Department of Mechanical Engineering

Degree Type: 

Provide a brief summary of the proposed program changes and describe the rationale for the change(s):

The Online Graduate Certificate in Composites Manufacturing and Engineering will (1) train students with a background in composites manufacturing needed for strategic manufacturing research initiatives in the college, (2) provide professional development training to staff and students in e-learning to help faculty transform their existing course offerings into appropriate interactive online modules, (3) encourage faculty to put their existing courses online by providing a course model and online infrastructure, (4) stimulate the development of new course offerings that can be included in future manufacturing degree programs and to supplement the certificate offerings, and (5) complement and enhance UD’s existing course offerings in composite materials.

 This initiative is closely aligned with the College of Engineering’s strategic manufacturing research and education initiatives. Advanced manufacturing is a major national initiative and is reflected in the National Network for Manufacturing Innovation (NNMI) and the current bi-partisan initiative aimed at establishing “Manufacturing Universities” spearheaded by Senator Coons that was recently included as part of the 2017 National Defense Authorization act1. This new Graduate Certificate is being initiated and supported by the College of Engineering’s Manufacturing Committee which is charged to formulate a program/curriculum in Manufacturing in response to the Manufacturing Universities initiative. These courses are also intended to form the foundation for a university-wide curriculum on additive manufacturing through a UD institute established by Unidel funds.

List new courses required for the new curriculum. How do they support the overall program objectives of the major/ minor/ concentrations)?

MEEG656 Practice Composites Manufacturing

MEEG657 Experimental Characterization of Composites for Manufacturing

These two courses will simulate a lecture-laboratory environment online. Our “virtual laboratory” approach will train both the professional composites manufacturing workforce as well as on-campus students in practical and fundamental aspects of manufacturing and characterization. These entirely new module-based courses, designed based on input and feedback from industrial partners, will include detailed videos combined with interactive lecture materials. Videos will simulate hands-on manufacturing, highlighting the technical as well as practical aspects of different composites manufacturing processes. For materials characterization modular lectures will couple fundamental techniques commonly used to characterize composite properties with detailed videos of sample preparation and approaches for data analysis. The course will make extensive use of CCM’s state-of-the-art chemical, thermal, and mechanical characterization laboratories. Students will be given data sets from characterization of real composites manufactured in the CCM laboratories to analyze and understand influence of processing on composite properties.

Resolutions:

WHEREAS, the Department of Mechanical Engineering (ME) and the Center for Composite Materials (CCM) is internationally known for research and education in composite materials. CCM has over 2,000 alumni in the composites engineering workforce worldwide, and the department has offered signature courses in composite materials for over four decades,

WHEREAS, with composite materials increasingly used in many applications there is a critical need to educate the engineering workforce on how to design and manufacture composite materials, and

WHEREAS, industries utilizing composite materials -- which spans aerospace, automotive, wind energy, and infrastructure -- have difficulty finding adequate personnel to fill current employment positions, and

WHEREAS, ME and CCM frequently receive inquiries over the past several years from individuals interested in completing graduate studies with an emphasis on composite materials, and

WHEREAS, the Graduate Certificate in Composites Manufacturing and Engineering will provide professional education and training at the graduate level focusing on the manufacturing and characterization of advanced composite materials with an emphasis on understanding the processing-structure-property relations, and

RESOLVED, that the Faculty Senate recommends the approval of the establishment of a new Graduate Certificate in Composites Manufacturing and Engineering.

Certificate Requirements:

Each certificate program course must be completed with a grade no lower than a B- and students must obtain at least at 3.0 cumulative grade point average in the program curriculum to receive the Graduate Certificate.

Three of the following:

Courses

MEEG 617 Composite Materials (3cr.)

MEEG 655 Principles of Composites Manufacturing (3cr.)

MEEG 656 Practical Composites Manufacturing

MEEG 657 Experimental Characterization of Composites for Manufacturing

MEEG - 617 - Composite Materials (3cr.)

MEEG - 655 - Principles of Composites Manufacturing (3cr.)

MEEG - 656 - Practical Composites Manufacturing

MEEG - 657 - Experimental Characterization of Composites for Manufacturing