

2016-2021



# Strategic Plan School of Mechanical and Aerospace Engineering



School of Mechanical and Aerospace Engineering

College of Engineering, Architecture and Technology

Oklahoma State University

2016-2021

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## Preamble

The *School of Mechanical and Aerospace Engineering* (MAE) was organized as *Mechanical Engineering* in 1923 with a faculty of three professors and a handful of students. The *aeronautical engineering* degree option was first offered in 1928 and was fully accredited as a standalone curriculum in 1960; eight years later, the School was reorganized as *Mechanical and Aerospace Engineering*. Since then, the mechanical-aerospace bond has grown stronger each year, and today, we have forged an interdisciplinary program that is among the finest in the nation. MAE is proud to continue in this tradition, creating high quality mechanical and aerospace engineers to spur the economic and scientific advancement of our state, our nation and our world.

## VISION

### **VISION**

*Our faculty and staff prepare the next generation of mechanical and aerospace engineers to engage their profession with integrity and excellence in order to provide innovative solutions to the world's grand challenges.*

We envision graduates who are prepared to lead intellectually, technically and ethically. We envision graduates who are willing and ready to tackle the 'grand challenges' that face our world and who have the technical, interpersonal and leadership skills necessary to cast a vision and create innovative solutions to those challenges. We envision graduates who both engage and advance their profession with integrity and excellence.

## MISSION

### **MISSION**

*Our Mission is to create a vibrant and stimulating learning and research environment and to instruct and encourage our students to reach their full potential in technical expertise, innovative expression, intellectual curiosity, and collaborative design.*



We create, instruct and encourage. We *create* knowledge through our research and scholarly activities. We *create* a learning environment in our classrooms and in our laboratories. We *instruct* through a variety of pedagogical methods and through mentoring relationships. And we

*encourage* by word and deed. Our mission is to provide the environment, instruction and encouragement that will allow our students to excel in every area to the best of their ability.



## Introduction

Oklahoma State University was founded in 1890 as *Oklahoma Agricultural and Mechanical College* with the land-grant mission of instruction, scholarship and outreach. The 5-year strategic plan presented in this document is aligned with the original charter of the university, emphasizing the practice of engineering and the needs of Oklahoma. The School of Mechanical and Aerospace Engineering will continue to provide a broad engineering education grounded in fundamentals and advanced studies. Scholarship will continue to underpin learning, form the basis for outreach and contribute to the advancement of science and technology on a national and international scale. And outreach through technology transfer and engagement with the engineering and manufacturing sectors of the Oklahoma economy will continue to provide direction for both educational and research activities.

This five-year strategic plan establishes a single goal in each of four areas: undergraduate programs, graduate programs, research and facilities. The first two goals directly support our mission to ‘instruct and encourage’ our students. The research and facilities goals support our mission to ‘create a vibrant and stimulating learning and research environment’. Each goal is formulated with specific and measurable objectives that can realistically be achieved within the five year time frame of the strategic plan.

***Undergraduate Programs Goal: Develop an undergraduate program that is recognized nationally for the hands-on technical expertise, leadership skills and integrity of our graduates.***

Hands-on engineering education has long been a hallmark of the MAE undergraduate experience. This goal envisions the integration of engineering science, design and technology in a curriculum that intentionally builds communication and teamwork skills as well as technical skills. Development of integrated experimental and design laboratories and the implementation of new pedagogical methods will drive the transformation. We will prepare our graduates to step into leadership roles both regionally and nationally by instructing and mentoring them in state-of-the-art learning environments.

#### **Strategies for Undergraduate Programs Goal**

- Recruit high-talent faculty members who are excellent instructors, mentors and leaders.
- Recruit high-talent graduate teaching assistants to facilitate the creation of dynamic and interactive learning experiences both in the classroom and in the MAE experimental and design laboratories.
- Create innovative experimental and design laboratories where hands-on engineering education can flourish.
- Strategically use classroom and online technology to facilitate

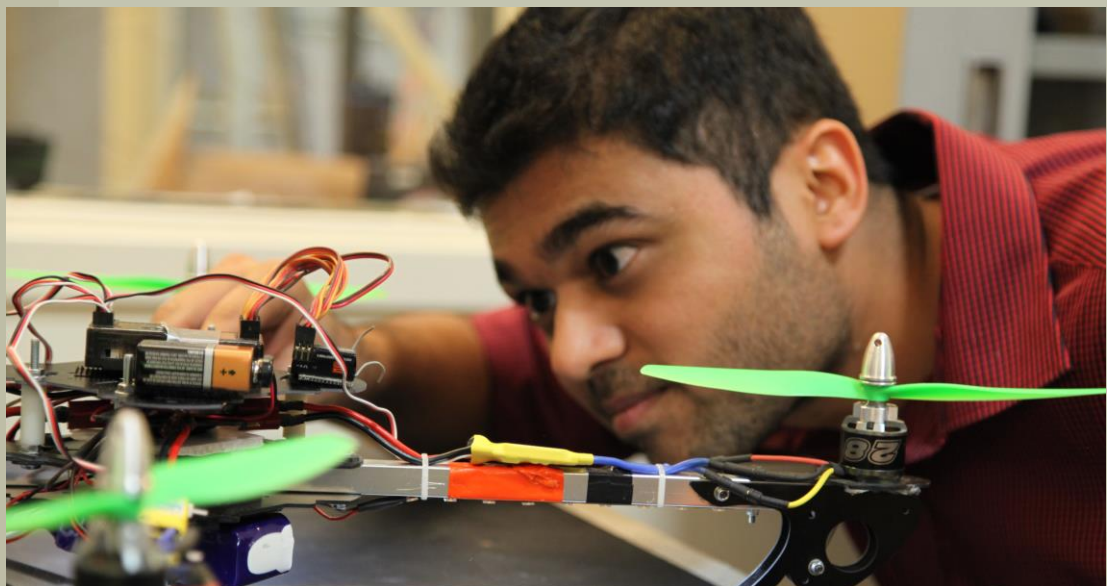


integration of engineering science with hands-on experiments, design and technology in the curriculum.

- Attend national engineering education conferences to calibrate our undergraduate program against national leaders in engineering education and to present MAE innovations in engineering education.

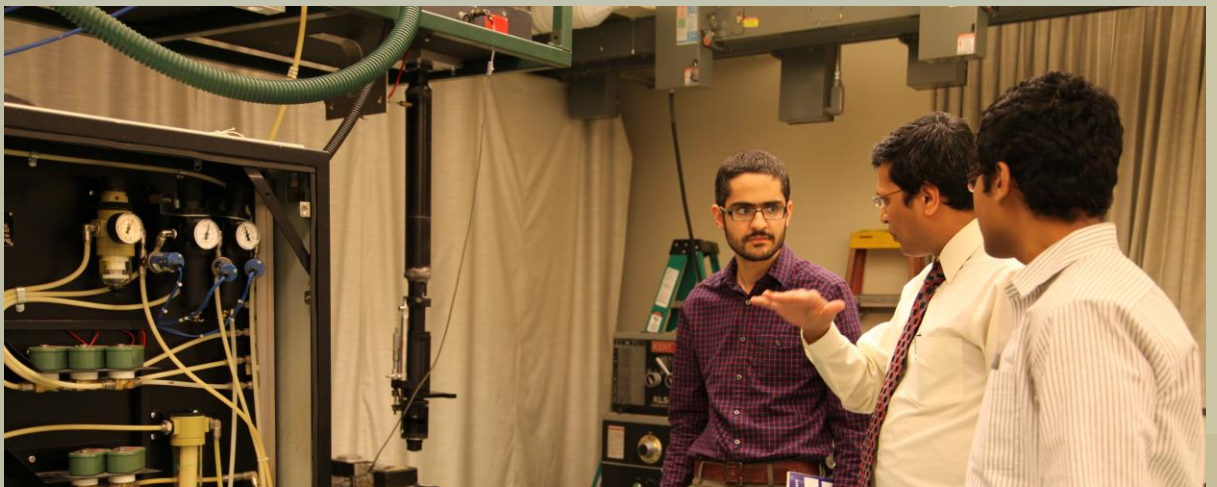
### **Metrics for Undergraduate Programs Goal**

- A faculty of over thirty-five (35), tenure-track assistant, associate and full professors
- A student faculty ratio of less than 20:1.
- One (1) graduate teaching assistant for every fifteen (15) undergraduates
- Integrated web-based/hands-on learning experiences in all MAE engineering science classes.
- Five (5) national conference presentations on MAE engineering education.



***Graduate Programs Goal:*** *Develop a graduate program that is internationally recognized for the scholarship, creativity and intellectual rigor of our graduates and regionally recognized for the technical and educational leadership they provide.*

We will prepare our graduate students to address state and national engineering research and education priorities by instructing them in advanced concepts of engineering science, engaging them in state-of-the-art research and scholarship and encouraging them to develop technical leadership skills that are well aligned with state and regional priorities. Our graduate students will underpin the transformation of our undergraduate programs as they work with faculty mentors to implement online technology in the classroom and facilitate integration of engineering science, design and technology in the laboratory.





## **Strategies for Graduate Programs Goal**

- Recruit high-talent tenure track faculty members who are excellent mentors and scholars, members of the graduate college, instructors in the MAE graduate curriculum and advisors of MAE graduate students.
- Recruit high-talent graduate students who desire to engage with state and local industry and become excellent researchers, scholars and mentors in the engineering sciences.
- Benchmark MAE graduate programs and policies against best practices of aspirational peer institutions.

## **Metrics for Graduate Programs Goal**

- A faculty of thirty-five (35) tenure track faculty members who are excellent mentors and scholars, members of the graduate college, instructors in the MAE graduate curriculum and advisors of MAE graduate students.
- Competitive offers and outstanding research and teaching opportunities resulting in a fully supported graduate student body with 75% of our incoming M.S. Students recruited from top U.S. Universities.
- Rank in top 75 ME graduate programs and top 40 AE programs in US News & World Report Survey

***Research Goal:*** *Develop sustainable, collaborative and internationally recognized research areas that build on our core strengths and are well-aligned with the priorities of the nation and the State of Oklahoma.*

In the next five years we will focus on building research teams within MAE and developing collaborative relationships that reach across CEAT and beyond to industrial and academic research partners. We will build on our core strengths in energy, manufacturing and aerospace and seek to develop new focus areas that support national research priorities.

#### **Strategies for Research Goal**

- Strategically hire faculty to build core research groups.
- Strategically recruit high-talent Ph.D. students to support research efforts.
- Balance faculty workloads to support research priorities.
- Improve quality and focus of research proposals.
- Develop technical support infrastructure for research activities.

#### **Metrics for Research Goal**

- Thirty-five (35), tenure-track, research-active faculty members.
- A Ph.D. to M.S. advisee ratio of 2:1.
- 50% improvement in MAE proposal funding rate.
- Annual research expenditures of \$5,000,000

***Facility Goal:*** *Develop and maintain state-of-the-art classrooms, design studios, laboratories and offices to support the research and educational mission of our faculty and staff.*

Our growing program will require additional office space for faculty, and our transformative vision for undergraduate education will require new integrated experimental and design laboratories for our undergraduate students. We will renovate existing facilities to improve space utilization and mission focus.

#### **Strategies for Facilities Goal**

- Identify and develop new office space for growing MAE faculty.
- Develop state-of-the-art collaborative learning environment for MAE undergraduate research, laboratories, classes and competition teams.

#### **Metrics for Facilities Goal**

- Renovate Engineering North second floor to fully accommodate Mechanical and Aerospace Engineering faculty.
- Develop plans for complete renovation of DML and create state-of-the art laboratory and project space for MAE students.