Purdue School of Engineering and Technology
Indiana University-Purdue University Indianapolis (IUPUI)

DEPARTMENT OF MECHANICAL ENGINEERING

Graduate Program Handbook

IUPUI
DEPARTMENT OF
MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING AND TECHNOLOGY
A Purdue University School
Indianapolis

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TABLE OF CONTENTS

1. INTRODUCTION

The Department of Mechanical Engineering (ME) welcomes you to IUPUI and the ME graduate program. We expect your time here to be an experience of enriched learning, exploration and discovery, and professional & personal growth. We hope it will be an invigorating experience that fosters a lifetime of learning. This handbook describes the requirements and regulations for the graduate degree programs in the Department of Mechanical Engineering (SL Building, Rm. 260) of the Purdue School of Engineering and Technology at IUPUI. The guidelines and procedures set forth in this handbook will help you in preparing your Plan of Study (see Section 2) and in meeting the necessary degree requirements for completing the program and graduation. We invite you to visit the Chair of the Graduate Education and Research Committee (GERC) and academic advisor in the Department of Mechanical Engineering (SL 260) and the Graduate Program Director (Graduate Programs Office, ET 215) of the Purdue School of Engineering and Technology with questions about requirements, plans of study, or any other academic matters. In addition, you are required to subscribe to the ME graduate students listserv (ME-GS-L) and Oncourse "GRAD_Site" to stay informed on program matters, to participate in the discussions of graduate study related topics and issues, and to receive information on job opportunities. Important announcements are also posted on the bulletin board outside the ME Office (SL 260).

The Department offers the following degree programs:

1. Graduate Certificate
2. Master's Degree
3. Doctor of Philosophy Degree (jointly administered with the West Lafayette campus)

The Graduate certificate program includes the offering of four certificates, namely Computer Aided Mechanical Engineering, Energy Management and Assessment, Hybrid and Electric Vehicle, and Systems Engineering.

The Master's degree program offers three Purdue University Master's degrees: Master of Science in Mechanical Engineering (MSME), Master of Science in Engineering (MSE), and Master of Science (MS). A detailed description of these degrees and their requirements are provided in Section 2 of this handbook. Your degree is granted by the Purdue University Graduate School upon successful completion of all degree requirements in the Department of Mechanical Engineering at IUPUI.

The Ph.D program is jointly administered with the West Lafayette campus. The program is described in detail in the Purdue University School of Mechanical Engineering Graduate Procedures Manual. Students enrolled in IUPUI need to follow specific requirements described in section 2.

Administration of your program is shared among the ME Department (SL 260; http://www.engr.iupui.edu/departments/me/), the School of Engineering and Technology's Graduate Programs Office (ET 215; http://engr.iupui.edu/main/academics/grad/index.php), the Purdue University Graduate School (WestLafayette campus; https://engineering.purdue.edu/ME/Academics/Graduate/index.html, and the IUPUI Graduate Office (University Library, Room 1170; http://www.iupui.edu/~gradoff/). You should become familiar with their roles and procedures. In addition, if you are an international student, you will have contacts with the

Office of International Affairs (OIA) at IUPUI (Education and Social Work Building, ES Rm. 2126) regarding visas and immigration regulations. The Graduate Program Office (ET 215) can direct you to the appropriate office for specific issues.

1.2 Special Information for New Students

Communication: E-mail is the primary mode of communication used between the Graduate Programs office and all graduate engineering students. Be sure that the Graduate Programs Office always has your current and active email address on file.

Course Selection: One of the first questions to address, as a new student, is how to be properly registered for graduate classes. This process may begin as soon as you have received the official notification of admission from the Purdue Graduate School. To be prepared for registration you should:

1. Have information about the program, its requirements, and the courses. Along with this Graduate Program Handbook, you should also refer to the following:
   Schedule of Classes. Course offerings and schedule of classes are available online at this website**:** http://registrar.iupui.edu/schedule.html.
   Faculty Research Expertise. This website provides a list of faculty members with their respective research interests. http://et.engr.iupui.edu/departments/me/people/index.php. Copies of these materials can also be obtained from the School of Engineering and Technology' MS Graduate Programs Office, in ET 215.

2. Study these documents and then consult with your advisor or the Chair of ME GERC. All students are assigned an advisor (who may be temporary) when they are admitted to the ME Graduate program. The purpose of the consultation is to begin planning your graduate program and decide, in particular, which courses you should take your first semester. The consultation also serves as a first step to selecting a major professor, the person who will be your academic advisor. Each graduate student is assigned or expected to choose a major professor/academic advisor before the end of the first semester, with the approval of the professor and the ME GERC. Each Student who is employed as a teaching assistant or a research assistant on a particular research project will be assigned a major professor. If thesis option is selected, the major professor will be the thesis advisor. The GERC Chair is the academic advisor for non-thesis students. The major professor will serve as chair of the student's advisory committee (see Section 2).

3. After consulting with the academic advisor, prepare a tentative list of classes for the initial semester according to the web-based *"Course Offerings"* and *"Schedule of Classes"* for the particular semester. Online course offerings and schedule of classes can be accessed through the Office of the Registrar website at registrar.iupui.edu. When you have your class schedule prepared and are ready to register, you may either go to the Graduate Programs Office (ET 215) for assistance with registration, or you may register directly via the web-based student information system, *OneStart*.

   Registration: Registration and fee information is available on the ONESTART web site. The Bursar's computer system will schedule and print the registration statement and the fee statement for mailing to the student.

Late Registration Fees: Students completing their registration after the first week of class are automatically assessed late fee by the Bursar.

Questions or problems regarding the registration process should be directed to the ET Graduate Office.

Registration for subsequent semesters:

Students are required to meet with their major professor or temporary advisor (Chair of GERC) to discuss a tentative plan of study and to choose courses for registration.

Registration for Summer and Fall Semesters begins approximately the second week in March, and registration for the Spring Semester begins approximately the second week of October. Students should complete the registration procedure as follows:

1. Access the Schedule of Classes. This is available on OneStart (http://onestart.iu.edu). (See Introduction)
2. Meet with the Major Professor or temporary advisor to select courses.
3. Meet with the Graduate Administrator to begin completion of the Registration Form
4. Get the signature of the Major Professor or temporary advisor for approval.
5. If a TA or RA has been awarded, meet with the ME department secretary for completion of paper work.
6. Submit Registration Form, and tuition waiver form if applicable, to the ET Graduate Office
7. Register online or in person with the registrar.

Additional Registration Guidelines for Employed Students

Students who have research assistantships or teaching assistantships should always meet with the ME administrative assistant in SL260 before completing the final step for registration (Section 3). Completion of this step each semester will ensure that proper documentation exists for the prompt payment of salary and, when appropriate, for payment of tuition.

Students seldom register for more than 9 credits of course work in a single semester. Students who have graduate assistantships, including teaching assistantship, research assistantship, and university fellowship, in the Dept. of Mechanical Engineering are required to register for a minimum of 6 credits for the Fall and the Spring Semesters. Requests for exceptions to the requirement may be submitted to the GERC Chair and are reviewed on a case-by-case basis.

2. GRADUATE DEGREE PROGRAMS IN MECHANICAL ENGINEERING

2.1 Master's Degree Programs

The Department of Mechanical Engineering offers three Master's degree programs: Master of Science in Mechanical Engineering, Master of Science in Engineering, and Master of Science. The specific degree awarded depends on the emphasis chosen by the student as well as the undergraduate degree received and academic background of the student. The degree programs are described as follows:

- *Master of Science in Mechanical Engineering (MSME*)

  Students who are graduates of recognized programs in Engineering, Science, or Technology, and meet the minimum requirements for undergraduate proficiency in mechanical engineering are qualified to apply for this degree. The minimum requirements are listed in Appendix A of this handbook.

- *Master of Science in Engineering (MSE)*

  Students who are graduates of recognized programs in Engineering, Science, or Technology are qualified to apply for this degree. Students who have chosen the MSE degree option may follow an interdisciplinary plan of study, where courses from different Engineering disciplines may be taken, depending on the student's interests. The admission requirements will be decided by the graduate committee on a case by case basis.

- *Master of Science (MS)*

  Students who are graduates of recognized programs in Engineering, Science, or Technology are qualified to apply for this degree. Students who have chosen the MS degree option may follow an interdisciplinary plan of study, where courses from other disciplines may be taken, depending on the student's interests. The admission requirements will be decided by the graduate committee on a case by case basis.

Combined BS-MS Programs. Outstanding undergraduate students in the IUPUI Mechanical Engineering, Physics and other designated programs, may apply for admission to one of the Master's programs while still in those B.S. programs. The requirements for the Master's degree remain the same, but allow special admission, credit transfer and mutual program adjustments. These are specified in Section 6 and Section 7 for the Bachelor of Science-Master of Science and Bachelor of Physics and Master Mechanical Engineering program, respectively. Other dual degree programs may have separate handbooks listing these requirements.

Admission Requirements

In all cases, applicants are required to have a minimum undergraduate GPA of 3.00/4.00 for admission to the program. International applicants who are graduates of non-US institutions and whose first language is not English are required to take the TOEFL exam. All applicants are required to take the GRE (Graduate Record Examination) and report the scores along with their application, including domestic applicants. A minimum TOEFL score of 550 is required for paper-based test,

213 for computer-based test, or 79 for internet-based test (with the following test sections' minima: Writing: 18; Speaking: 18; Listening: 14; Reading: 19). For the GRE, scores of at least 155 is preferred on the quantitative and verbal reasoning sections and 3.0 on the analytical writing section.

Areas of Concentration

The graduate program in mechanical engineering consists of the following six areas of concentration:

1. Biomechanics
2. Energy
3. Fluid and Thermal Sciences
4. Materials
5. Mechatronics and Controls
6. Solid Mechanics and Computer-Aided Engineering

The Biomechanics area includes study of the mechanics of biological systems and materials, such as musculoskeletal systems, joint mechanics, dental mechanics, bio-fluid mechanics, bio-solids mechanics, and medical instrumentation. The Energy area deals with the conversion, transfer, distribution, and efficient use of energy. It includes the study of thermodynamics, heat and mass transfer, fluid mechanics, and their application in traditional and renewable energies as well as the energy related elements of physics, electrochemistry and materials science. The Fluid and Thermal Sciences area includes study of fluid mechanics, heat transfer, thermodynamics, combustion, energy systems, thermal design, and computational fluid dynamics. The Materials area deals with the design, fabrication, characterization, and simulation of materials. It includes study of the properties and structure of matter and their relationship, strength of materials, composites, nanomaterials and elements of applied physics and chemistry. The Mechatronics and Controls area includes study of mechanical systems, electro-mechanical systems, control theory, micro-controllers, sensors, and actuators. The Solid Mechanics and Computer-Aided Engineering concentration area includes study of strength of materials, dynamics, kinematics, vibration, structural mechanics, mechanical design, CAD/CAM, and computational solid mechanics.

Degree Requirements for MSME, MSE, and MS Programs

The Mechanical Engineering Master's degree requires a minimum of 30 credit hours of graduate course work. Each student designs his or her own Master's Plan of Study (POS) with approval from the Advisory Committee. All students appointed as Research Assistants, Teaching Assistants, or who are receiving Fellowships must enroll in a zero (0) credit graduate seminar course in each semester of appointment.

Thesis and Non-Thesis Options

Students may choose either the thesis or the non-thesis option for their programs. The requirements for thesis and non-thesis options are as follows:

Thesis Option - MSME:

(1) Nine (9) credit hours of research thesis (ME 69800)
(2) Minimum nine (9) credit hours of primary area courses
(3) Maximum six (6) credit hours of related area courses

(4) Between the primary and related area courses, at least 3 courses (9 credit hours) must be ME courses

(5) Six (6) credit hours of mathematics or mathematics related courses. One of them must be from the Math Department.

Thesis Option - MSE:

(1) Nine (9) credit hours of research thesis (ME 69800)

(2) Minimum nine (9) credit hours of primary area courses, which can be taken from more than one research track. Courses not listed under any of the tracks will need to be approved by the graduate advising committee to count as primary.

(3) Maximum six (6) credit hours of related area courses. Any graduate level course can be counted as related if approved by the advisory committee.

(4) Six (6) credit hours of mathematics or mathematics related courses. One of them must be from the Math Department.

(5) A minimum of 3 engineering courses (9 credit hours)

Thesis Option - MS:

(1) Nine (9) credit hours of research thesis (ME 69800)

(2) Minimum nine (9) credit hours of primary area courses, which can be taken from more than one research track. Courses not listed under any of the tracks will need to be approved by the committee to count as primary.

(3) Maximum six (6) credit hours of related area courses. Any graduate level course can be counted as related if approved by the advisory committee.

(4) Six (6) credit hours of mathematics or mathematics related courses. One of them must be from the Math Department.

Note: "Satisfactory" or "Fail" (S/F) is assigned as a final grade for ME 69800 M.S. Research Thesis course, while S/F grades are not permitted for any other course on the plans of study.

Non-Thesis Option - MSME:

(1) Minimum of 12 credit hours of primary area courses

(2) Maximum of 12 credit hours of related area courses, including up to six (6) credit hours of ME 59700 Mechanical Engineering Projects I. Refer to Appendix B for the requirements for Mechanical Engineering Projects I.

(3) Between the primary and relates area courses, at least 15 credit hours (5 course) must be ME

(4) Six (6) credit hours of mathematics or mathematics-related courses. One of them must be from the Math Department.

Non-Thesis Option - MSE:

(1) Minimum of 12 credit hours of primary area courses, which can be taken from

more than one research track. Courses not listed under any of the tracks will need to be approved by the committee to count as primary.

(2) Maximum of 12 credit hours of related area courses, including up to six (6) credit hours of ME 59700 Mechanical Engineering Projects I. Refer to Appendix B for the requirements for Mechanical Engineering Projects I. Any course can be counted as related if approved by the advisory committee.

(3) Six (6) credit hours of mathematics or mathematics-related courses. One of them must be from the Math Department.

(4) A minimum of 5 engineering courses (15 credit hours)

Non-Thesis Option - MS:

(1) Minimum of 12 credit hours of primary area courses, which can be taken from more than one research track. Courses not listed under any of the tracks will need to be approved by the committee to count as primary.

(2) Maximum of 12 credit hours of related area courses, including up to six (6) credit hours of ME 59700 Mechanical Engineering Projects I. Refer to Appendix B for the requirements for Mechanical Engineering Projects I. Any graduate level course can be counted as related if approved by the advisory committee.

(3) Six (6) credit hours of mathematics or mathematics-related courses. One of them must be from the Math Department.

Primary Area and Related Area Courses

Courses are classified under primary area and related area. Those courses directly related to the area of specialty are classified as primary and those courses outside the specialty area are classified as related area. This list may change from time to time, and the Graduate Coordinator will have updated information. In addition, other courses in the primary and related areas may be offered by Purdue University's Engineering Professional Education (EPE, formerly CEE) through the IUPUI Course Offering.

Primary Area Courses

Biomechanics concentration area:

Primary area courses in Biomechanics include courses in the Solid Mechanics and the Fluid/Thermal Sciences areas, as well as additional courses in the Biomedical Engineering field, such as:

ME 59700 / BME 59500 Skeletal Biomechanics

BME 60100 Principles of Biomedical Engineering I

BME 60200 Principles of Biomedical Engineering II

Energy specialty area:

ME 50000 Thermodynamics

ME 50101 Energy Assessment of Industrial Processes

ME 50102 Energy Management Principles

ME 50103 Industrial Energy Assessment: Tools and Applications

ME 50500 Heat and Mass Transfer

ME 50900 Intermediate Fluid Mechanics
ME 54200 Introduction to Renewable Energy
ME 59700 Nanosystems Principles
ME 52500 Combustion
ME 59700 Energy Storage Devices and Systems
ME 59700 Electrochemistry for Engineering
ME 59700 Fuel Cell Science & Engineering
ME 59700 Ceramics Material for Renewable Energy

Fluid and Thermal Sciences concentration area:

ME 50000 Thermodynamics
ME 50500 Heat and Mass Transfer
ME 50900 Intermediate Fluid Mechanics
ME 51000 Gas Dynamics
ME 52500 Combustion
ME 55100 Finite Element Analysis
ME 58100 Numerical Methods in Mechanical Engineering
ME 58200 Thermal Stress Analysis
ME 59700 Topics: Design Optimization Methods
ME 59700 Topics: Principles of Turbo-machinery
ME 59700 Topics: Introduction to Tribology
ME 61400 Computational Fluid Dynamics

Materials specialty area:

ME 50500 Heat and Mass Transfer
ME 54200 Introduction to Renewable Energy
ME 55000 Advanced Stress Analysis
ME 55100 Finite Element Analysis
ME 55800 Composite Materials
ME 56900 Mechanical Behavior of Materials
ME 59700 Nanosystems Principles
ME 59700 Ceramics Material for Renewable Energy
ME 59700 Introduction to Tribology
ME 59700 Micromechanics of Materials
ME 69700 Computational Fracture Mechanics

Mechatronics and Controls concentration area:

ME 50104 Powertrain Integration
ME 50105 Hybrid and Electric Transportation

ME 50400 Automotive Control
ME 54600 CAD/CAM Theory and Applications
ME 55100 Finite Element Analysis
ME 56300 Mechanical Vibrations
ME 56500 Vehicle Dynamics
ME 57500 Theory and Design of Control Systems
ME 57800 Digital Control
ME 58100 Numerical Methods in Mechanical Engineering
ME 58600 Microprocessors in Electromechanical Systems
ME 59700 Analysis and Design of Robotic Manipulators
ME 59700 Electromechanical Systems and Applied Mechatronics
ECE 53800 Digital Signal Processing
ECE 55400 Electronic Instrumentation and Control Circuits
ECE 58000 Optimization Methods for Systems and Control
ECE 60200 Lumped System Theory
ECE 62900 Introduction to Neural Networks
ECE 68000 Modern Automatic Control
ECE 68500 Introduction to Robust Control
CSCI 54900 Intelligent Systems
CSCI 55600 Fault Tolerant Computing

Solid Mechanics & Computer-Aided Engineering concentration area:

ME 54600 CAD/CAM – Theory and Applications
ME 55000 Advanced Stress Analysis
ME 55100 Finite Element Analysis
ME 55700 Design for Manufacturability
ME 55800 Composite Materials
ME 56000 Kinematics
ME 56200 Advanced Dynamics
ME 56300 Mechanical Vibrations
ME 56900 Mechanical Behavior of Materials
ME 57500 Theory and Design of Control Systems
ME 58100 Numerical Methods in Mechanical Engineering
ME 58200 Thermal Stress Analysis
ME 59700 Topics: Design Optimization Methods
ME 59700 Topics: Topology Optimization
ME 59700 Topics: Design of Mechanical Systems
ME 65100 Advanced Applications of Finite Element Method

CE 57700 Analysis of Plates and Shells

Related Area Courses

Any Mechanical Engineering graduate course outside the primary area is considered a related area course, with the exception of project courses specified below which are considered related area courses for non-thesis students only:

ME 59700 Mechanical Engineering Projects I (for non-thesis option only)

ME 69700 Mechanical Engineering Projects II (for non-thesis option only)

Additional related area courses are:

MSE 54700 Introduction to Surface Science

MSE 59700E Materials and Devices for Solid-State Energy Conversion

MSE 57600 Corrosion

MSE 51000 Microstructural Characterization Techniques

ECE 59500G Materials and Devices for Solid-State Energy Conversion

MSE 59700E Materials and Devices for Solid-State Energy Conversion

ECE 59500G Materials and Devices for Solid-State Energy Conversion

MSE 54700 Introduction to Surface Science

ECE 53800 Digital Signal Processing I

ECE 62900 Introduction to Neural Networks

ECE 59500 Topics: Introduction to Computational Intelligence

ECE 59500 Topics: Parallel Processing Theory

ECE 59500 Topics: Electromechanical Systems and Applied Mechatronics

ECE 60000 Random Variables

ECE 60800 Computational Models and Systems

PHYS 51000 Physical Mechanics

PHYS 52200 Coherent Optics and Quantum Electronics

PHYS 54500 Solid State Physics

PHYS 55000 Introduction to Quantum Mechanics

PHYS 60000 Mathematical Methods in Physics

CHEM 54200 Inorganic Chemistry

CHEM 57500 Intermediate Physical Chemistry

CSCI 52000 Computational Methods in Analysis

CSCI 54900 Intelligent Systems

CSCI 55200 Advanced Graphics and Visualization

CSCI 58000 Algorithm Design and Implementation

CSCI 61400 Numerical Solution of Ordinary Differential Equations

CSCI 61500 Numerical Solution of Partial Differential Equations

BME 59500D Sensors & Implantable Devices

BME 59500E Medical Imaging

BME 59500J Molecular, Cellular Biomechanics

Mathematics Courses

Six (6) credit hours of mathematics courses are required in the plan of study as a related area for both thesis and non-thesis options. This requirement may be met by taking any of the two acceptable three-credit hour courses from the mathematics department (see the list below), or one course from the mathematics department and an equivalent course with a strong math content from another department, including ME. The following are acceptable mathematics courses:

MATH 53700	Applied Mathematics for Scientists and Engineers I
MATH 52800	Advanced Mathematics for Engineering and Physics II
MATH 51000	Vector Calculus
MATH 51100	Linear Algebra with Applications
MATH 52300	Introduction to Partial Differential Equations
MATH 57800	Mathematical Modeling of Physical Systems

Courses with strong mathematics content are:

ME 55100	Finite Element Analysis
ME 65100	Advanced Applications of Finite Element Methods
ME 58100	Numerical Methods in Mechanical Engineering
ME 61400	Computational Fluid Dynamics
ECE 58000	Optimization Methods for Systems and Control
ECE 60000	Random Variables
PHYS 55000	Introduction to Quantum Mechanics
PHYS 60000	Mathematical Methods in Physics

Note: MATH 53700 and MATH 52800 are the preferred math courses. GERC must be consulted for other math related courses.

Graduate Seminar

All students receiving financial aid including research assistantship, teaching assistantship, tuition assistance, or Fellowship awards must, in each semester of appointment, enroll for a zero credit:

ME 59700 Topics: ME Seminar

2.1.1 MASTER'S ADVISORY COMMITTEE

All students must have a Master's Advisory Committee consisting of at least three Graduate faculty members. The duties of this committee are to assist the student in the preparation of the Plan of Study, advise the student on research related to the Master's thesis, and conduct examination on the Master's thesis. During the first semester of enrollment, the student shall select a Major Professor who will serve as their Chair of the Advisory Committee. The Major Professor-student relationship must be established by mutual consent, and consent is presumed by acceptance of a research assistantship if offered. With the agreement of the Major Professor, the student will select other advisory members to be on the Committee. The major professor and at least one additional member of the committee must be members from the ME graduate faculty (see the current list in Appendix C).

The Advisory Committee is expected to be established at the beginning of the second semester of

enrollment. The Advisory Committee, as agreed by the Major Professor and the student, shall be recorded in a plan of study and presented to the Dean of the IUPUI or Purdue Graduate School for approval and formal appointment. The Dean may appoint additional members, if it is advisable. After the Plan of Study is approved, (see Section 7) any changes to the Advisory Committee would require a change to the Plan of Study.

2.1.2 MASTER'S PLAN OF STUDY

It is strongly recommended that all Master's students file a Plan of Study immediately upon completing 12 credit hours of coursework. A Master's Plan of Study is filed by completing Graduate School Form 6 "*Request for Master's Degree Advisory and Plan of Study Approval"* (refer to Appendix D and attachment for a sample copy). In all cases, the plan of study must be filed and approved by the Graduate School before the start of the final semester of graduation. If it becomes necessary or desirable to change the Plan of Study at a later date, a plan of study change form may be used for this purpose. An example of a portion of a Master's Plan of Study is provided in Figure 1.

The following guidelines must be observed in preparing a plan of study. Additional guidelines and information on filling out the Plan of Study are given in Section 2.1.3 of the handbook.

1. Indicate courses in your primary area with a "P" in the left-most column labeled "Area". List primary area courses together as a group.
2. Related area courses should be indicated with an "R" in the "Area" column. List related area courses together as a group
3. Mathematics courses are also indicated with an "R" on the Plan of Study, in the "Area" column.
4. Graduate level credits earned while in non-degree status at IUPUI may be used toward the master's degree, up to a maximum of 12 credits, if they meet degree requirements.
5. Graduate level credits earned at another recognized university may be used toward the master's degree, with the approval of the student's advisory committee and the GERC. A maximum of 12 credit hours earned before enrollment in the Master's program may be transferred toward the Master's degree. Additionally, no more than 6 transfer credits (2 courses) may be used toward the primary area of concentration. Undergraduate level courses taken at other universities will not be accepted for transfer credit. All courses transferred must meet the following requirements:
    a. they are acceptable for graduate credit at the school at which they were taken;
    b. have not been used to meet the requirements for another degree; and
    c. have grade of "B" or better

    Grades from transfer courses will not be included in calculation of the grade point index. Without exception, all transfer and excess undergraduate credits used on graduate plans of study must be approved by the student's Advisory Committee and by GERC. A special request for approval is not necessary; simply include such courses on the Plan of Study and attach a copy of the catalog description of the course. Additional documentations to comply with requirements above may be required for approval.

Graduate School Form 6
(Revised 6/06)

PURDUE UNIVERSITY
GRADUATE SCHOOL
Request for Master's Degree Advisory Committee and Plan of Study Approval

(Please type)

Pg. 1 of 2 Pgs. Date Degree Expected May 2014

1. NAME OF STUDENT John E. Doe PUID No. 10 digit Purdue ID / IUPUI

2. DEPARTMENT Mechanical Engineering Dept. Code MECH ☐ Thesis Option ☒ Nonthesis Option

Degree Title Masters of Science in Mechanical Engineering Degree Code ME-MSME Research Area Solid Mechanics & CAE

3. AREA OF SPECIALIZATION (if any) AOS Code

Area	4. COURSES				5. METHOD OF ESTABLISHING CREDIT			6. DATE COMPLETED OR TO BE COMPLETED
	OFFICIAL TITLE ABBREVIATION *Please group courses into "Primary" (P) & "Related" (R) areas.*	Subject Abbr.	Course No.*	Cr. Hours	Regular Regis.	Non-degree Regis.	Other or Transfer From +	
P	MECH BEHAVIOR MATLS	ME	56900	3	X			Dec 2012
P	MECHANICAL VIBRATIONS	ME	56300	3	X			Dec 2013
P	COMPOSITE MATERIALS	ME	55800	3	X			May 2014
P	DESIGN OPTIMIZATION METHODS	ME	59700	3	X			May 2014
R	MODERN CONTROL THEORY	ECE	68000	3	X			May 2013
R	INTRO TO SYSTEMS ENGINEERING	ME	59700	3	X			May 2013
R	SYSTEMS AND SPECIALTY ENGINEER	ME	59700	3	X			July 2013
R	AUTOMOTIVE CONTROL	ME	50400	3	X			Dec 2013
R	APPL MATH SCIENTISTS/ENGR I	MATH	53700	3	X			Dec 2012
R	FINITE ELEMENT ANALYSIS	ME	55100	3	X			Aug 2013

7. LANGUAGE REQUIREMENTS	Method to be used to meet language requirements
a.	a.
b.	b.

\+ Transfer course must be described as on original transcript.
* Mark course number with asterisk (*) if B or better is required.

8. NAMES OF ADVISORY COMMITTEE MEMBERS (Please type full name.)	9. GRADUATE FACULTY IDENTIFIER	APPROVED BY ADVISORY COMMITTEE MEMBERS (Signature)	10. DEPARTMENT Abbr.	10. DEPARTMENT Code	11. ADVISOR IN AREA OF:
Dr. Sohel Anwar Chair	X0460	Chair	ME	MECH	
Dr. Alan Jones	X0481		ME	MECH	
Dr. Tamer Wasfy	X0657		ME	MECH	

☐ Check here if supplemental notes or other requirements are attached.

13. APPROVED BY:

Head of the Graduate Program Date

12. SIGNATURE OF STUDENT Date

Academic Dean (if required) Date

Graduate School Dean

Submit original plus one copy to the Graduate School.

Figure 1. A Master's Sample Plan of Study

2.1.3 Preparation and Filing of Master's Plans of Study

Contact the Assistant to the Chair (advisor) in ME department in SL 260 for assistance in preparing the Master's Plan of Study (POS). The advisor must review the draft copy of your plan of study. You may obtain the Master's POS from the "ME_Graduate site" located on the Oncourse site. The form must be typed and can be done so directly on the electronic document. A sample plan of study is shown above in Figure 1.

The following are steps to preparing and submitting a plan of study for approval:

1. Review the preceding portions of this handbook, including the list of 500 and 600-level courses, to determine the requirements for the particular degree and the area of specialty you wish to pursue. Select courses that meet the degree requirements, and are appropriate for your area and interest. If possible, check the time the courses you need will be offered.

2. Prepare a draft of your plan of study. Label "P" for the primary area courses and "R" for related area courses respectively. Please note, math courses are labeled "R".

3. Select an ME faculty member as your major professor and to be the chair of your advisory committee. Confer with him/her for advice on the plan and ultimately his/her informal agreement to the plan.

4. In consultation with your major professor, select two additional faculty members to serve on your graduate advisory committee.

5. Prepare a computer-generated or typed version of your plan of study, sign it, and carry it to the members of your advisory committee for their signatures.

6. Submit the original copy with all necessary signatures to the School's Graduate Engineering Programs Office. Your plan of study will be reviewed by the Graduate Coordinator to ensure that the plan meets all format and program requirements, after which it will be submitted to the Purdue Graduate School for final approval.

Note: Information relevant to completing the Plan of Study includes the following:

1. There are six possible degree options. Their degree codes are:

Degree Code	Degree Title	Option
ME-MSME	Master of Science in Mechanical Engineering	Non-Thesis
ME-MSME	Master of Science in Mechanical Engineering	Thesis
ME-MSE	Master of Science in Engineering	Non-Thesis
ME-MSE	Master of Science in Engineering	Thesis
ME-MS	Master of Science	Non-Thesis
ME-MS	Master of Science	Thesis

2. The space for indicating the research area is left blank in most cases.
3. The title of a topic course (ME 59700) must start with TPCS, followed by the title.
4. Courses transferred from other schools should be listed on the (POS) with the same title and number as on the transcript from the school at which they were taken. Do not use the equivalent number from a Purdue course. One copy of the catalog description for each course/s transferred should be supplied to the ME department.
5. The column labeled "Regular Regis." is used to indicate whether a course was (or is to be) taken at IUPUI ("X") or transferred from another school ("TR").
6. The column labeled "Non-Degree Regis." is used to indicate courses that were (or are to be) taken while a student was in non-degree status and was not officially admitted to a degree program. A maximum of 12 credit hours taken in non-degree status with grade of "B" or higher may be used on a POS.
7. In order to use a graduate course that is an undergraduate excess on the POS the course must be declared as an undergraduate excess on the transcript. Otherwise, a letter certifying that the course was not used as a part of any degree is required from the school at which the course was taken.
8. Thesis research (ME 69800) should not be listed on the plan of study.

2.1.4 Combined BS-MS Program

This program allows IUPUI BSME students to take four graduate courses (12 credits) as ME electives during their senior (or fourth) year, which will provide credit for both B.S. degree (normally 128 credits) and M.S. degree (normally 30 credits). The curriculum includes all the core undergraduate courses that are currently required for BSME majors and all the current graduate course requirements of the traditional ME Master's program. Both diplomas will be issued together after all 146 credits of the combined programs are completed.

Students must maintain a minimum GPA of 3.2 for the first 85 credit hours of BS course work in the plan of study to be conditionally admitted to the program. Formal admission to the graduate program will be made after the student meets the usual minimum 3.00 GPA admission requirement and receives at least a "B" grade in each of the four graduate courses in his/her BS plan of study. The ME GERC or undergraduate program advisor may review conditionally admitted students at any stage and advise against formal application if progress is unsatisfactory.

There will be two plans of study for students in this program, each including the 12 credit hours allowed overlap: 1) BS plan of study filed no later than one semester before completing the BS degree requirements (normally in the 7th semester), and 2) MS plan of study filed after submitting the BS plan of study (normally in the 9th semester), and before the expected semester of graduation. The program roadmap with timeline (and including milestones and criteria) is shown below. A semester-by-semester recommended distribution of courses is given in Appendix E.

Combined BSME/MSME Program

Program Milestones, Actions and Criteria

Cumulative Credits < 85 credit hours			
Student Action	**Departmental Action**	**Criteria**	**Status**
Contact academic advisor indicating intention to join the program, or indicating in the application the intention to join the program	Department prepares bubble sheets with a distinguishable color for the students.	Good Academic Standing	Accepted into the Mechanical Engineering Department
Complete preliminary application	New code (BSME1) is assigned to the student and advisory hold will be imposed.		
	Mandatory for student to meet advisor every semester.		
85 Credit hours ≤ Cumulative Credits < 117			
Student Action	**Departmental Action**	**Criteria**	**Status**
Apply to the graduate program with: 1. Graduate application form Statement of purpose 2. One letter of recommendation 3. Take GRE test.	Department prepares graduate application form	Degree GPA ≥ 3.2	Conditional admission
Take ME5XX courses in the place of ME electives and free elective.	Graduate Education and Research Committee (GERC) evaluates the application. GERC monitors the student's GPA and provides counseling on semester basis.	Good supporting document	
Prepare undergraduate Plan of Study in the 7^{th} semester.	Student is mandatory to meet advisor every semester.		
Cumulative Credits ≥ 117 (with at least two ME5XX courses taken)			
Student Action	**Departmental Action**	**Criteria**	**Status**
Prepare graduate Plan of Study after receiving official admission and no later than the 9^{th} semester.	GERC evaluates the application and sends approved applications to WL Graduate School	Degree GPA ≥ 3.0 (All grades of graduate level course are "B" or better.)	**N/A**
N/A	Code for the students who are admitted changes (**MSME3**)		**N/A**
Final Semester			
Student Action	**Departmental Action**	**Criteria**	**Status**
Apply for graduation	Department awards both BSME and MSME degrees	Cum. GPA ≥ 3.0	**N/A**

If a student withdraws from the program, or if the student's performance is judged to be unsatisfactory for the dual degree program by the ME GERC, because of not meeting the minimum grade requirements, the student can receive the BSME upon completion of all the requirements for that degree.

2.1.5 MBA/MSE Dual Degree Program

The MBA/MSE Dual Degree Program offered at IUPUI allows for the concurrent study of graduate engineering and graduate business course work and lead to both the MBA and MSE degrees. The program is designed for individuals who want to practice engineering involving business clients, work in a corporate engineering department, or work in a government agency regulating business, among other engineering / business interrelated opportunities.

Candidates must meet the admissions and prerequisite criteria of each school and be separately admitted byt each. Candidates may be admitted to the Kelley School of Business in either August or January and to the Scholl of Engineering and Technology in August.

The MBA/MSE dual degree program requires three-four years of full-time study instead of the five years that would be required if the two degrees were to be earned separately. The program requires 66 total credit hours, 24 credit hours at the school of Engineering and Technology in Indianapolis and 42 credit hours at the Kelley School of Business at Indianapolis for graduation. Non-dual degree study requires 81 total credit hours, 30 credit hours at the School of Engineering and Technology and 51 credit hours at the Kelley School of Business. Summer school during the first two summers of the dual degree program is encouraged to help the MBA/MSE student attain increased credit hoiurs and ease potential scheduling conflicts that may arise when scheduling course work in two different professional schools. Some MBA courses are required to be taken during the summer term.

The MBA/MSE dual degree program is designed so that students take courses in both programs simultaneously. The degrees are conferred simultaneously when all requirements for graduation for for the dual degree student have been met in each professional program.

1. Admission

The person seeking admission to the MBA/MSE dual degree program in Indianapolis must:

1. Meet the prerequisite requirements for application to both the Kelley School of Business in Indianapolis and the School of Engineering and Technology in Indianapolis.
2. Complete and application and required application documentation for each school individually, including completion of the GRE (for Engineering), and the GMAT (for Business) examinations.
3. Be admitted to each school individually.
4. The Kelley School of Business Indianapolis deadlines for applications are April 15 for the fall admission and November 1 for spring admission, with applications considered as they arrive. Similar deadlines apply for MSE admission applications for the School of Engineering and Technology.

As part of the application procedure for the MBA/MSE dual degree program, the interested candidate should contact the School of Engineering and Technology and the Kelley School of Business to obtain applications and pre-admission advising for each program respectively. Included in the information for each program will be information on prerequisites, the applicant pool, and the characteristics of the successful applicants, deadlines, and application checklists. Since the prerequisite requirements and competitive standards are not waived for applicants to the dual degree program, it is to the benefit of the potential applicant to fully understand the application, admission procedures, criteria and applicant pools for both schools.

In order to be eligible for consideration for admission to the MBA/MSE program, applicants must apply, be admitted, and begin taking course work in the School of Engineering and Technology before they have completed more than 12 hours of MBA course work and begin taking course work in the Kelley School of Business before they have completed more than 12 credit hours in the School of Engineering and Technology.

Under no circumstances will an applicant who has completed more than 18 hours of course work in the

School of Engineering and Technology before matriculating in the MBA program be admitted to the Dual Degree Program.

2.1.6 Bachelor of Physics Masters of Mechanical Engineering Program (BPMME)

This program, BPMME, allows *IUPUI Physics* students to take two junior or higher level ME courses (6 or more credits) during their undergraduate program, which will provide credit for both B.S. (Physics) degree and make up for any deficiencies in undergraduate ME courses. The curriculum includes all the core undergraduate courses that are currently required for BS (Physics) majors and all current graduate degree requirements of the traditional ME Master's (MS) program. Both the BS and MSME degrees will be awarded simultaneously at the completion of all 142 credits of the combined programs.

Formal admission to the graduate program will be made through approval by the ME GERC. The ME GERC may review conditionally admitted students at any stage and advise against formal application if progress is unsatisfactory. An MSME plan of study must be filed before the expected semester of graduation. Semester-by-semester sample distribution of courses is given in Appendix F.

If a student withdraws from the program, or if the student's course grade does not meet the minimum grade requirement, the student will be required to leave the BPMME Program. When a student leaves the BPMME Program (for any reason), the student may receive only the BS (Physics) degree upon completion of all the requirements for that degree.

2.1.7 Master Degree Milestones

The following are "milestones" that should be used as a guide to accomplish needed tasks to complete the degree requirement:

First Semester Registration:

- Prior to registration meet to discuss with the graduate advisor about possible courses to take. It is always helpful to talk with course instructors regarding courses you are interested in taking.
- For assistance with registration, go to the Graduate Programs Office in ET 215.

During the First Semester:

- Satisfy conditions for admission and/or English proficiency requirements, if relevant.
- Get to know professors in the department and learn about their areas of research expertise.
- Choose the major professor or research advisor

Second Semester:

- Decide on an area of specialization.
- Choose the Advisory Committee
- Begin to prepare the Master's plan of study. Contact the Coordinator for Graduate Programs for assistance in preparing the plan.

One Semester Prior to the Final Semester of Graduation:

- Fill out an "*Application for Graduation*" form, available in the Graduate Programs Office, ET 215.
- Have an officially approved Master's plan of study on file with the Purdue University Graduate School and the ET Office of Graduate Programs.

Final Semester *(Thesis Option)*:

- Register for *"Candidacy 99100"* (0 credit hour) in your final semester of graduation.
- Attend a briefing session on Master's thesis preparation. Check with the Coordinator for Graduate Engineering Programs on dates for the briefing session.
- Obtain major professor's approval of the thesis prior to scheduling the final examination.
- File Graduate School Form 8 *"Request for Appointment of Examining Committee"* with the department and the School's Graduate Office a minimum of 3 weeks prior to the proposed date of final oral examination/thesis defense. (Refer to Appendix D for a list of Graduate School forms and see sample copy of Form 8 attached.) Also, schedule the final examination (thesis defense) with major professor and advisory members at least 3 weeks in advance. You are required to meet the deadlines by which the final thesis examination must be completed. (Read Appendix G for more information on preparing final oral/thesis exam). Distribute copies of thesis to members of the Advisory Committee at least 2-3 weeks before the oral exam to allow sufficient time for members to review the thesis.
- Immediately following the oral exam insure that your advisory committee members sign Graduate School Form 7 *"Report of Master's Examining Committee"* and submit the form at the Graduate Programs Office (ET 215).
- After the exam and all necessary changes have been made to your thesis, submit one copy to the ET Graduate Office, where it will be filed electronically.

Final Semester *(Non-Thesis Option)*:

- You must register for *"Candidacy 99100"* (0 credit) in your final semester of graduation.

2.2 Cooperative PhD Program

The Ph.D program of the Mechanical Engineering Department at IUPUI is a part of the Purdue University Ph.D. program. The procedures established in this handbook are based on the rules and guidelines defined in a cooperative agreement between: The Purdue School of Engineering and Technology, IUPUI and The School of Mechanical Engineering, Purdue University, West Lafayette on April 5, 2004.

This manual is intended to answer common questions Ph.D. students have concerning their program of study, Graduate School operations, the graduate program in Mechanical Engineering, and services provided by the Purdue School of Engineering and Technology (ET) Graduate Office. It provides information on registration procedures, setting up a plan of study, acceptable scholastic performance, thesis procedures, and various requirements that must be met to receive the Ph.D. degree.

Each admitted student at IUPUI is given a student identification number. Use that number to establish an OneStart account at http://onestart.iu.edu. The features of OneStart will let you access your university academic record, financial information, personal information, campus life and general information. You will need to refer to it often.

Special situations may certainly arise which are not addressed here. We welcome the opportunity to discuss these issues with you. Timing is often an important factor, and an early visit to the Graduate Advisor can sometimes save much effort and time for students and faculty alike.

In particular, PhD students who are initially registered as West Lafayette campus students must comply with requirements of the School of Mechanical Engineering, but must also register in a special student category at IUPUI in order to facilitate supervision by the major professor at IUPUI and to take courses at IUPUI.

2.2.1 Area Examinations Requirement

PhD students in the cooperative program must take their Area Examinations no later than the second semester of enrollment (excluding summer sessions) of graduate studies at Purdue. The student will be given two chances to pass the Area Examinations and must be enrolled in thesis hours in the semester they take their exams. In the first attempt, the student must take all three exams in the same semester. A student, unable to pass all the required Area Examinations after two attempts, will be dismissed from the PhD program. If desired, by the student and the Major Professor, the student may make a request to the Graduate Committee to change from the PhD to the Master's degree program.

2.2.2 Cooperative PhD Coursework

PhD coursework requires a minimum of 21 graduate credit hours beyond the Master's degree, 12 of which must be from coursework originating from the Purdue West Lafayette campus. A minimum of 90 graduate course and research credit hours (including at most 30 credit hours from the Master's degree) are required for graduation. At least nine credit hours (usually three courses) of the 90 credit hours must be in applied mathematics. Two of them must be from Math Department. The mathematics requirement may be partially or fully satisfied by courses taken during the MS Program.

2.2.3 Cooperative PhD Program Advisory Committee

The Advisory Committee consists of at least four members and must be co-chaired by one ME faculty member from IUPUI and one ME faculty member from the Purdue West Lafayette campus. These Co-chairs serve as the Major Professors who guide the student's thesis research. The Co-chairs should work together in guiding the student's thesis research. At least two members of the Advisory Committee (including a Co-chair) must be ME faculty at the Purdue West Lafayette campus. One committee member must be from a department/school outside of ME. This member can be from Purdue West Lafayette or IUPUI. All persons serving on the Advisory Committee of students must already be regular or special graduate faculty, i.e., certified by the Graduate School to serve on the committees of graduate students. Students also can include non-Purdue academics (faculty at other Universities), scientists at national labs, or researchers in industry on the Advisory Committee. These members require prior approval from the Graduate School in the form of a certification as special graduate faculty. In case a student and the Major Professors contemplate including such a member in the Advisory Committee, the Co-chairs should send a letter to the Graduate Chair requesting this with a clear justification for the specific expertise that the requested member brings to the research to be conducted by the student. An electronic version of the complete vita for the person being considered for Advisory Committee must be provided with this memo. This request must be submitted in one transaction. Do not ask the outside person to submit information directly to the Graduate Chair. This should be done by a regular ME professor.

2.2.4 Essential Actions for Completion of the Ph.D

First Year

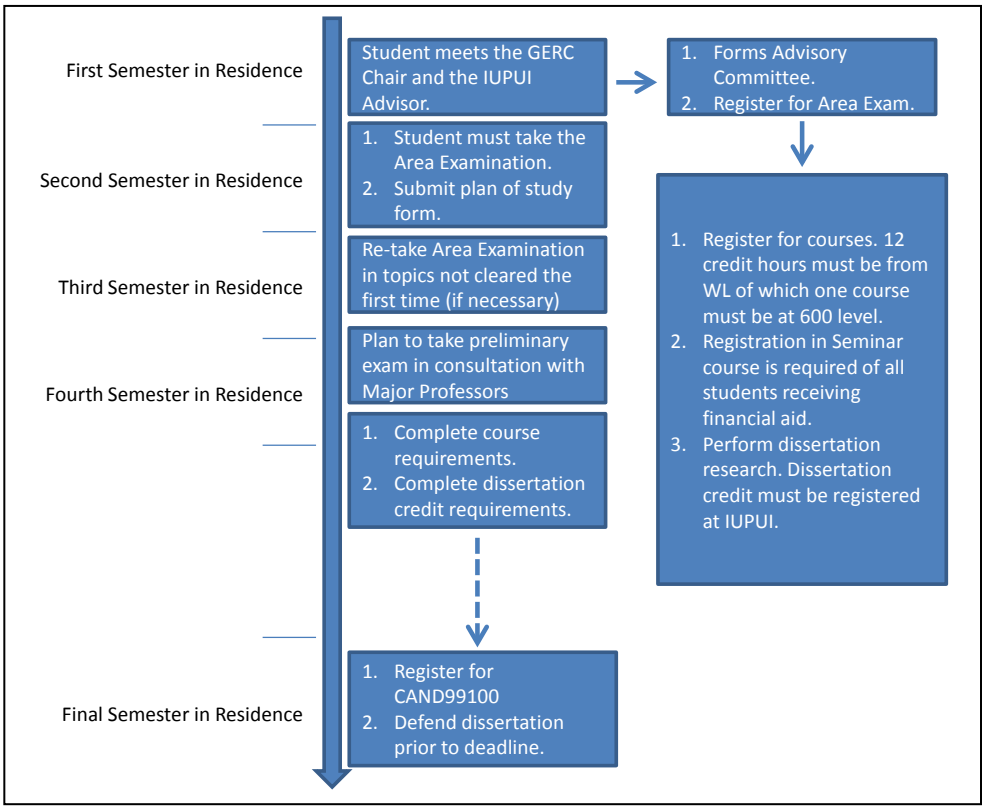
1. Meet with your Major Professor or temporary advisor, Chair of ME Graduate Education and Research Committee (GERC), to discuss course selection before registering.
2. Complete the registration process in the ET Graduate Office. Students with foreign language requirement using Option D should register for a foreign language course.

3. **Thoroughly review the PhD section of the Purdue University School of Mechanical Engineering Graduate Procedures Manual (latest update). You can locate this manual at this link: https://engineering.purdue.edu/ME/Academics/Graduate/currgrad.html.**
4. Choose your Advisory Committee.
5. Register for and successfully complete the Area Examinations before the end of one calendar year of residence in the Ph.D. Program.
6. Formalize a plan of study in consultation with your Major Professors. The POS should be submitted in the semester in which you successfully complete your area exams.
7. Complete the foreign language requirement, if necessary.
8. Take Preliminary Exams (enrolled in Ph.D. thesis hour).

Final Semester

1. Indicate your intention to graduate on your registration form to declare candidacy.
2. Submit a Change to the Plan of Study form to the ME GERC no later than the beginning of the final semester of graduate study, if needed.
3. Pick up a Candidate Packet with a list of deadlines for students from the ET Graduate Office.
4. Schedule the dissertation defense two weeks prior to the deadline for the defense.
5. Submit the first draft of your dissertation to your major professor well before the date of your defense.
6. Submit the ME Departmental Check-out Signature Form to the Graduate Office before leaving campus. Include a forwarding address when the form is submitted.

PhD Process by Semester



2.2.5 Foreign Language Requirements

At the option of the Major Professor and Advisory Committee, proficiency in a foreign language may be required. Your Major Professor will designate the language most appropriate for your program. The language chosen is usually German, Russian, Japanese, or French. The required foreign language is to be indicated on the Plan of Study. The method by which the language requirement is to be met shall also be stipulated on the Plan of Study.

Each student's Advisory Committee will specify in which of the following ways the student may satisfy the minimum language requirement by:

A. Transfer or satisfaction of the foreign language at some other graduate school.

B. Passing the fourth semester of the undergraduate course sequence in an acceptable language with at least a grade of "C" in the last course or the equivalent of this requirement by transfer from another institution.

C. Examination. The student's Advisory Committee will determine an appropriate examination in consultation with foreign language departments, consistent with Purdue policy. This examination may be repeated no more than twice

D. Course work. The student's Advisory Committee will determine appropriate course work to be taken from foreign language departments, consistent with Purdue policy. These courses may not be audited. Grades in these courses will not be counted in the student's grade index.

E. Taking the E.T.S. Graduate School Foreign Language Test and scoring 500 or better.

2.2.6 Plan of Study

Each Ph.D. student must file a Plan of Study before the end of the semester in which the Area Examinations are successfully completed (Section 2.2.11). Students failing to meet this requirement will not be permitted to complete their registration for the next semester.

The Plan of Study may be modified after it is filed. The draft Plan of Study must be submitted to the Major Professor, and after approval, the Graduate Coordinator will assist the student to prepare the final copy and to submit it for approval.

A Plan of Study consists of a group of courses in the student's "Primary Area" and other courses in "Related Areas." Courses on the Plan of Study must have a quantitative and technical content. Courses in the primary area should show a reasonably close relation to the core subject. For example, if your primary area is heat transfer, it might include courses in heat transfer, mass transfer, fluid mechanics, and thermodynamics. Courses in the primary area can also come from schools or departments other than Mechanical Engineering. Courses in related areas are outside your primary area but still contribute to your program. These courses may come from ME or from other schools or departments. As a special requirement, a minimum of four courses from each student’s plan of study (or eight courses for direct Ph.D. students) must have originated at West Lafayette. These may include courses offered through the Purdue EPE program.

Although there is no specific lecture credit hour requirement for the Ph.D., typical Plans of Study will include from 21 to 30 credit hours beyond the Master's degree; a minimum of ninety course and research credits (including the Master’s degree credits) is required for graduation. Your Major Professor may also feel that additional courses not included on the Plan of Study should be taken to broaden your background in a particular area. Only graduate level courses (500 or 600 numbers) may be listed on a Ph.D. Plan of Study. All Plans of Study must contain at least two semesters of ME 597 ME Graduate Seminar and a minimum of

nine hours of applied mathematics. (IUPUI Ph.D students are required to take the seminar course every semester when they receive financial aid.) At least six of these hours must be taken from the Mathematics Department and a minimum of one ME course (3 credit hours) must be at 6XXXX level. (This requirement may be partially or fully satisfied by courses taken as part of the M.S. program.) When completing the Plan of Study, students should choose from the following list for the Area of Specialization:

ACOUSTICS
APPLIED OPTICS
AUTOMATIC CONTROLS
AUTOMATION
BIOENGINEERING
COMBUSTION
DESIGN (CAD, ROBOTICS)
ENVIRONMENTAL CONTROL (HVAC&R)
FLUID MECHANICS
HEAT TRANSFER
MANUFACTURING AND MATERIALS PROCESSING
NOISE CONTROL AND VIBRATIONS
PROPULSION
THEORETICAL AND APPLIED MECHANICS
TRANSPORTATION

After Graduate School approval, the courses listed on the POS must be completed before certification for graduation can be granted.
Changes to the approved POS require approval of the Advisory Committee. This process may be used to change Advisory Committee members, to delete or add courses, or to change the area of specialization. Courses may not be removed from the POS after a grade has been received.

2.2.7 <u>Scholastic Requirements</u>
Requirements for completing the Ph.D. degree are:
• Successfully complete all courses on your approved Plan of Study.
• Pass the Area Examinations and Oral Preliminary Examination as specified by your Advisory Committee (Section 2.2.11-12).
• Complete the dissertation to the satisfaction of your Final Examining Committee.
• Accumulate ninety (90) credits in course work and research (See below).
In general, grades of A or B are expected from Ph.D. students. An occasional "C" in a 60000 level course or in a related area course will be acceptable, but the large majority of your courses must show A or B grades. Pass/Fail grades are not acceptable in fulfilling degree requirements.
A minimum of ninety credits is required for graduation. This includes both course and research credits, plus thirty credits allowed for a master's degree, if completed in an appropriate discipline. A minimum of four courses must originate at the West Lafayette campus, and a minimum of thirty credits must be earned by continuous residence at the Indianapolis or West Lafayette campuses. In fulfilling these requirements, a maximum of fifteen credit hours will be allowed from any one semester and a maximum of eight credits from a summer session.

Semester Grade Review: The GERC reviews graduate student performance each semester and sends warning letters to those Ph.D. students not maintaining a 3.0/4.0 grade point average index on their Plan of Study and/or failing to make successful progress in their research. The Plan of Study index for Ph.D. students is based on courses taken at Purdue which apply toward the Ph.D. and were not previously applied towards the Master's degree. The warning letter may set forth specific conditions to be met within a specified time period.

Unsatisfactory course work and/or research, if continued, may lead to dismissal from the Mechanical Engineering graduate program. **A student, who's Plan of Study index is below 2.75 after twelve semester**

hours of course work, will be automatically dropped from the program. Should the student's Advisory Committee advise the GERC of unsatisfactory performance on research, the student may be considered for dismissal at the end of any semester.

Dismissals: The GERC action on dismissals from the Mechanical Engineering graduate program resulting from failure to meet the index requirements will take place as soon as practical after the grade reports are received following the end of an academic term. The GERC determines the effective date of dismissal. Normally the official date of dismissal will be approximately three weeks after the decision, but in some cases it may be extended to the end of the term. Course registration will not be allowed after dismissal takes effect, and registration for the current term will be canceled if classes have already begun. It is understood that dismissal from the graduate program implies termination of any assistantship held by the student in the Dept. of Mechanical Engineering.

Appeal Process: If a student's Advisory Committee feels that special circumstances are involved, it may appeal a dismissal by making a written petition to the GERC. A student whose Advisory Committee does not support an appeal may petition the GERC directly.

An appeal will be successful only if evidence is presented to show that unusual circumstances were responsible for the student's poor performance and a reasonable chance exists for the student to successfully complete the program.

2.2.8. Area Examinations

Before a student becomes an official candidate for the Ph.D. degree, the Area Examinations and Preliminary Examinations must be passed. Ph.D. students pursuing their studies at IUPUI must take the Area Examinations at WL, subject to the same conditions and rules as WL students. An exam may be held simultaneously at IUPUI if a sufficient number of students appearing in a particular Area Examination are registered at IUPUI.
Responsibility and Authority: The responsibility and authority for the implementation of the Ph.D. Area Examinations rests with the Mechanical Engineering faculty at PUWL. Certain portions of this responsibility and associated authority are delegated to the Graduate Committee, WL, GERC, IUPUI, and/or the student's Advisory Committee.
Purpose: The Ph.D. Area Examinations exist to provide assurance that all Ph.D. candidates have sufficient knowledge of fundamental principles in selected areas of Mechanical Engineering. Accordingly, these procedures apply to all Ph.D. students, including those who do not have BS and/or MS degrees in Engineering.

Area Examinations: The student is expected to demonstrate a firm command of fundamental principles up to and including the Master's level in applied mathematics plus at least two of the following approved areas of Mechanical Engineering: (1) acoustics, (2) applied optics, (3) control, (4) design, (5) dynamics, (6) fluid mechanics, (7) heat and mass transfer, (8) solid mechanics, (9) thermodynamics.

Written examinations in these ten areas will be offered each semester, excluding the summer session. The student must take three Area Examinations during one semester, no earlier than the first semester of enrollment in the Ph.D. program and no later than the second semester of residency past receipt of the Master's degree. A request by the student for exception to these constraints must be in writing to his Advisory Committee and should clearly indicate the unusual and/or special circumstances justifying the request. If the student's Advisory Committee approves, the approved request must be transmitted to the

Chairman of the GERC in time for appropriate action. Such a request will require approval by the GERC in addition to the student's Advisory Committee.

The Area Examination Committee at WL will prepare, administer and grade the Area Examinations, then report the results to both the Major Professor and the Graduate Committee at WL. The Area Examination Committee will give grades of pass, fail, or conditional pass. The grade of "pass" will require no remedial action on the part of the student. The grade of "conditional pass" will be associated with a recommendation for remedial work, but not re-examination. Since these written examinations are meant to guide the student's Advisory Committee, any areas of weakness indicating a need for remedial work should receive immediate action. The remedial work specified by the student's Advisory Committee, either course work or individual study or both, should be reported in writing to the Chairman of the Graduate Committee, WL with signatures from all members of the Advisory Committee.

A student who fails any of the three examinations must retake that examination the following semester. Furthermore, a student will be terminated by the GERC if any examination is failed twice. An appeal of this termination may be made via written petition to the Graduate Committee at WL by the student's Advisory Committee. The petition must explain the reasons the student should be allowed to continue. If the petition is denied, the student termination from the program becomes permanent.

Each semester the GERC will report to the Mechanical Engineering faculty on student performance and actions taken by the various Advisory Committees concerning the Area Examinations.

2.2.9 Oral Preliminary Examinations

The Oral Preliminary Examination should be completed within one year after successful completion of the Area Examinations. The responsibility and authority for the Ph.D. Oral Preliminary Examination rests entirely with the student's Advisory Committee. The Oral Preliminary Examination exists to provide assurance that all Ph.D. candidates have in-depth knowledge of subject matter closely related to the student's research topic. In the Oral Preliminary Examination the student should:

- Demonstrate competency with fundamentals in areas that required remedial action as a result of the Area Examinations.
- Demonstrate in-depth knowledge of subject matter related to the thesis topic
- Present a written research proposal containing a reasonable research plan for the thesis. The formal request for an appointment of the Preliminary Examination Committee must be received by the Graduate School at least two weeks prior to the date of the Preliminary Exam. Form 8 is available on the Graduate School web page and in the ME Office for this request.

2.2.10 Final Examination and Committee

At least two terms must elapse and be devoted to research between the Preliminary and Final Examinations. The Final Examining Committee consists of a minimum of four members and is appointed at the request of the student's Major Professor. The same guidelines (Section 7) for choosing the Advisory Committee apply. The Examining Committee is normally the same as the student's Advisory Committee and is responsible for reading the student's dissertation and conducting the Final Examination. A copy of the dissertation should be submitted to the Examining Committee and the Graduate Chairman at least two weeks before the examination (see Section 13- E, F). Final Oral Exam Presentations are open to all interested parties. Therefore, the WL Graduate School requires that the date, time and room for the examination be registered at least two weeks in advance by way of Form 8. (Room location needs to accommodate at least 20 people.) At the time the exam is scheduled, the student will send an electronic copy of the abstract to the ME Graduate Committee at WL and the GERC for distribution to the ME faculty and graduate students.

2.2.11 Final Exam Registration, Dissertation Approval and Dissertation Deposit

A. A Manual for the Preparation of Graduate Dissertation is available in the ET Graduate Office and on the Graduate School web page. IMPORTANT NOTE: Type "Department of Mechanical Engineering, Indianapolis" at the beginning of the abstract, after the name(s) of the major professor(s). Express appreciation for any financial support in the "Acknowledgments" section.

B. NO LATER THAN TWO WEEKS BEFORE THE PH.D. FINAL EXAMINATION DATE, submit Form 8 to the ME Graduate Office – Request for Appointment of Examining Committee, which registers the date, time and location of the defense. The Form 8 is available on the Graduate School website under Publications, Forms, and Reports.

When the exam registration (Form 8) is approved by the Graduate School at WL, it will be returned to the ME Graduate Office with the following additional form:

The Graduate School Form 9 – Dissertation Acceptance (Signature) Page. Pick up Form 9 from the ME Graduate Office with a copy of the examination registration approval from the Graduate School. Bind the original Form 9/Signature page into the Library Thesis Office Deposit Copy and bind copies of the form in the dissertation copies (see H 1-3 below).

On Form 9: Type the names of the individual examining committee members under the appropriate signature lines on the dissertation signature page. Type "School of Mechanical Engineering" under the line for the Department Head signature on the thesis signature page.

C. If a thesis is to be classified as "confidential," obtain Form 15 – Request for Confidentiality of Thesis from the ET Graduate Office. Complete and submit to the Graduate Chairman at the same time as the dissertation for final approval.

Consult your major professor if the confidentiality of the dissertation is uncertain.

D. NO LATER THAN TWO WEEKS BEFORE THE FINAL EXAMINATION, submit an unbound copy of the dissertation to the ET Graduate Office for format approval. This submission should be as far ahead of the deadline as possible.

E. NO LATER THAN TWO WEEKS BEFORE THE FINAL EXAMINATION, submit a copy of the dissertation to the Examining Committee.

F. After the Final Examination, revise the dissertation according to the requirements of the Examining Committee and the format review.

G. Submit the revised dissertation to the ME GERC for final approval to the Graduate Chair. The Graduate Chair will require three days minimum to read the dissertation and may require additional changes before final approval. After final approval an electronic copy will be filed and stored at IUPUI and WL. Bound copies are no longer required.

H. Upon notification, pick up the dissertation copies from the ET Graduate Office. If no additional corrections are required and final approval is given, deposit the dissertation copies as follows:

1. The ME Graduate Office will retain the ME Departmental Copy for electronic deposit. (If the thesis has been classified as "confidential," submit an abstract to the ME Graduate Office.)
2. An electronic copy of theses classified as "confidential" are retained by the Thesis and Dissertation Deposit and Approval Office.

I. Publication: It is expected that Ph.D. thesis should lead to journal publication. The Major Professor will Insist that the student prepare a paper in suitable form for publication from the results of his/her research. The student should check with the Major Professor early to be sure of the requirements. A student will not be certified for the degree until the publication requirements are met.

2.2.12 Time Limit for Ph.D. Programs

Graduate study, particularly at the Ph.D. level, is less structured than undergraduate study and the time needed for a particular student to complete a program depends on many factors. Nevertheless, a student who is actively pursuing a degree should be able to complete the course work and dissertation in a reasonable length of time beyond which the relevance and originality of his work becomes suspect. Accordingly, the Dept. of Mechanical Engineering has adopted the following policy that is used by the School of Mechanical Engineering, WL.

The total elapsed time for completion of a Ph.D. in the School of Mechanical Engineering shall be no more than eight calendar years from date of entry into the Ph.D. program to final approval of the Ph.D. thesis by the Examining Committee. In the case of students in residence continuing beyond the Master's degree, the date of entry is defined as the start of the semester following receipt of the Master's degree. This policy applies to all students including those who register for research in absentia.

The GERC may grant an extension of the eight-year time limit upon recommendation of the student's Advisory Committee. However, such an extension will require re-approval of the Plan of Study and retaking of the Area and Preliminary Examinations.

2.3 Graduate Certificate Programs

The graduate certificate programs at the Department of Mechanical Engineering are designed for working professionals who want to enhance their skills in certain technical areas, but are unable to commit to a full master's degree program. The ME department has developed four graduate certificate programs based on the industry needs in the central Indiana area and beyond. Currently the following four graduate certificate programs are available:

1. Computer Aided Mechanical Engineering
2. Energy Management and Assessment
3. Hybrid Electric Vehicle Technology
4. Systems Engineering

2.3.1 Graduate Certificate in Computer Aided Mechanical Engineering

Many engineers today are required to routinely solve complex problems in fluid mechanics, heat and mass transfer, structural mechanics, vibrations, and acoustics, using computational tools such as solid modelers, computer-aided design and computer-aided manufacturing (CAD/CAM) systems, system simulators, and finite element simulation. The proficiency in using such systems enables engineers to model complex engineering design and to analyze problems competently and efficiently.

The graduate certificate program in computer-aided mechanical engineering is designed specifically to:

- Train engineers to become professionally certified in the computer-aided mechanical engineering field without formally pursuing a graduate degree.
- Provide a set of integrated courses on the fundamentals of finite element analysis and CAD/CAM, and
- Enable students completing the certificate program to understand the theoretical foundations of modeling and analysis of various mechanical components and to conduct performance analysis.

The program's emphasis will be on fundamentals of analysis and design, which will be supplemented by learning commercially available computer codes such as ProEngineer, Ansys, StarCD, Patran, and Abaqus.

What are the requirements to complete the graduate certificate program?

To earn a graduate certificate you must complete 12 credit hours of graduate coursework, equivalent to four graduate courses, and obtain at least a "B" average over all courses applicable towards the certificate. The minimum grade acceptable is "C". Courses with a grade of "C-" or less must be retaken to count towards the certificate. All requirements for the certificate must be completed within three years of admission.

Specialty Areas

There are two specialty areas for the certificate program. You may select one of the two following specialties:

- Computations of Mechanical Systems
- Computations of Fluid and Thermal Systems

Required and Elective Courses

There are two required and two elective courses for each specialty area.

The required courses for both specialties are:

1. ME 54600 CAD/CAM: Theory and Applications
2. ME 55100 Finite Element Analysis

Computations of Mechanical Systems specialty area

Select two electives from the following:

ME 55000 Advanced Stress Analysis
ME 55800 Composite Materials
ME 56100 Optimum Design: Theory and Practice

ME 56300 Mechanical Vibrations
ME 56900 Mechanical Behavior of Materials
ME 59700 Advanced Mechanical Engineering Projects I
ME 65100 Advanced Applications of the Finite Element Method

Computations of Fluid and Thermal Systems specialty area

Select two electives from the following:
ME 50500 Intermediate Heat Transfer
ME 50900 Intermediate Fluid Mechanics
ME 52500 Combustion
ME 58100 Numerical Heat Transfer and Fluid Flow
ME 59700 Advanced Mechanical Engineering Projects I
ME 61400 Computational Fluid Dynamics
ME 65100 Advanced Applications of the Finite Element Method

2.3.2 Graduate Certificate in Energy Management and Assessment

The potential benefits of energy efficiency are tremendous. According to the National Action Plan for Energy Efficiency, more than half of expected growth in demand for electricity and natural gas can be avoided over the next 15 years. Globally, new energy efficiency standard, ISO 50001, has been established and implemented. Accordingly, the Department of Energy (DOE) has developed Superior Energy Performance (SEP) criteria. The companies certified by the ISO 50001 may be granted with the SEP status, which will give the companies tremendous advantages to do business globally. The implementation of this new standard and concept requires a workforce with an expertise in energy management and efficiency. Experts in energy efficiency will be greatly needed for improving energy efficiency, energy auditing, and SEP certification.

This certificate program is designed to address industry's increased needs for engineers who have expertise in energy management and efficiency. It will prepare today's engineers to be competitive in taking on the new challenges of energy efficiency facing industry. The purpose of this new graduate-certificate program in mechanical engineering is to enable engineers to become certified in energy assessment without formally pursuing a graduate degree.

The certificate is a Purdue University certificate that would appear on a student’s transcript upon completion.

Who should join the program?

Mechanical engineering graduate students and practicing engineers who joined the workforce after received an engineering bachelor’s degree with working experience in energy systems would be interested in obtaining training on these new technologies. Therefore, to be eligible, an applicant needs to be an existing graduate student in our Mechanical Engineering Programs, or the fourth year students in our combined BS and MS program, or an engineer in industry. If the engineer has training from disciplines other than Mechanical Engineering, working experience on energy systems is required. One year experience on energy systems will meet this requirement.

What are the requirements to complete the graduate certificate program?

1. Total requirement: 12 credit hours

2. GPA requirements
   a. Minimum overall GPA
   Successful completion of the certificate requires at least a B average over all courses counting towards the certificate.

   b. Minimum grade:
   Courses with a grade of C- or less must be taken again to count towards the certificate. The minimum grade that will be accepted in any single course is C. For transfer credits, only the courses taken that result in a grade of B or better may be transferred for this certificate program.

3. Curriculum
   There are four courses specifically designed for this certificate program:

- ME 50101 Industrial Energy Assessment: Tools and Applications
- ME 50102 Energy Assessment of Industrial Processes
- ME 50103 Energy Management Principles
- ME 59700 Assessment projects

2.3.3 Graduate Certificate in Hybrid Electric Vehicle Technology

Development of the next generation of fuel-efficient and environmentally-responsible advanced electric drive vehicles is one of the nation's top priorities. The State of Indiana plays a major role in the design, development, and manufacturing of these types of vehicles, such as electric vehicle (EV), hybrid electric vehicle (HEV) or plugin hybrid electric vehicle (PHEV), or their components. This is a very technically intensive and competitive field that requires multidisciplinary approaches. Expertise in the HEV technology will be greatly needed to meet the demands in the hybrid vehicle sector of the automotive industry.

This certificate program is designed to address industry's increased needs for engineers having expertise in EV/HEV/PHEV. It will prepare today's engineers to be competitive in taking on the new challenges facing the industry so that the companies in automotive sector can compete globally.

The certificate is a Purdue University certificate that would appear on a student's transcript upon completion.

Who should join the program?

Practicing engineers who joined the workforce after bachelor's degree and graduate students would be interested in obtaining training on these new technologies in order for them to be current in solving complex hybrid drive related problems. The proposed certificate program will provide them with the necessary technical skills.

What are the requirements to complete the graduate certificate program?

1. Total requirement: 12 credit hours

2. GPA requirements
a. Minimum overall GPA

Successful completion of the certificate requires at least a B average over all courses counting towards the certificate.

b. Minimum grade:

Courses with a grade of C- or less must be taken again to count towards the certificate. The minimum grade that will be accepted in any single course is C. For transfer credits, only the courses taken that result in a grade of B or better may be transferred for this certificate program.

3. Curriculum

There are a number of courses in both the primary and related areas. The certificate requires selection of at least two courses in the primary area and the remaining two courses in the related area.

The primary area courses consist of:

- ECE 59500 Advanced Hybrid and Electric Vehicle Systems and Control
- ECE 61000 Energy Conversion (required for students in ECE)
- ME 50104 Powertrain Integration
- ME 50105 Hybrid and Electric Transportation
- ME 59700 Dynamics and Simulation of Hybrid-electric vehicles
- ME 59700 Energy Storage Devices and Systems

The related courses include:

- ECE 58000 Optimization Methods for Systems and Control
- ECE 59500 Introduction to Smart Grid Theory and Implementation
- ME 50400 / ECE 59500 Automotive Control
- ME 59700 Renewable Energy and Fuel Cells

2.3.4 Graduate Certificate in Systems Engineering

Systems Engineering is a multi-disciplinary field that aims at integrating the engineering and management functions in the development and creation of a product, process, or service. The definition given by International Council on Systems Engineering (INCOSE) is a good description of what SE encompasses: “Systems Engineering is concerned with the overall process of defining, developing, operating, maintaining, and ultimately replacing quality systems. While other engineering disciplines concentrate on the details of individual aspects of a system (electronics, mechanics, ergonometrics, aerodynamics, software, etc.), systems engineering is concerned with the integration of all of these aspects into a coherent and effective system. Systems engineers concentrate their efforts on the aspects of the engineering process (requirements definition, top-level functional designs, project management, life cycle cost analysis, etc.) that serve to organize and coordinate other engineering activities. The systems engineer is the primary interface between management, customers, suppliers, and specialty engineers in the systems development process.” Based on this description, all engineering and manufacturing firms, and many other complex institutions, need Systems Engineering to improve productivity and quality as well as reduction in overall cost.

This certificate program is designed to address industry's increased needs for engineers who have expertise in Systems Engineering. It will prepare today's engineers to be competitive in taking on the new challenges facing the industry so that our companies can compete globally.

The certificate is a Purdue University certificate that would appear on a student's transcript upon completion.

Who should join the program?

Practicing engineers who joined the workforce after bachelor's degree and graduate students would be interested in obtaining training on this area in order for them to be current in solving demanding systems engineering problems. The proposed certificate program will provide them with the required technical skills.

What are the requirements to complete the graduate certificate program?

1. Total requirement: 12 credit hours

2. GPA requirements

a. Minimum overall GPA
Successful completion of the certificate requires at least a B average over all courses counting toward the certificate.

b. Minimum grade:
Courses with a grade of C- or less must be taken again to count towards the certificate. The minimum grade that will be accepted in any single course is C. For transfer credits, only the courses taken that result in a grade of B or better may be transferred for this certificate program.

3. Curriculum

There are two courses in the primary area and a number of courses in the related area. The certificate requires completion of both courses in the primary area and the remaining two courses in the related area.

The primary area courses consist of:

- ME 59700 Introduction to Systems Engineering Principles
- ME 59700 Systems and Specialty Engineering

The related courses include:

- ECE 51500 Software Engineering Methodology
- ECE 53600 Introduction to Computational Intelligence
- ECE 56500 Computer Architecture
- ECE 58000 Optimization Methods for Systems and Control
- ECE 60200 Lumped System Theory
- ECE 68000 Modern Automatic Control
- ME 57500 Theory and Design of Control Systems
- ME 58100 Numerical Methods in Mechanical Engineering
- ME 59700 Advanced Mechanical Engineering Projects I
- ME 59700 Design Optimization Methods
- STAT 51100 Statistical Methods I
- STAT 51200 Applied Regression Analysis

- STAT 51400 Designs of Experiments

2.3.5 Admission to Graduate Certificate Program

Admission requirements for the certificate program

In order to be eligible for a certificate program, the students must have a bachelor's degree from an accredited institution in an area which provides the necessary mathematical preparation for an engineering degree with a minimum undergraduate GPA of 3.0 out of 4.0. A conditional admission may be offered for applicants not meeting this criterion who have superior overall credentials. Applicants with non-engineering degrees, including mathematics, physical sciences, and engineering technology, may be required to take undergraduate mechanical engineering courses before admission to the program. Appropriate work experience also will be taken into account in making decisions about admission. Students will be required to submit a statement of interest and three letters of recommendation. All applicants are required to take the GRE (Graduate Record Examination) and report the scores to graduate office, including domestic applicants. A minimum TOEFL score of 550 is required for paper-based test, 213 for computer-based test, or 79 for internet-based test (with the following test sections' minima: Writing: 18; Speaking: 18; Listening: 14; Reading: 19). For the GRE, scores of at least 155 is preferred on the quantitative section and 3.0 on the analytical writing section.

Students admitted directly to the Purdue University graduate program can be considered for this certificate program, provided the student formally applies for the certificate program and receives admission. Courses completed under certificate program are not automatically transferred to a graduate degree program, unless the student makes a petition to the GERC in respective departments. A student already enrolled in a graduate degree program may complete the certificate irrespective of his/her major so long as the requirements of the certificate are fulfilled.

On-line Course Options

The majority of the graduate courses are offered in late afternoon hours to accommodate the needs of part-time students. In addition, a number of course lectures may be available in both live lecture and online via video streaming modes.

Certificate course transfer toward a graduate degree

All four courses may be used toward the requirements for a graduate degree in mechanical engineering, if one wishes to pursue a MS degree program.

Past graduate courses transfer rules for the certificate program

If you have already earned credits for one or more of the equivalent courses from another institution or another certificate program, you may request to transfer up to a maximum of three credits of these courses toward this certificate. A maximum of 6 equivalent credit hours taken prior to admission to the certificate program, including 3 credit hours taken from another institution, may be counted towards the certificate. The rest of the courses must be completed at IUPUI within a three-year period from the time of admission. Any waivers or substitutions require approval. No undergraduate courses can be applied to this certificate program.

Applying for admission to the certificate program

To apply for admission, contact Valerie Lim Diemer, Director for Graduate Engineering Programs by telephone at (317) 278-4961 or by email: wvlim@iupui.edu .

3. ENGLISH LANGUAGE PROFICIENCY REQUIREMENTS FOR INTERNATIONAL STUDENTS

English as a Second Language (ESL) Requirements:

All graduate degree-seeking international students whose English is not their first language must take the English Placement Test (English language proficiency examination) administered by the IUPUI English as a Second Language (ESL) Program before they are permitted to enroll for classes after admission.

Students tested with English language deficiencies are required to take all of the remedial courses determined by the ESL placements and receive passing grades on those courses. There is one exception to the requirement: students placed into English G013 *"Reading/Writing for Academic Purposes"* may replace G013 with TCM 460 "*Engineering Communication in Academic Context"*. Students must begin taking the first ESL course in the first semester of enrolment and complete the requirements in sequence before graduation. Students with incomplete ESL requirements will **not** be approved for graduation.

There may be unusual circumstances that merit a student to retake the ESL placement test. The IUPUI English Placement policy allows one retake of the ESL examination, to be taken, preferably, within the first semester. If the test scores show no significant improvement, the results of the previous test will stand and students will be required to take the assigned courses.

SPEAK Test for International Graduate Teaching Assistants:

All non-native speakers of English must be tested for their oral English proficiency before they are assigned duties that involve direct student contact (teaching assistants, laboratory assistants and tutors). Students must take and passed the SPEAK Test, a nationally standardized test, before they are given an academic appointment. Students who fail to obtain the required minimum scores will need to take an ESL course, G020 "*Communication Skills for International Teaching Assistants"* (3 credit) and retake the test before they can accept their appointments.

4. RESIDENCY AND LOAD

Semester Load. To qualify as a full-time student, you must satisfy one of the following criteria:

- Be enrolled for at least eight (8) credit hours; or
- Hold a *Student Academic Appointment* as a research or teaching assistantship and be enrolled for at least six (6) credit hours.

All international students must be enrolled full-time to maintain their visa status.

Residency Requirements. The total number of hours of academic credit used to satisfy residency requirements consists of all course credit hours that appear on the plan of study, taken at IUPUI while enrolled in a graduate degree program, and passed with grades of "C" or better; and thesis/ dissertation research hours that appear on the transcript. At least eighteen (18) of the total credit hours used to satisfy degree requirements must be earned in residence on the IUPUI campus, where the degree is to be granted.

5. REGISTRATION

Registration. The registration period begins approximately October 21 for the Spring semester and March 21 for the Summer Sessions and Fall Semester. All current ME graduate students are encouraged to register online through the *OneStart* student information system during the open registration period (October-November and March-April). Note that late registration incurs a penalty fee. We encourage you to select your courses and register early, as department's decisions to cancel courses that have low enrollment may affect your course options.

Dropping/Adding Courses. Be aware of procedures, late fee charges, and refunds deadlines for dropping and adding of courses. Students may drop/add courses online during the open registration period. However, once the open registration period ends, students must use a Drop/Add form to change a course. Information on procedures and deadlines are available on the *Registrar's website* at http://registrar.iupui.edu/

6. MINIMUM GRADE REQUIREMENTS

Good Academic Standing. The Department of Mechanical Engineering maintains the following minimum standards to be in "good academic standing" in the Master's degree program.

To be in good academic standing, a Master's graduate student must maintain a cumulative grade point index of at least 3.00 out of 4.00 over the courses on his/her Plan of Study. A graduate student who is not in good standing at the end of the semester is automatically placed on "*academic checklist*" and is provided with a "warning letter". Registration is restricted when students are placed on academic checklist. Students on academic checklist are required to meet with their advisors and complete the form "Request for Temporary Checklist Clearance" for the checklist to be temporarily released for registration that semester. Should the student's cumulative grade point index remain below 3.00 at the end of the succeeding semester or summer session, he/she will be placed on probation. A student on probation may not be permitted to register for further graduate courses, pending academic review and approval by the ME Graduate Committee.

The cumulative grade point index is calculated using the courses that are on the Plan of Study. If a course is taken more than once while the student is enrolled as a graduate student, only the most recent grade received in the course will be used in computing the grade point index. Transfer courses are not included in the computation of the cumulative grade point average. No grade of "D' or "F" is allowed for a course that is on the approved Plan of Study. *All Master's students must achieve a final cumulative grade point index of 3.00 or higher for courses that are on the Plan of Study.* Any course on the Plan of Study that carries a grade of "D" or "F" must be repeated. In the event of a

deficiency in the cumulative grade point index, a course may be repeated but only the most recent grade received will be used in computing the index.

7. CHANGES IN ACADEMIC PROGRAM

It is recognized that as a student's academic program progresses there may arise conditions that make it necessary to change the program and to make changes to the Master's Plan of Study. Indeed such changes, when based on appropriate academic reasons, may be acceptable. However, there are regulations to be observed for the change. Specifically,

- A course may *not* be removed from an approved Plan of Study once the course has been taken and a grade of "D" or lower is received. This is a Graduate School rule.
- Any change to a Plan of Study requires approval of the student's Advisory Committee and the ME Graduate Chair.

Change to the Master's Plan of Study. To make changes to an approved Plan of Study, Graduate School Form 13 *"Request for Change to the Plan of Study"* has to be completed and filed with the Purdue Graduate School. This form is also used to request for a change of major professor and/or other advisory committee members, or for a change of the Master's degree option. The form is available from the School's Graduate Engineering Programs Office or from the website at: http://www.engr.iupui.edu/sites/graduateprograms/current-students/index.php

8. INACTIVE ACADEMIC STATUS

Students who do not enroll in classes for three (3) consecutive academic sessions, including summer session, will be automatically placed in ***inactive academic status***.

Students who have been placed in inactive academic status are required to submit a new graduate application for re-admission to the program before they are permitted to enroll again. Completing and submitting a new application is a formal procedure to reactivate inactive academic status. All other supporting application materials are *not required* for re-admission.

Students should wait for their applications for re-admission to be officially approved by the Purdue University Graduate School before enrolling for classes. Registration activities that take place while in "inactive academic status" and before a new application for re-admission had been officially approved by the Graduate School are considered invalid registrations and will not count toward graduate credit.

9. PETITIONS TO THE GRADUATE COMMITTEE

All graduate students have the right to petition the Mechanical Engineering GERC for exceptions to an existing rule, if they feel that circumstances are sufficiently unusual to warrant special considerations. Such petitions should be delivered in writing to the Chair of the GERC and must include the approval (or disapproval) of each member of the student's advisory committee.

APPENDIX A

UNDERGRADUATE COURSE REQUIREMENTS FOR NON-ENGINEERING MAJORS

Graduates from recognized non-engineering programs in science and technology, may apply for admission to the graduate program in Mechanical Engineering leading to a Master of Science in Mechanical Engineering (MSME) degree upon completion of the requirements specified below for the different majors. Course requirements may vary depending on the specialty area chosen. For admission to the program, the student must maintain a grade point average of 3.00/4.00 or higher in all of the required courses.

Physics Majors (except BPMME Program) – Three Courses

***Solid Mechanics and Computer-Aided Engineering*:** Two junior or higher level ME courses (each with three or more credit hours) approved by the Graduate Committee, and ME46200 – Capstone Design.

***Fluid and Thermal Sciences*:** Two junior or higher level ME courses (each with three or more credit hours), and one of the following: ME46200 – Engineering Design, ME31000 – Fluid Mechanics or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: ME 33000 – Modeling and Analysis of Dynamic Systems, ME 34000 – Instrumentation and Measurement Systems, and ME 48200 – Control System Analysis and Design.

***Materials*:** Two junior or higher level ME courses (each with three or more credit hours) approved by the Graduate Committee, and ME 34400 – Engineering Materials.

Energy: One junior or higher level ME courses (three or more credit hours), ME31000 – Fluid Mechanics, and ME 31400 – Heat and Mass Transfer

***Biomechanics*:** Two junior or higher level ME courses (each with three or more credit hours) approved by the Graduate Committee, and ME46200 – Capstone Design.

Mathematics Majors – Four Courses

***Solid Mechanics and Computer-Aided Engineering*:** ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, and ME 46200 – Engineering Design.

***Fluid and Thermal Sciences*:** ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 31000 – Fluid Mechanics, and one of the following: ME46200 – Engineering Design, ME 31400 Heat and Mass Transfer or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: ME 20000 – Thermodynamics I, ME 33000 – Modeling and

Analysis of Dynamic Systems, ME 34000 – Instrumentation and Measurement Systems, and ME 48200 – Control System Analysis and Design.

Materials: ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, and ME 34400 – Engineering Materials.

Energy*:* ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 31000 – Fluid Mechanics, and ME 31400 Heat and Mass Transfer.

Biomechanics: ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, and ME 46200 – Engineering Design.

Other Science and Technology Majors – Seven Courses

Solid Mechanics and Computer-Aided Engineering**:** Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, ME 27400 Basic Mechanics II, and ME 46200 – Capstone Design.

Fluid and Thermal Sciences**:** Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 31000 Fluid Mechanics, ME 31400 Heat and Mass Transfer, and one of the following: ME46200 – Capstone Design, ME41400 – Thermal-Fluid Systems Design, or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 27000 – Basic Mechanics I, ME 27400 Basic Mechanics II , ME 33000 – Modeling and Analysis of Dynamic Systems, ME 34000 – Instrumentation and Measurement Systems, and ME 48200 – Control System Analysis and Design.

Materials: Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, ME 34400 Engineering Materials, and ME 46200 – Capstone Design.

Energy*:* Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 31000 Fluid Mechanics, ME 31400 Heat and Mass Transfer, and one of the following: ME46200 – Capstone Design.

Biomechanics: Math 26100 – Multivariate Calculus, Math 26600 – Linear Algebra and Differential Equations, ME 20000 – Thermodynamics I, ME 27000 – Basic Mechanics I, ME 27200 – Mechanics of Materials, ME 27400 Basic Mechanics II, and ME 46200 – Capstone Design.

Other Majors –*Courses to be determined by the graduate committee on a case by case basis.*

APPENDIX B

Requirements for ME 59700 Mechanical Engineering Projects I

Approval. To be eligible to register for a 3 credits independent project course (ME 597 Mechanical Engineering Projects I), a graduate student must first receive the approval of a graduate faculty member who will be the advisor for the project and instructor of record for the course.

Proposal. It is normally recommended that the student submit a written proposal to the faculty member for the project to be undertaken. The proposal should include the following sections: Abstract (no more than one page), Problem Description and Significance, Review of Existing Work, Methodology to be Followed, Deliverables, Timeline, References.

Timely Progress. It is recommended that student should meet with the faculty advisor at least biweekly, and should write monthly progress reports on the project. If the project is not complete at the end of the semester, the student will receive an Incomplete (I) grade, which will automatically convert to a Failure (F), if not completed and graded in one year.

Completion. The requirements for successful completion of the course include a formal final report and a successful oral presentation of the work to a jury of faculty. The report should follow a format similar to Master's thesis. For successful completion of this course, the student should be able to:

1. Clearly identify the problem investigated
2. Demonstrate creativity
3. Demonstrate the use of a sound methodology
4. Use sound engineering principles
5. Demonstrate completeness of project
6. Demonstrate effectiveness in writing
7. Demonstrate effectiveness in presenting orally

Multiple Projects. A student may not register for more than 3 credits of ME 597 ME Projects I In one semester, unless it is with different faculty advisors and on different topics. In this case, a clear differentiation should be made between the two projects, and separate reports and presentations are required. A student may register for up to 3 credits of ME 597 ME Projects I in each of two successive semesters (total up to 6 credits), to complete a relatively larger project in more depth, and submit one report with one presentation at the end of the second semester. Equivalence to these requirements for unusual cases, such as rare transfers from thesis research, will be determined on an individual case basis.

APPENDIX C

CANDIDACY REGISTRATION REQUIREMENTS

Candidacy registration is required of all graduate students in the final semester of their plan of study. The Graduate School has three options to choose from in order to certify awarding of the degree (graduation) at the end of a fall, spring or summer term.

CAND 99100 is zero credit (0) and zero cost ($0)

All Thesis and Non-Thesis Graduate Students:

- Student is enrolled in at least 1 credit of fee-bearing coursework, i.e. regular course(s), directed project, or thesis credit(s).

**Best value with least effort.*

CAND 99200 is zero credit (0) with a fee of $125

Thesis graduate students:

- Completed all degree requirements
- Passed the final oral examination
- HAVE NOT YET completed a thesis deposit

FAILURE to successfully deposit the thesis with the Graduate School within the first 7 weeks of the term will require:

1. Withdrawal from CAND 99200
2. Late registration into CAND 99100
3. Late registration into at least 1 thesis research credit
4. Payment of all late registration fees and credit hour costs

Non-Thesis graduate students:

- Completed all degree requirements
- HAVE NOT YET completed the Directed Project ***OR*** (not both)
- HAVE NOT YET resolved one or more grades of Incomplete (**I**)

FAILURE to successfully resolve all Incomplete (**I**) grades by the end of the term will require:

1. A grade of "F" be assigned for CAND 99200
2. Enrollment in CAND 99100 the subsequent term
3. Enrollment in a *fee-bearing* course the subsequent term
4. Resolution of all remaining grades of Incomplete (**I**)

**Ok value and minimum effort "Degree Only Registration."*

CAND 99300 is zero credit (0) with a fee of $125

Thesis graduate students:

- Completed all degree requirements
- HAVE NOT YET passed the final oral examination
- HAVE NOT YET completed a thesis deposit

FAILURE to successfully deposit the thesis with the Graduate School within the first 7 weeks of the term will require:

1. Withdrawal from CAND 99300
2. Late registration into CAND 99100
3. Late registration into at least 1 thesis research credit
4. Payment of all late registration fees and credit hour costs

**Least value and most effort. Exam only registration.*

Non-Thesis graduate students:

- Completed all degree requirements
- HAVE NOT YET completed the Directed Project ***AND***
- HAVE NOT YET resolved one or more grades of Incomplete (**I**)

FAILURE to successfully resolve all Incomplete (**I**) grades by the end of the term will require:

1. A grade of "F" be assigned for CAND 99300
2. Enrollment in CAND 99100 the subsequent term
3. Enrollment in a *fee-bearing* course the subsequent term
4. Resolution of all remaining grades of Incomplete (**I**)

APPENDIX D

ME GRADUATE FACULTY IDENTIFIERS

Graduate Faculty Identifiers must be listed on the Plan of Study following each Committee member's signature. The following is a list of Graduate Faculty Identifiers:

ABELLA,JOSEPH,F	X0595
ANWAR,SOHEL	X0460
BADAR,M.,AFFAN	X0526
BELL III,WILLIS,V.	X0557
CHEN,JIE	X0229
CHEN,RONGRONG	X0511
EL-MOUNAYRI,HAZIM A.	X0362
FU, YONGZHU	X0746
JONES,ALAN,S.	X0481
KATONA,THOMAS R.	X0337
KOPONEN,TIMOTHY,M	X0596
NALIM,M. RAZI	X0361
NEMATOLLAHI,KHOSROW	X0505
RAZBAN,ALI	X0689
RYU, JONG	
SMITH,CRAWFORD,FRED	X0571
SURBER,DAN,C.	X0545
TOVAR,ANDRES	X0670
TSEREGOUNIS,SPYROS I.	X0466
WASFY,TAMER,M.	X0657
XIE,JIAN	X0554
YU,HUIDAN (WHITNEY)	X0671
ZHANG,JING	X0672
ZHU,LIKUN	X0627

An up to date listing of ME graduate faculty identifiers can be found on Oncourse GRAD_SITE.

APPENDIX E

GRADUATE SCHOOL FORMS

All graduate program-related forms may be obtained from the School's Graduate Engineering Programs Office (ET 215) or directly from the internet by accessing the Graduate Program web pages on the ME Department's website: http://www.engr.iupui.edu/me/fgrad.html. There are at least six graduate school forms associated with the Master's programs. The forms (samples are attached in the following pages in the handbook) are as follow:

1. Graduate School Form 6: Request for Master's Degree Advisory Committee and Plan of Study Approval
2. Graduate School Form 7: Report of Master's Examining Committee
3. Graduate School Form 8: Request for Appointment of Examining Committee
4. Graduate School Form 9: Thesis Acceptance
5. Graduate School Form 13: Request for Change to the Plan of Study
6. Graduate School Form 19: Master's Thesis Agreement

Note: Forms 8, 9, and 19 are only for students with thesis option.

Form 7 is required from **all** thesis and non-thesis students for graduation.

APPENDIX F

RECOMMENDED DISTRIBUTION OF COURSES IN THE DUAL BS-MS ME PROGRAM

First Semester

ENGR 19500	Introduction to Engineering Profession	1
ENGR 19600	Introduction to Engineering	3
CHEM C10500	Chemical Science I	3
COMM R11000	Fundamentals of Speech Communication	3
MATH 16300	Integrated Calculus and Analytic Geometry	5
	Total	**15**

Second Semester

ENGR 19700	Introduction to Programming Concepts	3
ENG W13100	Elementary Composition I	3
MATH 16400	Integrated Calculus and Analytic Geometry II	5
PHYS 15200	Mechanics	4
Science Elective		3
	Total	**18**

Third Semester

ME 20000	Thermodynamics I	3
ME 27000	Basic Mechanics I	3
ECON E20100	Introduction to Microeconomics	3
MATH 26100	Multivariate Calculus	4
PHYS 25100	Heat, Electricity, and Optics	5
	Total	**18**

Fourth Semester

ME 26200	Mechanical Design I	3
ME 27400	Basic Mechanics II	3
ECE 20100	Linear Circuit Analysis I	3
ECE 20700	Electronic Measurement Techniques	1
MATH 26200	Linear Algebra and Differential Equations	4
Gen Ed Elective		3
	Total	**17**

Fifth Semester

ME 27200	Mechanics of Materials	4
ME 31000	Fluid Mechanics	4
ME 33000	Modeling and Analysis of Dynamic Systems	3
ME 34400	Introduction to Engineering Materials	3
Gen Ed Elective		3
	Total	**17**

Sixth Semester

ME 31400	Heat and Mass Transfer	4
ME 34000	Dynamic Systems and Measurements	3
Gen. Ed Elective		3

ME 37200	Mechanical Design II	4
Stat. Elective	Restricted to Probability and Statistics courses	3
	Total	**17**

Seventh Semester

ME 48200	Control Systems Analysis and Design	3
TCM 36000	Communication and Engineering Practice	2
ME Elective (ME 5XXXX)	ME Primary/Related Area Course	3
Math (MATH 5XXXX)	ME Primary/Related Area Course	3
Gen Ed Elective		3
	Total	**14**

Eighth Semester

ME 40100	Engineering Ethics and Professionalism	1
ME 41400	Thermal-Fluid Systems Design	3
ME 46200	Engineering Design	4
ME Elective (ME 5XXXX)	ME Primary/Related Area Course	3
Free Elective (ME 5XXXX or MATH 5XXXX)	ME Primary/Related Area Course	3
	Total	**14**

Summer

ME 69800 (thesis option) or ME 5XXXX or ME 59700	Thesis or ME Primary/Related Area Course	3
	Total	**3**

Ninth Semester

ME 5XXXX	ME Primary Area Course	3
ME 5XXXX	ME Related Area Course	3
ME 69800 (thesis option) or ME 5XXXX	Thesis or ME Primary Area Course	3
	Total	**9**

Tenth Semester

ME 5XXXX	ME Related Area Course	3
ME 69800 (thesis option) or ME 5XXXX	Thesis or ME Related Area Course	3
	Total	**6**

Total: 148 credit hours

Notes:

1. Students who want to do thesis or an independent project are advised to take *ME 69800 MS Thesis Research* or *ME 59700 Mechanical Engineering Project I* during the summer following the eighth semester to reduce their work load in the last semester.

2. Depending on the thesis topic, the thesis options may take longer than five years.

3. Two math courses are required as the related area courses. At least one of these courses must be a graduate mathematics course offered by the mathematics department, the other may a graduate course with strong math content from ME or another department, as approved by the graduate committee.

4. It is to be noted that few regular undergraduates take 500 level courses as ME electives. However, students in the BSMS program will be required to take 500 level courses as ME Technical electives.

5. Taking a general education course during the summers of second and third years may reduce the course load in their senior year; hence increase chances of success in the semesters when graduate courses will be taken.

APPENDIX G

SAMPLE DISTRIBUTION OF COURSES IN THE BPMME PROGRAM

B.S. in Physics/M.S. in Mechanical Engineering Sample Program (Minimum 142 cr. required)

FRESHMAN YEAR	
First Semester	
CHEM C10500 Principles of Chemistry I	3
CHEM C12500 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI I12000 Windows on Science	1
ENG W13100 Elementary Composition I	3
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM C10600 Principles of Chemistry II	3
CHEM C12600 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
Second composition course	3
Total	**16**
Summer Term	
Two courses from Lists H, S, or C	6
Total	**6**
SOPHOMORE YEAR	
Third Semester	
PHYS 25100 Heat, Electricity, and Optics	5
MATH 26100 Multivariate Calculus	4
CSCI Course	4
HIST H11400 History of Western Civilization II	3
Total	**16**
Fourth Semester	
PHYS 33000 Intermediate Electricity and Magnetism	3
PHYS 34200 Modern Physics	3
PHYS 35300 Electronics Laboratory	2
MATH 26600 Ordinary Differential Equations	3
COMM R11000 Fundamentals of Speech Communication	3
Elective	3
Total	**17**
Summer Term	
One course from Lists H, S, or C	3
Total	**3**
JUNIOR YEAR	

Fifth Semester

PHYS 31000 Intermediate Mechanics	4
ME 27200 Mechanics of Materials	4
ME 33000 Modeling and Analysis of Dynamic Systems	3
CAND 99100 Candidate for Graduation (with B.S. in Physics)	0
Physical or biological science elective	5
Total	**16**

Sixth Semester

PHYS 41600 Thermal Physics	3
ME 46200 Engineering Design	4
MATH Course	3
Physical or biological science elective	3
General education elective	3
Total	**16**

SENIOR YEAR

Seventh Semester

PHYS 55000 Introduction to Quantum Mechanics	3
ME 500-level ME primary area course	3
Elective: 400 or 500 level Engineering or Physics	3
MATH 53700 Applied Mathematics for Sci. & Eng. I	3
Total	**12**

Eighth Semester

ME 500-level ME primary area course	3
Elective: 400 or 500 level Engineering or Physics	3
MATH 52800 Advanced Mathematics for Eng. & Phys. II	3
Total	**9**

FIFTH YEAR

Ninth Semester

Science elective: Graduate PHYS or MATH course	3
ME 500-level ME primary area course	3
ME 500-level ME primary area course	3
Total	**9**

Tenth Semester

ME 69800 (thesis option) or	
ME 500-level ME primary/related area course	3
ME 69800 (thesis option) or	
ME 500-level ME primary/related area course	3
CAND 99100 Candidate for Graduation (with M.S. in ME)	0
Total	**6**

Science electives (5th and 6th semesters) may be replaced by engineering courses with departmental approval. Consult the *Department of Mechanical Engineering Master's Program Handbook* for ME primary and related courses.

IUPUI School of Science – B.S. in Physics / M.S. in Mechanical Engineering

FIRST-YEAR EXPERIENCE

Windows on Science SCI I120 1 cr._____
(With permission another Learning Community may be substituted. Waived only for students who transfer in more than 18 credit hours.)

AREA I - COMMUNICATION

A. English Composition - 6 credits total
(grade of C or better in each course)

English Composition ENG W131 3 cr._____

Choose from: ENG W132, W150, W231, W250, W290, W331 or W350, TCM 320 3 cr._____

B. Speech Communication - 3 credits total

Speech Communication COMM R110 3 cr._____

AREA II - FOREIGN LANGUAGE - *not required*

AREA III - GENERAL REQUIREMENTS

A. Humanities, Social Sciences, & Comparative World Cultures
15 credits total

History of Western Civilization II H114 3 cr._____

One course each from Lists H, S, and C (9 cr.):

_____ _____ _____
(See School of Science Course List)

B. Junior/Senior Integrator – *replaced*

Replace with general educ. course (3 cr.) _____

C. Physical and Biological Sciences – 4 lecture courses
minimum 16 credits total

Principles of Chemistry I CHEM C105 (3 cr.) _____
Experimental Chemistry I CHEM C125 (2 cr.) _____
Principles of Chemistry II CHEM C106 (3 cr.) _____
Experimental Chemistry II CHEM C126 (2 cr.) _____

Two physical, biological science or engineering courses (e.g. EE 201, ME 200) approved by the Dept. of Physics:

_____ _____

D. Mathematics and Computer Course Requirements
minimum 24 credits total

Analytic Geom. & Calc. I MATH 165 (4 cr.) _____
Analytic Geom. & Calc. II MATH 166 (4 cr.) _____
Multidimensional Math. MATH 171 (3 cr.) _____
Multivariate Calculus MATH 261 (4 cr.) _____
Ordinary Differential Eqs. MATH 266 (3 cr.) _____
One 3-credit course beyond MATH 266 (as approved by the Dept. of Physics) _____

One course in Computer Science (3-4 cr.) _____
(CSCI 230, N305, N331, or higher)

AREA IV - MAJOR COURSES

A. Physics – 24 credits total

Mechanics PHYS 152 (4 cr.) _____
Heat, Electricity, & Optics PHYS 251 (5 cr.) _____
Intermediate Mechanics PHYS 310 (4 cr.) _____
Intermediate E & M PHYS 330 (3 cr.) _____
Modern Physics PHYS 342 (3 cr.) _____
Electronics Laboratory PHYS 353 (2 cr.) _____
Thermal Physics PHYS 416 (3 cr.) _____

B. Mechanical Engineering – 11 credits total

Mechanics of Materials ME 272 (4 cr.) _____
Modeling Dynamic Systems ME 330 (3 cr.) _____
Engineering Design ME 462 (4 cr.) _____

C. Advanced Courses – 36 credits total

Note: Students must apply for admission into the Master's program in Mechanical Engineering during their Junior year in order to be able to enroll in 500-level or higher courses.

Applied Mathematics I MATH 537 (3 cr.) _____
Advanced Mathematics II MATH 528 (3 cr.) _____
Intro to Quantum Mech. PHYS 550 (3 cr.) _____

Four 500-level ME primary area courses:
(Consult the *ME Master's Program Handbook*.)

_____ _____ _____ _____

Two 400 or 500 level PHYS or ME electives:

_____ _____

One 500-level or higher PHYS or MATH: _____

Minimum of 6 credits from the two following courses:

Master's Thesis Option ME 698 (3 cr.) _____
500-level ME primary /related course (3 cr.) _____

AREA V – ELECTIVES

_____ _____ _____

A minimum of 142 credits must be completed for graduation with both the B.S. in Physics and M.S. in Mech. Engineering.

Revised 8/2009

Notes:

1. ME 59700 – Mechanical Engineering Projects I could be taken instead of ME 69800 – Master's Research Thesis

2. Science electives (5th and 6th semesters) could be replaced by engineering courses with approval.

3. Students should take Physics 55000 and one other physics or math course, e.g., Physics 51000 (Physical Mechanics) or Physics 60000 (Methods of Theoretical Physics) during the last two years.

Note that P60000 could be taken in lieu of Math 53800 in the BPMME program. Alternatively, P51000 or P60000 could be taken as the Science elective in the tenth semester.

4. The ME primary and related area courses are listed in Section 2 above.

5. Taking a general education course during the summers of second and third years may reduce the course load in the senior year, hence increase chances of success in the semesters when graduate courses will be taken.

6. Depending on the thesis topic, the thesis options may take longer than five years.

7. This sample distribution of courses contains the minimum number of undergraduate ME courses required in the BPMME program; additional preparatory courses may be recommended by a student's graduate advisor if they are deemed prerequisite fspecific graduate courses.

APPENDIX H

FINAL ORAL EXAMINATION (THESIS DEFENSE)

This appendix describes the procedures or scheduling and completing the final oral examination (thesis defense). The final exam must be scheduled three weeks prior to the examination date by filing the Graduate School Form 8 *"Request for Appointment of Examining Committee"*. At the time of scheduling, the student should provide the Graduate Coordinator in the Graduate Programs Office, ET 215, with a hardcopy of his/her thesis abstract. The abstract together with time and location of your final examination will be distributed to all ME faculty members and will also be posted on the graduate bulletin board.

PREPARATION OF RESEARCH THESIS AND FINAL ORAL EXAMINATION (DEFENSE)

1. Download the *"A Manual for the Preparation of Graduate Theses"* from the following Purdue University Graduate School website: http://www.purdue.edu/GradSchool/Publications/publications.html. The manual provides specific instructions on organizing, formatting, and binding the thesis.

2. Before proceeding to write your thesis, you must make an appointment to meet with the Graduate Engineering Coordinator in ET 215 for a briefing on thesis formatting requirements and preparing for thesis defense. You are strongly advised to consult with your major professor to review your plans for preparing the thesis.

3. At least three weeks prior to the defense, deliver a draft copy of the thesis to members of your examining committee.

4. Necessary paperwork and final oral exam must be completed by their deadlines. Be sure to have a copy of the *"Graduation Deadlines"* for the semester you intend to graduate. A copy of the Graduation Deadlines can be obtained from the Graduate Programs Office (ET 215) or the ME department (SL 260).

5. On the day of the final exam, your major professor should pick up your exam forms from the School's Graduate Programs Office (ET 215). Two exam forms need to be signed by your examining committee: Graduate School Form 7 *"Report of Master's Examining Committee"* and Graduate School Form 9 *"Thesis Acceptance"*. Immediately after your oral exam, Form 7 must be signed and returned by your major professor to the Graduate Coordinator in the Graduate Programs Office, ET 215. Keep Form 9 *"Thesis Acceptance"* until you have made all necessary revisions to your thesis requested by your examining committee and obtain all the required signatures on the form.

6. After you have completed all revisions the Graduate Engineering Coordinator must thoroughly check and formally approved the thesis formatting before the thesis is deposited. Allow sufficient time to make any changes necessary to ensure that the thesis is in compliance with format requirements of the Purdue Graduate School.

7. Obtain all necessary signatures on the Thesis Acceptance form and include the original form on the front of the thesis to be electronically filed.

APPENDIX I

ASSESSMENT OF PROJECT AND THESIS WORK

The rubrics used for assessment of independent projects and thesis together with the expected outcomes in related works are given in this Appendix for information of students. The faculty members will evaluate the success of such works using these rubrics. It is important for the students to keep these under consideration during their studies.

E.1 ASSESSMENT RUBRIC FOR ME 59700 AND ME 69700 MECHANICAL ENGINEERING PROJECTS COURSES

1. **Problem Identification:** The quality of the written description of the problem investigated

   1 2 3 4 5

2. **Creativity:** The degree of creativity demonstrated

   1 2 3 4 5

3. **Methodology:** The effectiveness of the methodology used

   1 2 3 4 5

4. **Use of Engineering Principles:** The soundness of the engineering principles used and understood

   1 2 3 4 5

5. **Completeness:** The degree of completeness of the project work and quality of the methods used

   1 2 3 4 5

6. **Effectiveness of the Written Report:** The overall effectiveness of the written report

   1 2 3 4 5

7. **Effectiveness of the Oral Presentation:** The overall effectiveness of the student's oral presentation of his/her work

   1 2 3 4 5

Notes:

1. All items will be scored from 1 through 5, with 1 = Poor, 2 = Fair, 3= Good, 4 = Very good, 5 = Excellent). No partial scores will be granted.

2. Scoring will be conducted by the Advisory Committee after the presentation and the final version of the report.

3. Additional members may be invited for scoring at the discretion of the Committee.

4. The anonymity of the student and the supervisor(s) will be maintained in the surveys.

E.2 EXPECTED OUTCOMES OF ME 59700 AND ME 69700 MECHANICAL ENGINEERING PROJECTS COURSES

For successful completion of this course, the students should be able to:

1. Clearly identify the problem investigated
2. Demonstrate creativity
3. Demonstrate the use of a sound methodology
4. Use sound engineering principles
5. Demonstrate completeness of project
6. Demonstrate effectiveness in writing
7. Demonstrate effectiveness in presenting orally

E.3 ASSESSMENT RUBRIC FOR ME 69800 M.S. THESIS RESEARCH COURSE

1. **Problem Identification:** The quality of the written description of the problem investigated

   1 2 3 4 5

2. **Literature Survey:** The quality of the literature survey conducted for the thesis or project

   1 2 3 4 5

3. **Creativity:** The degree which creativity was demonstrated in the solution of the problem

   1 2 3 4 5

4. **Use of Engineering Principles:** The soundness of the engineering principles used and understood

   1 2 3 4 5

5. **Research Quality:** The quality of the investigative research demonstrated by the student

   1 2 3 4 5

6. **Collection, Analysis, and Interpretation of the Data:** The completeness and quality of the data collection, analysis and interpretation of the data

   1 2 3 4 5

7. **Completeness of the Research:** The degree of completeness of the research work

   1 2 3 4 5

8. **Effectiveness of the Written Report:** The overall effectiveness of the written report

   1 2 3 4 5

9. **Effectiveness of the Oral Presentation:** The overall effectiveness of the student's oral presentation of his/her work

   1 2 3 4 5

Notes:

1. All items will be scored from 1 through 5, with 1 = Poor, 2 = Fair, 3= Good, 4 = Very good, 5 = Excellent). No partial scores will be granted.
2. Scoring will be conducted by the Advisory Committee after the presentation and the final version of the report.
3. Additional members may be invited for scoring at the discretion of the Committee.

E.4 EXPECTED OUTCOMES FOR ME 69800 M.S. THESIS RESEARCH COURSE

For successful completion of this course, the students should be able to:

1. Clearly identify the problem investigated
2. Conduct comprehensive literature survey
3. Demonstrate creativity
4. Use sound engineering principles
5. Conduct high quality research

6. Competently collect, analyze and interpret the data
7. Demonstrate completeness in research
8. Demonstrate effectiveness in writing
9. Demonstrate effectiveness in presenting orally