Robust Closed Loop Articulated Minimally-actuated (CLAM) Hand", Robotica, Cambridge University Press, DOI: 10.1017/S0263574719001723, pp.1-19.
8. Suzette Herrera*, Allison Serrano*, Daniel Arroyo*, Axel Alvarez-Loya*, **Nina Robson**, Madeline Rasche, 2019, "Towards Designing DNA Nano-structures for Chemotherapeutic Drug Delivery", Dimensions, v. 21, 38-43.

Most Recent Professional Development (Past 5 years)

- Design Thinking Workshop, d.school, Stanford University, 01/20
- Top#1-Top#4 Online Teaching Workshops, CSUF, 10/18 – 05/19
- Technology Transfer Workshop, CSU Chancellor's Office, Long Beach, CA, 10/18
- Innovation Corps (I-CORPS) Teams Curriculum, NSF, 04/18

Dr. Siheng Su

Name & Academic Rank
Siheng Su, Assistant Professor of Mechanical Engineering

Education
- Ph.D. Mechanical Engineering, Texas Tech University, 2016
  -Dissertation: Graphene-Based Nanomaterial for Brain Cancer Therapy
- B.S. Environmental Science, Sun Yet-Sen (Zhongshan) University, 2009

Academic Experience
- 08/2017-present, **Assistant Professor**, California State University Fullerton, Fullerton, CA
- 02/2017-05/2017, **Instructor**, Texas Tech University, Lubbock, TX
- 05/2014-12/2016, **Teaching Assistant**, Texas Tech University, Lubbock, TX
- 01/2012-05/2014, **Research Assistant**, Texas Tech University, Lubbock, TX

Non-academic Experience
- 09/2009-12/2011, **Technician**, Environmental Protection Agency, Zhaoqing, China

Service Activities
- **Journal Reviewer**: Research and Development in Material Science, Composite Part B: Engineering, Journal of Nanomaterials, Materials Science and Engineering C, Journal of Biomedical Nanotechnology, Nanoscale and Biomaterials Science
- **Lead Guest Editor:** Special Issue (Topic: Advances in 3D Printing Nanotechnology) in Journal of Nanotechnology, Special Issue (Topic: Recent Progress in Development of Nanomaterials in Biomedical Applications) in Bioengineering
- **Grant Proposal Reviewer:** New Investigator (NI) Grant Program in CSUPERB (CSU Program for Education & Research in Biotechnology)

Principal Publications and Presentations (Most important from past 5 years)
- **Peer-Reviewed Journal Papers**

1. Huiming Zhang, Guangbiao Xu, Fumei Wang, **Siheng Su**, Jilong Wang and Hua Shen, "A theoretical and experimental study of oil wicking behavior via 'green' superabsorbent" *Cellulose 28.16 (2021): 10517-10529.*
2. Jilong Wang, Yan Liu, Xintian Zhang, Syed Ehsanur Rahman, **Siheng Su**, Junhua Wei, Fuda Ning, Zhonglue Hu, Raul Martínez-Zaguilán, Souad R. Sennoune, Weilong Cong, Gordon Christopher, Kun Zhang, and Jingjing Qiu, "3D printed agar/calcium alginate hydrogels with high shape fidelity and tailorable mechanical properties. " *Polymer 214 (2021): 123238.*
3. **Siheng Su**, Jilong Wang, Jingjing Qiu, Rual Martinez-Zaguilan, Souad R. Sennoune and Shiren Wang. "In-vitro study of transportation of porphyrin immobilized graphene oxide through blood brain barrier." *Materials Science & Engineering C 107 (2020): 110313*

4. Jilong Wang, Yan Liu, **Siheng Su**, Junhua Wei, Syed Ehsanur Rahman, Fuda Ning, Gordon Christopher, Weilong Cong, and Jingjing Qiu. "Ultrasensitive wearable strain sensors of 3D printing tough and conductive hydrogels." *Polymers* 11, no. 11 (2019): 1873.
5. Jilong Wang, Junhua Wei, **Siheng Su**, Jingjing Qiu, Zhonglue Hu, Molla Hasan, Evan Vargas, Michelle Pantoya, and Shiren Wang. "Thermal-recoverable tough hydrogels enhanced by porphyrin decorated graphene oxide." *Nanomaterials* 9, no. 10 (2019): 1487.
6. Jilong Wang, **Siheng Su**, Jingjing Qiu, and Shiren Wang. "One-Dimensional Fluorescent Nanosized-Diamond Nanowires with Fluorescent Detection of Vitamin B 1 2." *Nano*14, no. 07 (2019): 1950084.
7. Haopeng Zhang and **Siheng Su**. "A hybrid many-objective multi-agent coordination optimization algorithm. " *Swarm and Evolutionary Computation 51 (2019): 100603*
8. Jilong Wang, Junhua Wei, **Siheng Su,** and Jingjing Qiu. "Tough and Fatigue-Resistant Hydrogels with Triple Interpenetrating Networks. " *Journal of Nanomaterials*, 2019, *Article ID 6923701*

- **Conference Presentations**

1. Jimena Londono, Sebastian Solis and Siheng Su, "The Design and Testing of 3D Printed Aligners for Application in Dentistry", *2021 CSUF Summer Undergraduate Research Academy (SUReA) Conference*
2. Linlin Zhou, Ramseen Rayes, Michael David Chapman and **Siheng Su**. "Manufacturing optimization of 3D printed hydrogel knee implants. " *2nd World Conference & Expo on Biomedical Engineering*, Las Vegas, NV, July 2019
3. Shoeb Memon, Michael Chapman, Khaled Alomani, Jidong Huang and **Siheng Su**. "3-dimensional printer Ultimaker multi-microstep optimization for hydrogel layered printing." *2019 CSUF/CSU Student Research Competition*, CSUF, April 2019
4. Linlin Zhou, RamseenRayes, Michael David Chapman and **Siheng Su**. " 3D printed natural-polymer hydrogel for knee repair." *2019 CSUF/CSU Student Research Competition*, CSUF, April 2019
5. **Siheng Su**, Jilong Wang and Jingjing Qiu. "A novel graphene-photosensitizer complex for cancer phototherapy. " *12th New Diamond and Nano Carbons Conference*, Flagstaff, AZ, May 2018

Dr. Justin Tran

Name & Academic Rank
Justin Tran, Assistant Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, Stanford University, Stanford, CA, 2018
M.S., Mechanical Engineering, University of California, San Diego, La Jolla, CA, 2015
B.S., Mechanical Engineering, University of California, Los Angeles, Los Angeles, CA, 2013

Academic Experience
California State University Fullerton, Assistant Professor, 1/2019-Present, Full Time

Non-academic Experience
Aerospace Corporation, El Segundo, CA, Technical Intern, Electric Propulsion Group, 6/20129/2012, Full Time
Aerospace Corporation, El Segundo, CA, Technical Intern, Chemical Propulsion Group, 9/2012-12/2012, Part Time
Aerospace Corporation, El Segundo, CA, Technical Intern, Chemical Propulsion Group, 6/20139/2013, Part Time

Current Membership in Professional Organizations
Tau Beta Pi, 2010-present; American Physical Society, 2010-present

Honors and Awards
Best Paper in Workforce Development, Training, Diversity, and Education, Practice and Experience in Advanced Research Computing, 2022
Best Paper Finalist, Summer Biomechanics, Bioengineering, and Biotransport Conference, 2017
Honorable Mention, NSF Graduate Research Fellowship, 2014-2015

Service Activities
Undergraduate Advisor, 2022-Present
Faculty Search Committee, 2019-2020
Undergraduate Program Committee, 2019-2020
Reviewer for various journals, 2018-Present

Principal Publications and Presentations (Most important from past 5 years)
1. **Justin S. Tran**, Eroma Abeysinghe, John Ladisa, Alison Marsden, Marlon Pierce, “SimVascular Gateway for Education and Research”, PEARC ’22: Practice and Experience in Advanced Research Computing (2022).

2. **Justin S. Tran**, Eroma Abeysinghe, "Expanding the SimVascular Educational Gateway for Research Use", PEARC '21: Evolution Across All Dimensions (2021).

3. Parastou Eslami, **Justin Tran,** Zexi Jin, Julia Karady, Romina Sotoodeh, Michael T. Lu, Udo Hoffmann, Alison Marsden, "Effect of Wall Elasticity on Hemodynamics and Wall Shear Stress in Patient-Specific Simulations in the Coronary Arteries", The Journal of Biomechanical Engineering, 142 (2), (2020)

4. Noellia Grande Gutierrez, Matthew Matthew, Brian W. McCrindle, **Justin S. Tran**, Andrew M. Kahn, Jane C. Burns, Alison L. Marsden, "Hemodynamic variables in aneurysms are associated with thrombotic risk in children with Kawasaki Disease", International Journal of Cardiology, 281, (2019).

5. **Justin S. Tran**, Daniele E. Schiavazzi, Andrew M. Kahn, Alison L. Marsden, "Uncertainty quantification of simulated biomechanical stimuli in coronary artery bypass grafts", Computer Methods in Applied Mechanics and Engineering, 345, (2019).

6. **Justin S. Tran**, Vijay Vedula, Kathrin Baeumler, Alison Marsden, "A comparison of fluidstructure interaction approaches to blood flow modeling with vessel prestress", World Congress on Computational Mechanics (2018).

7. **Justin S. Tran,** Daniele Schiavazzi, Alison Marsden, "Stochastic sub-modeling under heterogeneous input uncertainty with application to coronary artery disease", SIAM Conference on Uncertainty Quantification (2018).

8. Kristian Valen-Sendstad, Aslak W. Bergersen, …, **Justin S. Tran**, …, Kenichi Kono, David A. Steinman "Real-world variability in the prediction of intracranial aneurysm wall shear stress: The 2015 International Aneurysm CFD Challenge", Cardiovascular engineering and technology, 9(4) (2018).

Most Recent Professional Development (Past 5 years)

- Attended Fall Assessment Basics Workshop, Fullerton, CA, 10/30/2019
- Attended Assessment Forum, Fullerton, CA, 5/2/2019
- Enrolled in Stanford course on Engineering Course Design, 9/2018 – 12/2018
- Attended the Scientific Teaching Institute, Stanford, CA, 8/2018
- Enrolled in Stanford course on Learning and Teaching of Science, 1/2018 – 3/2018

Dr. Haowei Wang

Name & Academic Rank
Haowei Wang, Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, NY, 2012
M.S., Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, NY, 2009
B.Eng., Thermal Energy and Power Engineering, Southeast University, Nanjing, China, 2008

Academic Experience
California State University Fullerton, Professor, 8/2022-Present, Full Time
California State University Fullerton, Associate Professor, 8/2017-8/2022, Full Time
California State University Fullerton, Assistant Professor, 8/2012-8/2017, Full Time

Non-academic Experience
GE Global Research Center, Niskayuna, NY, R&D Intern, Combustion Laboratory, 5/2010-8/2010, Full Time

Current Membership in Professional Organizations
American Society of Mechanical Engineering, 2012-present
Combustion Institute, 2012-present

Honors and Awards
Faculty Advisor of Distinction, CSUF 2018
Extraordinary and Sustained Service Award, CSUF, 2017
Faculty Scholarly and Creative Activity Award, CUSF, 2015

Service Activities
Faculty Search Committee, 2013-2018, 2019-2020
Department Personnel Committee, 2017-2018, 2019-2020
Campus-wide Assessment Liaison for ECS, 8/2019-Present
ECS Dean Search Committee, Spring 2018
Undergraduate Advisor, 2016-2018
Faculty Search Committee Chair, 2015-2016
Reviewer for various journals and funding agencies, 2011-Present

Principal Publications and Presentations (Most important from past 5 years)

1. Guitao Zhang, Kangjun Lu, Yifan Wang, **Haowei Wang**, Qian Chen, "Mechanical and electronic properties of α−M_2X_3 (M=Ga, In; X=S, Se) monolayers", Phys. Rev. B 105, 235303 (2022)

2. **Haowei Wang**, Matthew A. Oehlschlaeger, "Shock tube ignition delay time measurements for methyl propanoate and methyl acrylate: influence of saturation on small methyl ester high-temperature reactivity", International Journal of Chemical Kinetics, 1-11 (2020)

3. **Haowei Wang**, Hope Weiss, Chean Chin Ngo, Sang June Oh, "A Comparison of Student Performance and Confidence between a Traditional and Hybrid Thermodynamics Class", International Journal of Engineering Sciences & Management Research, 7(3), 1-7 (2020).

4. Yitian Wang, Chenghuan Jiang, Qian Chen, Qionghua Zhou, **Haowei Wang**, Jianguo Wan, Liang Ma, Jinlan Wang, "Highly Promoted Carrier Mobility and Intrinsic Stability by Rolling Up Monolayer Black Phosphorus into Nanoscrolls", The Journal of Physical Chemistry Letters, 9, (2018).

5. Chenghuan Jiang, Yitian Wang, Yehui Zhang, **Haowei Wang**, Qian Chen, Jianguo Wan, "Robust Half-Metallic Magnetism in Two-Dimensional Fe/MoS_2", The Journal of Physical Chemistry C, 122(37), (2018).

6. Chenghua Jiang, Yitian Wang, Rongqing Zhou, **Haowei Wang**, Qian Chen, "Air Molecules in XPbI3 (X=MA, FA, Cs) Perovskite: A Degradation Mechanism Based on First-principles Calculations", Journal of Applied Physics, 124(8), (2018).

Most Recent Professional Development (Past 5 years)

- CSU Certificate Program - Student Success Analytics, 1/2020-5/2020
- Attended the 2017-18 CSU Course Redesign with Technology Summer Institute, Sacramento, CA 6/26 – 6/30 2017
- Attended and presented at the Council on Undergraduate Research 2014 conference hosted in D.C. on 6/30/2014
- Attended the Assessment: Basics & Outlook workshop hosted by Office of Academic Affairs on 9/17/2015
- Attended High Impact Practice workshop at CSUF on 8/9/2016
- Participating in the High Impact Practice Student Activity Tracking for Student Success and Assessment on the institutional level in Fall 2016

Dr. Hope Weiss

Name & Academic Rank
Hope L. Weiss, Associate Professor of Mechanical Engineering

Education
Ph.D., Mechanical Engineering, University of California, Berkeley, 2012
M.S., Mechanical Engineering, University of California, Berkeley, 2008
B.S., Mechanical and Aerospace Engineering, Cornell University, 2006

Academic Experience
California State University Fullerton, Associate Professor, 8/2021- present, Full Time
California State University Fullerton, Assistant Professor, 8/2015-8/2021, Full Time
Milwaukee School of Engineering, Assistant Professor, 8/2012-5/2015, Full Time

Non-academic Experience
Sandia National Laboratories, Livermore, CA, Technical Intern, Multi-physics Modeling & Simulation Department, 8/2004-12/2004 and 5/2005-8/2005, Full Time

Current Membership in Professional Organizations
American Society of Engineering Education, 2017-Present

Honors and Awards
Extraordinary and Sustained Service Award, CSUF, 2017

Service Activities
Writing Across the Committee member, 2021 - Present
GI2025 Working Group on Academic Advising and Success Pathways, 2021 - 2022
Pa'Lante Mentor, 2020 - 2022
Senate Ad Hoc SOQ Committee member, Spring 2019, 2020-2021
Reviewer for various journals, 2018-Present
Faculty advisor for SWE, Fall 2017 - Present
Undergraduate Program Committee Chair, 2017-2021
Faculty Search Committee Chair, 2016-2020
Undergraduate Advisor, 2016 - Present
ECS College Curriculum Committee member, 2016-2021
Faculty Search Committee member 2015-2016

Principal Publications and Presentations (Most important from past 5 years)

1. **H. Weiss**, J. Sanders., "A Curriculum-spanning Review Video Library to Improve Retention of Prerequisite Course Material" Proceedings of the 2020 ASEE Annual Conference & Exposition, Virtual Conference, June 22-26. https://peer.asee.org/33995 (Best paper in Mechanical Engineering Division)

2. M. Traum, **H. Weiss**, "Tiny Tesla Turbine Analytical Performance Validation Via Dynamic Dynamometry" Proceedings of the Sustainable PolyEnergy generation and HaRvesting Conference and Exhibition (SUPEHR19), Savona, Italy, September 4-6, 2019.

3. **H. Weiss**, "Work in Progress: Using Videos for Improvement in Knowledge of Prerequisite Material" Proceedings of the 2019 ASEE Annual Conference & Exposition, Tampa, Florida, June 16-19, 2019. https://peer.asee.org/33662

4. S. Mayoral, **H. Weiss**, and R. Edirisinghe*, "On the Relationship between the Vortices from an Underbody Diffuser in Ground-Effect and the Resulting Downforce," SAE Technical Paper, 2019-01-0650, 2019. (* CSUF Students)

5. J. Piacenza, **H. Weiss**, M. Patel*, S. Moore*, T. Nguyen*, N. Shields, "3D Food Printing Insights and Opportunities: A Capstone Design Case," International Journal of Engineering Research & Innovation, 10(2), 2019. (* CSUF Students)

Most Recent Professional Development (Past 5 years)

- Mental Health First Aid, Fall 2022
- Fullerton Faculty Leadership Development Program, Spring 2018
- Women in Leadership - CSUF committee, 2017-2018
- Participating in the High Impact Practice Student Activity Tracking for Student Success and Assessment on the institutional level in Fall 2016, Fall 2017, Fall 2018

APPENDIX E: Resources

Appendix E: Resources

Table 10. Department Resources Received

Year	State Support	Faculty Startup	Grants/Contracts	Development
2016-2017	$29,995	$90,000	$404,809	$12,536
2017-2018	$65,831	$80,000	$573,888	$2,910
2018-2019	$196,874	$45,000	$44,870	$2,407
2019-2020	$46,399	$45,000	$432,540	$5,690
2020-2021	$63,820	-	$50,000	$7,600
2021-2022	$22,916	-	$15,000	$20,700
Total	$425,835	$260,000	$1,521,107	$51,843