Mechanical Engineering

Degree Designation: BSME

Mission Statement

The Mission of the Department of Mechanical Engineering is to provide a quality undergraduate and graduate education for students entering the mechanical engineering profession or seeking careers in related fields; to advance scientific knowledge through basic and applied research; to disseminate technical information through scholarly publication, conferences and continuing education; to advance the profession through service within the associated societies and; to promote activities which serve global development.

Student Learning Outcomes

USF mechanical engineering graduates should be able to do the following:

- Apply knowledge of mathematics, science and engineering to a broad range of new engineering problems;
- Design and conduct experiments, as well as to analyze and interpret data;
- Design a system, component, or process to meet desired needs;
- Function on multi-disciplinary teams;
- Identify, formulate, and solve engineering problems;
- Exhibit an understanding of professional and ethical responsibility;
- Demonstrate an ability to communicate effectively;
- Possess the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- Exhibit a recognition of the need for and an ability to engage in life long learning;
- Exhibit a knowledge of contemporary issues;
- Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;
- Possess a knowledge of chemistry and physics with depth in at least one.
- Display an ability to apply advanced mathematics through multivariate calculus and differential equations.
- Possess a familiarity with statistics and linear algebra;
- Exhibit an ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.

Content / Discipline Skills

- To develop skills necessary for effective professional interaction including multi-disciplinary collaboration, successful oral and written communication, and;
- To encourage an understanding of technology within a global societal context, the need for continued
professional development, the importance of professional responsibility and the ethics of professional practice.

- To teach students to understand and to apply concepts of basic science, mathematics, computation, and engineering science essential to professional practice;
- To train students in the design of experiments and testing of systems, in proper instrumentation methods, in the techniques of modern data acquisition and in methods of data interpretation;
- To develop skills essential to the design process, including problem formulation, synthesis, analysis, construction, testing and evaluation;

Critical Thinking Skills

- Students are trained to think about the world around them, describing both physical systems and processes, in terms of fundamental laws and established engineering principles. Supplementing this approach, students are taught to analyze and interpret their findings using modern engineering tools including advanced computational methods and accurate physical instrumentation.

Communication Skills

- Student training focuses on the development of graduates well prepared to express themselves in both written and oral forms. Newer technologies play an important roll in this process as students are introduced to techniques for enhancing both written and oral expression through modern electronic presentation tools.

Assessment Strategies

- Mechanical Engineering Faculty – individually evaluate and document success in meeting outcomes for each course which they teach.
- Undergraduate Program Committee (UPC) – committee evaluates the overall program in meeting current educational objectives of the program.
- Course Review Committee (CRC) – a committee of departmental faculty working in closely related areas evaluate individual course content and outcomes on a rotating basis. This results in a detailed review of each course on a 3 year cycle.
- College Advisory Board (CAB) – an industrial advisory board meets annually to evaluate content of overall college program and to advise changes to improve, update or add to the existing curriculum.
- Mechanical Engineering Advisory Committee (MEAC) - an industrial advisory board meets biannually to evaluate content of overall mechanical engineering program and to advise changes to improve, update or add to the existing curriculum.
- Student Chapters of ASME, SAE, ASHRAE and AIAA are individually queried as to program content and possible improvements in program objectives.
- Undergraduate Student Advisory Committee (USAC) has been formed to provide for direct student input into overall program content and objectives.
- Graduating Seniors are individually interviewed to obtain feedback on quality of teaching, overall educational program and program objectives.
- Alumni are surveyed to recommend areas where program may be strengthened or improved.

Career/Employment Options for Graduates

Mechanical engineering is one of the broadest engineering disciplines with graduates being employed in many industries. Major areas of specialization include energy systems, manufacturing, plant engineering, automotive
design, heating, ventilation and air conditioning. Employment opportunities for mechanical engineers in these areas are projected to experience continued growth as manufacturing technologies become increasing complex. Rising pressure on energy resources will create wider opportunities to develop and implement improved energy efficiency technologies. Additionally, emerging technologies in biotechnology, materials and nanotechnology are creating entirely new opportunities for mechanical engineering graduates.