

# DOCTOR OF PHILOSOPHY IN MECHANICAL AND AEROSPACE ENGINEERING

72 credit hours beyond the B.S.

This program provides advanced, research-based education and knowledge through advanced coursework, state-of-the-art and original research, and publication of novel results in preparation for careers in academia and industrial research and development.

The doctoral degree is awarded in recognition of a high level of mastery in one of the several fields of the department including a significant original research contribution. A student working toward the Ph.D. degree has great flexibility in formulating an overall program to meet individual needs under the guidance of an adviser and the department. All full-time doctoral students are required to register for MMAE 593 MMAE Seminar in every semester and achieve an attendance of greater than 80%.

Further, the student must be accepted by a thesis adviser and pass a qualifying examination given by the department in order to be admitted to candidacy for the Ph.D. degree. The examination evaluates the student's background in order to determine the student's potential for achieving a doctorate.

The student, in consultation with the adviser, prepares a plan of study to meet individual needs and interests, which must then be approved by the adviser, the department's graduate studies committee, and the department chair. The plan of study usually consists of at least one full year of advanced coursework beyond the master's degree, or equivalent, and a minimum of one full year of thesis research. The plan should also include MMAE 593 MMAE Seminar in every semester.

After students essentially complete all coursework, they must pass the Ph.D. comprehensive examination. Conducted by the student's thesis advisory committee, this examination must be completed at least one year prior to graduation. Concentrated research to satisfy the requirements of a doctoral dissertation is ordinarily conducted after the comprehensive examination has been passed. The dissertation must be approved by the student's thesis advisory committee. Thesis research should be equivalent to at least one full year's work, corresponding to up to 36 thesis credit hours. This work is performed on campus; the department's graduate studies committee and the Dean of the Graduate College must approve off-campus research. The doctoral dissertation is expected to contain a distinct and substantial original contribution to the student's field of study. After the research has been completed and a preliminary draft of the dissertation is approved, the candidate defends their thesis at a final oral examination, which is open to the public.

## Curriculum

### For students entering with a B.S.:

Code	Title	Credit Hours
<b>Required Courses</b>		(27-29)
MMAE 501	Engineering Analysis I	3
MMAE 502	Engineering Analysis II	3
Select a minimum of two courses from group EA <sup>1</sup>		6
Select one core course in major area of study		3-4
Select one core course in second area		3-4
Select a minimum of nine credit hours of non-core courses in major area		9
<b>Elective Courses</b>		(7-21)
Select 7-21 credit hours		7-21
<b>Ph.D. Research</b>		(24-36)
MMAE 691	Research and Thesis Ph.D.	24-36

**Minimum degree credits required: 72**

**For students entering with an M.S., M.E., or Co-Terminal M.E.:**

Code	Title	Credit Hours
<b>Required Courses</b>		(15-16)
MMAE 501	Engineering Analysis I	3
MMAE 502	Engineering Analysis II	3
Select a minimum of two courses from group EA <sup>1</sup>		6
Select one core course in major area of study		3-4
<b>Ph.D. Research</b>		(24-36)
MMAE 691	Research and Thesis Ph.D.	24-36

Minimum degree credits required: 72

**Core Courses as Determined by Major Area of Study**

Code	Title	Credit Hours
<b>Fluid Dynamics</b>		(4)
MMAE 510	Fundmntls of Fluid Mechanics	4
<b>Thermal Sciences</b>		(3)
MMAE 520	Advanced Thermodynamics	3
or MMAE 525	Fundamentals of Heat Transfer	
<b>Solids and Structures</b>		(3)
MMAE 530	Advanced Mechanics Solids	3
<b>Dynamics and Controls</b>		(3)
MMAE 541	Advanced Dynamics	3
<b>Computer Aided Design and Manufacturing</b>		(3)
MMAE 545	Advanced CAD/CAM	3

**<sup>1</sup>Group EA**

MMAE 509 is required for fluid dynamics, thermal sciences, and solids and structures students.

Code	Title	Credit Hours
MMAE 503	Advncd Engineering Analysis	3
MMAE 508	Perturbation Methods	3
MMAE 509	Intro to Continuum Mechanics	3
MATH 512	Partial Differential Equations	3
MATH 515	Ord Diff Eqtns&Dynamic Systems	3
MATH 522	Mathematical Modeling	3
MATH 535	Optimization I	3
MATH 544	Stochastic Dynamics	3
MATH 545	Stochastic Partial Diff Equatn	3
MATH 553	Discrete Applied Mathematics I	3
CHE 530	Advanced Process Control	3
ECE 505	Applied Optimization Engrgs	3
ECE 511	Analysis Random Signals	3
ECE 531	Linear System Theory	3
ECE 533	Robust Control	3
ECE 567	Statistical Signal Processing	3