MECH ENGRDEPT INST  1524
September 24, 2015

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From: Chairman, Department of Mechanical Engineering

Subj: CONCENTRATIONS IN MECHANICAL ENGINEERING

1. Purpose:

Establish concentrations for Mechanical Engineering students in Energy & Propulsion, Structures & Materials and Nuclear Engineering. The concentration program is intended to assist with recruiting students to the major by providing them with a framework to understand the different disciplines within Mechanical Engineering. The concentration program will also guide students in their selection of electives and focus their interests. It is expected that the program will also provide stability for our elective course offerings, and ensure we are providing a proper and balanced set of electives.

2. Background:

a. Energy & Propulsion Concentration:

Students shall develop an appreciation of disciplines within mechanical engineering that focus on thermodynamics, fluid mechanics and heat transfer. Courses that support this concentration include applied thermodynamics courses such as gas turbine engines and internal combustion engines; energy conversion courses including wind, solar and chemical energy; advanced fluid dynamics course such as turbomachinery, aerodynamics, compressible flow and computational fluid dynamics; and advanced heat transfer courses covering conduction, convection and radiation.

b. Structures & Material Concentration:

Students shall develop an appreciation of disciplines within mechanical engineering that focus on solid mechanics and materials science. Courses that support this concentration include solid mechanics courses examine the stresses, deformation and mechanical behavior of structures and machine elements; materials science courses that examine the effects of structure and processing on the resulting properties of engineering materials; and courses that examine damage and failure of engineering materials such as failure analysis, corrosion and non-destructive evaluation.

c. Nuclear Concentration:

Students shall develop an appreciation of disciplines within engineering that focus on nuclear applications for power generation. Courses that support this concentration
include courses in reactor theory, a nuclear instrumentation laboratory, and a nuclear energy conversion course.

d. Requirements for Completion of a Concentration

(1) The concentration will be awarded upon completion of (2) courses from the approved list shown in Appendix A.
(2) Students must receive a grade of B or better in both courses that shall count towards the concentration.
(3) One independent research project may be substituted for a course on the approved list, subject to approval of the Department Chairman.
(4) Trident Scholar credits may be substituted for both courses with 3 research credits counting as one course; based on approval of the Department Chairman regarding the relevance of the research.
(5) New courses and courses offered outside the department may be considered, subject to approval by the Department Chairman.

3. Responsibilities

a. MIDFAC Relations Committee
(1) Advertise the mechanical engineering concentrations to the Plebe Class during the fall plebe tours, the plebe briefs and the spring open houses.
(2) Organize an annual 3/c Town Hall meeting, and provide a detailed brief of the concentration program.
(3) Organize a 2/c town hall meeting; and in collaboration with the Senior Academic Advisor solicit the intentions of the student regarding concentrations before pre-registration during the spring semester of their 2/c year.
(4) Collect feedback based on the exit survey regarding student opinion of the concentration program.

b. Senior Academic Advisor
(1) Provide an annual assessment of the concentration program to the department.
(2) Assure that all advisors are familiar with the concentration program and their responsibilities as outlined in this instruction.
(3) Compile and maintain a department list of student pursuing concentrations. Solicit advisors for input as necessary to keep the list accurate.
(4) Provide an accurate list of students that are likely to complete a concentration to the Executive Assistant each spring semester.

c. Academic Advisors
(1) Advertise the option of majoring with a concentration to their advisees.
(2) Be familiar with this instruction and cognizant of the requirements associated with majoring with a concentration.
(3) Maintain a list of advisees that shows the concentration, if any, that each student is pursuing. Provide this information to the Senior Academic Advisor when requested.
(4) Advise students of appropriate electives to satisfy concentration requirements.
(5) Notify the Senior Academic Advisor of any changes in student intentions.

d. Executive Assistant
   (1) Query the MIDS database to determine that students have completed a concentration.
   (2) Reconcile that list with the list provided by the Senior Academic Advisor.
   (3) Verify with the independent research project coordinator that all independent research projects were completed in an area appropriate to the concentration.
   (4) Assure that each student completing a concentration receives a letter from the Department Chairman acknowledging their accomplishment.
   (5) Recognize the top student in each concentration with an award at the department awards ceremony. This award should be given to the top student in each concentration as determined by CQPR. Students that have won the Palmer or Speed Edwards Award are not eligible.

e. Chairman of the Curriculum Committee
   (1) Maintain the list of approved courses for each concentration.

f. Department Chairman
   (1) Provide a broad offering of major elective courses that will enable students to complete a concentration.
Appendix A – Approved Courses for Mechanical Engineering Concentrations:

**Energy and Propulsion**
- EM443 Energy Conversion
- EM444 Solar Engineering
- EM447 Wind and Tidal Energy
- EM461 Engines: Principles, Design and Applications
- EM474 Gas Turbines: Design and Analysis
- EM485F Energy Analysis, Policy and Security
- EM486A Energy Leadership
- EM486B Fluid Flow in Biology and the Environment
- EM486H Waste-to-Energy Conversion
- ER301 Fundamentals of Nuclear Engineering

**Structures and Materials**
- EM424 Analytical Methods in Mechanics
- EM433 Computer-Aided Manufacturing
- EM451 Design of Robotic Elements
- EM452 Engineering Materials
- EM453 Materials: Processing and Fabrication
- EM456 Corrosion and Corrosion Control
- EM458 Failure Analysis

**Nuclear Engineering**
- ER301 Fundamentals of Nuclear Engineering
- ER362 Reactor Physics
- ER371 Nuclear Plant Design
- ER463 Radiation Engineering
- ER468 Nuclear Plant Engineering
- ER486A Nuclear Weapons Effects

Additional Courses:
- EM485/6 courses that do not appear on the list may still count towards a concentration, check with your Academic Advisor.
- EM495/6 Independent Research courses may also count towards the concentration if the project is in the area of concentration.