



DEPARTMENT OF MECHANICAL AND MATERIALS ENGINEERING POLICY ON PHD QUALIFIERS

**Updated October 2004
March 2004**

Qualifying exam and defense structure:

The MME Ph.D. program has three components:

1. Qualifying Exam
2. Proposal Defense and Candidacy Exam
3. Final Defense

Scheduling of qualifying exam:

The qualifying exam is offered by the department in fall and spring semesters.

Students entering the Ph.D. program with M.S. degrees:

A Ph.D. student entering the program with a recognized M.S. degree will take the qualifying exam in the second major semester.

If the student fails the exam in the first attempt, a second chance will be provided in the third major semester.

Students entering the Ph.D. program with B.S. degrees:

A Ph.D. student entering the program with a B.S. degree will take the qualifying exam in the fourth major semester.

If the student fails the exam in the first attempt, a second chance will be provided in the fifth major semester.

Exceptional cases:

Students may file a petition with the MME Graduate Committee for a deferral of the qualifying exam by one major semester at a time.

SUGGESTED COURSES AND CORRESPONDING REFERENCE TEXTBOOKS FOR PHD QUALIFYING EXAM PREPARATION

The Qualifying Exam has four sections:

1. Analytical Math (Answer 2 problems out of a total of 3 problems in this area)
2. Computational Math (Answer 1 problem out of a total of 3 problems in this area)
3. Major Area (Before the exam, declare a major area and 2 courses in that major area; and answer 4 problems out of a total of 4 problems; 2 problems per course)
 - a. Thermo/Fluid
 - b. Mechanics/Materials
 - c. CAD/Robotics
4. Breadth Area (Before the exam, declare a course in each of the non-major areas; and answer 1 problem out of a total of 2 problems)

ANALYTICAL MATH

EGM 5315 Intermediate Analysis of Mechanical Systems

Applied Partial Differential Equations, D. W. Trim, PWS Publishing, Boston, 1990.

Theory and Problems of Linear Algebra, Schaum's Outline Series, 2nd edition, McGraw-Hill, 1991.

Elementary Differential Equations and Boundary Value Problems, Chapters 1-7, 7th edition, William E. Boyce, and Richard C. DiPrima, John Wiley and Sons, 2003.

Complex Variables, Schaum's Outline Series, McGraw-Hill, 1968.

COMPUTATIONAL MATH

EGM 5346 Computational Engineering Analysis

EGM 6422 Advanced Analysis of Mechanical Systems

Applied Numerical Analysis, C. F. Gerald, and P. O. Wheatley, 6th edition, Pearson Addison Wesley, 1998.

EGM 5354 Finite Element Method Applications in Mechanical Engineering

Concepts and Applications of Finite Element Analysis, R. D. Cook, D. S. Malkus, M. E. Plesha, and R. J. Witt, 4th edition, Wiley, 2001.

THERMO/FLUID AREA

EML 5103 Intermediate Thermodynamics

Thermodynamics: An Engineering Approach, Y. A. Cengel, and M. A. Boles, McGraw Hill, 2002.

EML 5152 Intermediate Heat Transfer

Principles of Heat Transfer, M. Kaviany, John Wiley and Sons, 2002.

EML 5709 Intermediate Fluid Mechanics

Analytical Fluid Dynamics, G. Emanuel, 2nd edition, CRC Press, Boca Raton, Florida, 2002.

EML 6725 Computational Fluid Dynamics

Computational Fluid Dynamics: The Basics with Applications, J. D. Anderson, Jr., McGraw-Hill, 1994.

MECHANICS/MATERIALS AREA

EGM 5615 Synthesis of Engineering Mechanics

Advanced Mechanics of Materials, R. Cook, and W. Young, 2nd edition, Prentice Hall, 1998.

Theory of Elasticity, S. P. Timoshenko, and J. N. Goodier, 3rd edition, McGraw-Hill, 1970.

EGM 6570 Fracture Mechanics

Fracture Mechanics: Fundamentals and Applications, T. L. Anderson, 2nd edition, CRC Press, 1994.

EMA 5001 Physical Properties of Materials

Phase Transformations in Metals and Alloys, K. E. Easterling, D. A. Porter, and R. Bonnett, 2nd edition, Stanley Thornes Pub Ltd, 1992.

or

EMA 5935 Advanced Topics in Materials Engineering

Physical Metallurgy Principles, R. E. Reed-Hill, R. Abbaschian, 3rd edition, PWS Publishing, Boston, 1991.

EMA 5106 Thermodynamics and Kinetics of Materials

Thermodynamics of Materials: Kinetics, D. Ragone, John Wiley and Sons, 1995.

CAD/ROBOTICS AREA

EML 5530 Intermediate CAD/CAE

Computer Graphics, D. Hearn, and M. P. Baker, Prentice-Hall, New Jersey, 1986.

EML 5385 Identification Techniques of Mechanical Systems

Neural Network Design, M. T. Hagan, H.B. Demuth, and M. Beale, PWS Publishing, Boston, 1995.

EML 5808 Control Technology for Robotic Systems

Robot Dynamics and Control, M. W. Spong, and M. Vidyasagar, Wiley, 1989.

EML 6805 Advanced Design of Robots

Mechanical Design of Robots, E. I. Rivin, McGraw Hill, 1988.