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

DEPARTMENT OF MECHANICAL ENGINEERING

Master's Program Handbook

2008 - 2010

10/9/2009

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1. INTRODUCTION

This handbook describes the requirements and regulations for the Master's 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 4) and in meeting the necessary degree requirements for completing the program and graduation. We invite you to visit the Chair of the ME Graduate Program in the Department of Mechanical Engineering (SL 260) and the Purdue School of Engineering and Technology's Graduate Coordinator (Graduate Programs Office, SL 164) 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) to stay informed on program matters as well as to participate in the discussions of topics and issues. Important announcements are also posted on the bulletin board outside the ME Office (SL 260).

The Department 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.

Administration of your program is shared between the ME Department (SL 260; http://www.engr.iupui.edu/me/), the School of Engineering and Technology's Graduate Programs Office (SL 164; http://www.engr.iupui.edu/gradprogs/index.html), the Purdue University Graduate School (West Lafayette campus; http://www.gradschool.purdue.edu), and the IUPUI Graduate Office (Union Building, Rm. 207; 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 at IUPUI (Education and Social Work Building, ES Rm. 2126) regarding visas and immigration regulations. The Graduate Coordinator in the Graduate Programs Office (SL 164) can direct you to the appropriate office for specific issues.

New Student Information. 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. One of the first questions to address as a new student is how to be properly registered for graduate classes. You may begin this process as soon as you have received the official notification of admission from the Purdue Graduate School.

1. To be prepared for registration you should have information about the program, its requirements, and the courses. Along with this Master's 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.htm.**

   Faculty Research Expertise. **http://www.engr.iupui.edu/me/ffaculty.shtml** This website provides a list of faculty members with their respective research interests.

   Copies of these materials can also be obtained from the School of Engineering and Technology's Graduate Programs Office, in SL 164.

2. Study these documents and then consult with your advisor or the ME Graduate Chair. 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 deciding, in particular, which courses you should take in 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 Graduate Committee. Students who are employed as research assistants on a particular research project will be assigned a major professor providing the assistantship. If thesis option is selected, the major professor will also be the thesis advisor. The Graduate Chair is the academic advisor for non-thesis students. The major professor will be chair of the student's advisory committee (see Section 3)

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 (SL 164) for assistance with registration, or you may register directly via the web-based student information system *OneStart*.

Registration for subsequent semesters is covered in Section 10 of the handbook.

2. MASTER'S DEGREE PROGRAMS

The Department of Mechanical Engineering offers three Master's degree programs. 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 options are:

- *Master of Science in Mechanical Engineering (M.S.M.E.*)

  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 (M.S.E.)*

  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 (M.S.)*

  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. Highly achieving undergraduate students in the IUPUI Mechanical Engineering and Physics programs, and other designated programs, may apply for admission to one of the Master's programs while still in those BS 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 BS-MS and the BPMME 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 both the TOEFL and the GRE exams. Applicants for a fellowship or scholarship, graduates of non-ABET-accredited US programs, and graduates of all non-US institutions are required to take the GRE (Graduate Record Examination). GRE scores are recommended for other 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 650 is preferred on the quantitative section and 4.0 on the analytical writing section

Areas of Concentration

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

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

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. The Fluid and Thermal Sciences area includes study of fluid mechanics, heat transfer, thermodynamics, combustion, energy systems, thermal design, and computational fluid dynamics. 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 Mechatronics and Controls area includes study of mechanical systems, electro-mechanical systems, control theory, micro-controllers, sensors, and actuators. 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. 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 elements of physics, electrochemistry and materials science.

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 698)

(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

Thesis Option - MSE:

(1) Nine (9) credit hours of research thesis (ME 698)

(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 course can be counted as related if approved by the advisory committee.

(4) Six (6) credit hours of mathematics or mathematics related courses

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

Thesis Option - MS:

(1) Nine (9) credit hours of research thesis (ME 698)

(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 course can be counted as related if approved by the advisory committee.

(4) Six (6) credit hours of mathematics or mathematics related courses

Note: "Satisfactory" or "Fail" (S/F) is assigned as a final grade for ME 698 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 597 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

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 597 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

(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 597 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

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

Solid Mechanics & Computer-Aided Engineering concentration area:

ME 546 CAD/CAM – Theory and Applications
ME 550 Advanced Stress Analysis
ME 551 Finite Element Analysis
ME 558 Composite Materials
ME 560 Kinematics
ME 562 Advanced Dynamics
ME 563 Mechanical Vibrations
ME 569 Mechanical Behavior of Materials

Fluid and Thermal Sciences concentration area:

ME 500 Thermodynamics
ME 505 Heat and Mass Transfer
ME 509 Intermediate Fluid Mechanics
ME 510 Gas Dynamics
ME 525 Combustion
ME 597 Topics: Principles of Turbomachinery
ME 597 Topics: Introduction to Tribology
ME 551 Finite Element Analysis
ME 614 Computational Fluid Dynamics

Biomechanics concentration area: Primary area courses are a combination of courses in the Solid Mechanics and the Fluid/Thermal Sciences areas, as well as additional courses in the Biomedical Engineering field, such as:

ME 597/BME 59500 Skeletal Biomechanics
BME 601 Principles of Biomedical Engineering
BME 602 Principles of Biomedical Engineering

Mechantronics and Controls concentration area:

ME 546 CAD/CAM Theory and Applications
ME 551 Finite Element Analysis
ME 563 Mechanical Vibrations
ME 597 Topics: Analysis and Design of Robotic Manipulators
ME 504 Topics: Automotive Control
ME 597 Topics: Electromechanical Systems and Applied Mechatronics
ME 597 Power Train Integration

ECE 554 Electronic Instrumentation and Control Circuits
ECE 580 Optimization Methods for Systems and Control
ECE 602 Lumped System Theory
ECE 680 Modern Automatic Control
ECE 685 Introduction to Robust Control

Materials specialty area:

ME 505 Heat and Mass Transfer
ME 542 Introduction to Renewable Energy
ME 550 Advanced Stress Analysis
ME 558 Composite Materials
ME 569 Mechanical Behavior of Materials
ME 597 Introduction to Nanotechnology
ME 597t Micromechanics of Materials

Energy specialty area:

ME 500 Thermodynamics
ME 505 Heat and Mass Transfer
ME 509 Intermediate Fluid Mechanics

ME 542 Introduction to Renewable Energy
ME 597 Introduction to Nanotechnology

ME 525 Combustion
ME 597 Electrochemistry for Engineering

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 597 Mechanical Engineering Projects I (for non-thesis option only)
ME 697 Mechanical Engineering Projects II (for non-thesis option only)

Additional related area courses are:

MSE 547	Introduction to Surface Science
MSE 597E	Materials and Devices for Solid-State Energy Conversion
MSE 576	Corrosion
MSE 510	Microstructural Characterization Techniques
ECE 595G	Materials and Devices for Solid-State Energy Conversion
MSE 597E	Materials and Devices for Solid-State Energy Conversion
ECE 595G MSE 547	Materials and Devices for Solid-State Energy Conversion Introduction to Surface Science
ECE 538	Digital Signal Processing I
ECE 629	Introduction to Neural Networks
ECE 595	Topics: Introduction to Computational Intelligence
ECE 595	Topics: Parallel Processing Theory
ECE 595	Topics: Electromechanical Systems and Applied Mechatronics
ECE 600	Random Variables
ECE 608	Computational Models and Systems
PHYS 510	Physical Mechanics
PHYS 522	Coherent Optics and Quantum Electronics
PHYS 545	Solid State Physics
PHYS 550	Introduction to Quantum Mechanics
PHYS 600	Mathematical Methods in Physics
CHEM 542	Inorganic Chemistry
CHEM 575	Intermediate Physical Chemistry
CSCI 520	Computational Methods in Analysis
CSCI 549	Intelligent Systems
CSCI 552	Advanced Graphics and Visualization
CSCI 580	Algorithm Design and Implementation
CSCI 614	Numerical Solution of Ordinary Differential Equations
CSCI 615	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 537	Applied Mathematics for Scientists and Engineers I
MATH 528	Advanced Mathematics for Engineering and Physics II
MATH 510	Vector Calculus
MATH 511	Linear Algebra with Applications
MATH 523	Introduction to Partial Differential Equations
MATH 578	Mathematical Modeling of Physical Systems

Courses with strong mathematics content are:

ME 551	Finite Element Analysis
ME 552	Advanced Applications of Finite Element Methods
ME 581	Numerical Methods in Mechanical Engineering
ME 614	Computational Fluid Dynamics
EE 580	Tpcs: Optimization Methods for Systems and Control
EE 600	Random Variables
PHYS 550	Introduction to Quantum Mechanics
PHYS 600	Mathematical Methods in Physics

Note: MATH 537 and MATH 528 are the preferred math courses. The Graduate Committee must be consulted for other math related courses.

Graduate Seminar

All students with Research Assistantship, Teaching Assistantship, or Fellowship awards must in each semester of appointment, enroll for:

ME 597 Topics: ME Seminar

3. MASTER'S ADVISORY COMMITTEE

All students must have a Master's Advisory Committee consisting of at least three 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 examinations on the Master's thesis. During the first semester of enrollment, the student shall select a Major Professor who will serve as the 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 in 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 must be established by the beginning of the second semester of enrollment. The Advisory Committee, as agreed by the Major Professor and the student, shall be presented to the Dean of the 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 12) any changes to the Advisory Committee would require a change to the Plan of Study.

4. 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 5 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 ME graduate committee chair. A maximum of 12 credit hours earned before enrollment in the Master's program may be transferred toward the Master's degree. Undergraduate level courses taken at other universities shall *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 the ME Graduate Chair. 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.

5. PREPARATION AND FILING OF MASTER'S PLANS OF STUDY

Contact the Coordinator for Graduate Programs in SL 164 for assistance in preparing the Master's plan of study. The Coordinator must review a draft copy of your plan of study. You

may obtain the Master's Plan of Study from the School's Graduate Programs Office (SL 164) or from the web at: http://www.engr.iupui.edu/gradprogs/gradForms.shtml. The form must be typed and can be done so directly on the electronic document. See Figure 1, a sample plan of study.

Graduate School Form 6 (Revised 2/90) **PURDUE UNIVERSITY** Please type)

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

Pg.___of___Pgs.

1. NAME OF STUDENT First Name Last Name Student ID No. Your ID No. Date Today's Date

2. DEPARTMENT Mechanical Engineering Dept. Code E25 Date Degree Expected m/y

Degree Title Master of Science in Mechanical Engineering Degree Code 49 [ ] Thesis Option [X] Nonthesis Option

3. AREA OF SPECIALIZATION (if any) SOLID MECHANICS Research Area

4. COURSES					5. METHOD OF ESTABLISHING CREDIT			DATE COMPLETED OR TO BE COMPLETED
Area	OFFICIAL TITLE ABBREVIATION	Subject Abbr.	Course No.	Cr. Hours	Regular Regis.	Non-Degree Regis.	Other or Transfer From	
P	ADVANCED STRESS ANALYSIS	ME	550	3	X			mm/yy
P	FINITE ELEMENT ANALYSIS	ME	551	3	X			mm/yy
P	MECHANICAL BEHAVIOR OF MATERIALS.	ME	563	3	X			mm/yy
P	TPCS: MECHANICS OF COMPOSITE MATERIALS	ME	597	3	X			mm/yy
R	THERMODYNAMICS	ME	500	3	X			mm/yy
R	HEAT AND MASS TRANSFER	ME	505	3	X			mm/yy
R	INTERMEDIATE FLUID MECHANICS	ME	509	3	X			mm/yy
R	MECHANICAL ENGINEERING PROJECTS	ME	697	3	X			mm/yy
R	APPLIED MATHEMATICS FOR SCIENTISTS AND ENGINEERS I	MATH	537	3	X			mm/yy
R	ADV MATHEMATICS FOR ENGINEERING AND PHYSICS II	MATH	528	3	X			mm/yy

Figure 1. A Sample Plan of Study

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 option/s you wish to pursue. Select courses that meet the degree requirements, and are appropriate for your area and interest. If possible, check that the courses you need will be offered at a time when you wish to take them.

2. Prepare a draft of your plan of study. Label "P" and "R" for the primary area courses and related area courses respectively.

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.

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
69	Master of Science in Mechanical Engineering	Non-Thesis
70	Master of Science in Mechanical Engineering	Thesis
53	Master of Science in Engineering	Non-Thesis
54	Master of Science in Engineering	Thesis
21	Master of Science	Non-Thesis
22	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 597) must start with TPCS, followed by the title.

4. Courses transferred from other schools should be listed on the plan of study (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 course that is an undergraduate excess on the POS, the course must be declared 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 698) should not be listed on the plan of study.

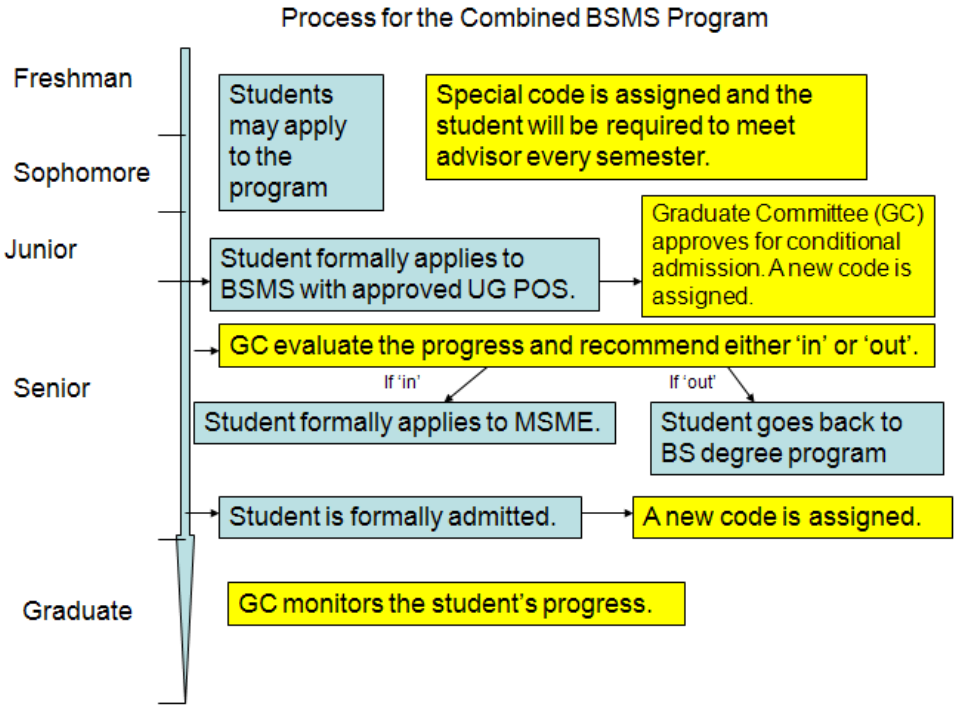
6. COMBINED BS-MS PROGRAM

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 130 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 148 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 Graduate Committee 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. On the other hand, a semester-by-semester recommended distribution of the courses is given in Appendix E.



Combined BSME/MSME Program

Program Milestones, Actions and Criteria

Category	Action (students)	Action (department)	Criteria	Status
Cumulative Credits < 85 credits	• 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. • New code (**BSME1**) is assigned to the student and advisory hold will be imposed. • Student is mandatory to meet advisor every semester. • Faculty advisor monitors the student's GPA and provides counseling on semester basis.		
85 ≤ Cumulative Credits < 130	• Apply to the graduate program with o Graduate application form o Statement of purpose o One letter of recommendation • Take ME5XX courses in the place of ME electives and free elective • Prepare undergraduate Plan of Study in the 7th semester	• Department prepares graduate application form. • Graduate Education and Research Committee (GERC) evaluates the application. • Code for the conditionally admitted student changes (**BSME2**) and advisory hold will still be imposed. • Student is mandatory to meet advisor every semester. • GERC monitors the student's GPA and provides counseling on semester basis.	• Degree GPA ≥ 3.2 • Good supporting document	• Conditional admission
Cumulative Credits ≥ 117 (with at least two ME5XX courses taken)	• Prepare graduate Plan of Study after receiving official admission and no later than the 9th semester	• GERC evaluates the application and sends approved applications to WL Graduate School • Code for the students who are admitted changes (**MSME3**) • Faculty advisor and GERC monitor the student's GPA and provide counseling on semester basis	• Degree GPA ≥ 3.0 • All grades of graduate level course are "B" or better	• **Admitted** if at least 4 graduate courses completed, each with a minimum B • **Conditionally admitted** if number of completed graduate courses with a minimum B (each) is less than 4.
Last semester	Apply for graduation	Department awards both BSME and MSME degrees	**Graduate** GPA ≥ 3.0	

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 Graduate Committee, because of not meeting the minimum grade requirements, the student can receive the BSME upon completion of all the requirements for that degree.

7. BPMME PROGRAM

This program 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 Graduate Committee. The ME Graduate Committee may review conditionally admitted students at any stage and advise against formal application if progress is unsatisfactory. An MS (ME) plan of study must be filed before the expected semester of graduation. Semester-by-semester sample distribution of courses is given provided in Appendix F.

If a student withdraws from the program, or if the student's performance is deemed by the ME Graduate Committee as unsatisfactory due to below minimum grade requirements, the student may receive only the BS (Physics) degree upon completion of all the requirements for that degree.

8. 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, graders, and tutors). Students must take and passed the SPEAK Test, a nationally standardized test before the students are given an academic appointment. Students who failed to obtain the required minimum scores will need to take an ESL course, G020 "*Communication Skills for International Teaching Assistants"* (3 crds) and take the test again before they can accept their appointments.

9. RESIDENCY AND LOAD

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

- Be enrolled for eight (8) credit hours; or
- Hold a *Student Academic Appointment* as a research or teaching assistantship and be registered 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 the master's degree program, and passed with grades of "C" or better; and 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.

10. REGISTRATION

Registration. The registration period normally begins about October 21 for the Spring semester and about March 21 for the Summer Session and Fall Semester. Keep a look out for announcements on registration as these dates approach. 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/

11. 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 in 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.

12. 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 (SL 164) or from the website at: http://www.engr.iupui.edu/gradprogs/gradForms.shtml.

13. 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.

14. PETITIONS TO THE GRADUATE COMMITTEE

All graduate students have the right to petition the Mechanical Engineering Graduate Committee 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 Graduate Committee and must include the approval (or disapproval) of each member of the student's advisory committee.

15. MASTER'S 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 about the courses you are interested in taking.
- For assistance with registration, go to the Graduate Programs Office in SL164.

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, SL 164.

- You must already have an officially approved Master's plan of study on file with the Purdue University Graduate School and the Office of Graduate Programs.

Final Semester *(Thesis Option)*:

- You must register for *"Candidacy 991"* (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 ensure 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 (SL 164).
- After the exam and all necessary changes have been made to your thesis, submit one copy (bound according to thesis preparation guidelines) of thesis to ME Office and one copy to the IUPUI Graduate Office, Union Building, Rm. 207. A final copy of the thesis should be provided to the major professor.

Final Semester *(Non-Thesis Option)*:

- You must register for *"Candidacy 991"* (0 crd) in your final semester of graduation.

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 ME462 – 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: ME462 – Engineering Design, ME310 – Fluid Mechanics or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: ME 330 – Modeling and Analysis of Dynamic Systems, ME 340 – Instrumentation and Measurement Systems, and ME 482 – 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 344 – Engineering Materials.

***Energy**:* One junior or higher level ME courses (three or more credit hours), ME310 – Fluid Mechanics, and ME 314 – 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 ME462 – Capstone Design.

Mathematics Majors – Four Courses

***Solid Mechanics and Computer-Aided Engineering*:** ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, and ME 462 – Engineering Design.

***Fluid and Thermal Sciences*:** ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 310 – Fluid Mechanics, and one of the following: ME462 – Engineering Design, ME 314 Heat and Mass Transfer or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: ME 200 – Thermodynamics I, ME 330 – Modeling and Analysis of Dynamic Systems, ME 340 – Instrumentation and Measurement Systems, and ME 482 – Control System Analysis and Design.

Materials: ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, and ME 344 – Engineering Materials.

Energy*:* ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 310 – Fluid Mechanics, and ME 314 Heat and Mass Transfer.

Biomechanics: ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, and ME 462 – Engineering Design.

Other Science and Technology Majors – Seven Courses

Solid Mechanics and Computer-Aided Engineering**:** Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, ME 274 Basic Mechanics II, and ME 462 – Capstone Design.

Fluid and Thermal Sciences**:** Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 310 Fluid Mechanics, ME 314 Heat and Mass Transfer, and one of the following: ME462 – Capstone Design, ME414 – Thermal-Fluid Systems Design, or a three or more credit hour thermal science elective with design content.

Mechatronics and Controls: Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 270 – Basic Mechanics I, ME 274 Basic Mechanics II , ME 330 – Modeling and Analysis of Dynamic Systems, ME 340 – Instrumentation and Measurement Systems, and ME 482 – Control System Analysis and Design.

Materials: Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, ME 344 Engineering Materials, and ME 462 – Capstone Design.

Energy*:* Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 310 Fluid Mechanics, ME 314 Heat and Mass Transfer, and one of the following: ME462 – Capstone Design.

Biomechanics: Math 261 – Multivariate Calculus, Math 266 – Linear Algebra and Differential Equations, ME 200 – Thermodynamics I, ME 270 – Basic Mechanics I, ME 272 – Mechanics of Materials, ME 274 Basic Mechanics II, and ME 462 – Capstone Design.

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

APPENDIX B

Requirements for ME 597 Mechanical Engineering Projects I

Approval. To be eligible to register for a 3 crds independent project course (ME 597 Mechanical Engineering Projects I), a graduate student must first receive the approval of a faculty member who will 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 crds 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 crds of ME 597 ME Projects I in each of two successive semesters (total up to 6 crds), 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

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:

Hasan U. Akay	X0135
Sohel Anwar	X0460
Jie Chen	X0229
Akin Ecer	X0124
Hazim El-Mounayri	X0362
Andrew Toming Hsu	X0382
Alan Jones	X0481
Thomas R. Katona	X0337
M. Razi Nalim	X0361
Nasser Paydar	X0177
Sivakumar Santhanakrishnan	X0417
Charles H. Turner	X0238
Hiroki Yokota	X0357
Guofeng Wang	X0553
Jian Xie	X0554
Tamer Wasfy	_____
Likun Zhu	_____

APPENDIX D

GRADUATE SCHOOL FORMS

All graduate program-related forms may be obtained from the School's Graduate Engineering Programs Office (SL 164) 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 option students for graduation.

APPENDIX E

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

First Semester

ENGR 195	Introduction to Engineering Profession	1
ENGR 196	Introduction to Engineering	3
CHEM C105	Chemical Science I	3
COMM R110	Fundamentals of Speech Communication	3
MATH 163	Integrated Calculus and Analytic Geometry	5
	Total	**15**

Second Semester

ENGR 197	Introduction to Programming Concepts	3
ENG W131	Elementary Composition I	3
MATH 164	Integrated Calculus and Analytic Geometry II	5
PHYS 152	Mechanics	4
Science Elective		3
	Total	**18**

Third Semester

ME 200	Thermodynamics I	3
ME 270	Basic Mechanics I	3
ECON E201	Introduction to Microeconomics	3
MATH 261	Multivariate Calculus	4
PHYS 251	Heat, Electricity, and Optics	5
	Total	**18**

Fourth Semester

ME 262	Mechanical Design I	3
ME 274	Basic Mechanics II	3
EE 201	Linear Circuit Analysis I	3
EE 207	Electronic Measurement Techniques	1
MATH 262	Linear Algebra and Differential Equations	4
Gen Ed Elective		3
	Total	**17**

Fifth Semester

ME 272	Mechanics of Materials	4
ME 310	Fluid Mechanics	4
ME 330	Modeling and Analysis of Dynamic Systems	3
ME 344	Introduction to Engineering Materials	3
Gen Ed Elective		3
	Total	**17**

Sixth Semester

ME 314	Heat and Mass Transfer	4
ME 340	Dynamic Systems and Measurements	3
Gen. Ed Elective		3
ME 372	Mechanical Design II	4
Stat. Elective	Restricted to Probability and Statistics courses	3
	Total	**17**

Seventh Semester

ME 482	Control Systems Analysis and Design	3
TCM 360	Communication and Engineering Practice	2
ME Elective (ME 5XX)	ME Primary/Related Area Course	3
Math (MATH 5XX)	ME Primary/Related Area Course	3
Gen Ed Elective		3
	Total	**14**

Eighth Semester

ME 401	Engineering Ethics and Professionalism	1
ME 414	Thermal-Fluid Systems Design	3
ME 462	Engineering Design	4
ME Elective (ME 5XX)	ME Primary/Related Area Course	3
Free Elective (ME 5XX or MATH 5XX)	ME Primary/Related Area Course	3
	Total	**14**

Summer

ME 698 (thesis option) or ME 5XX or ME 597	Thesis or ME Primary/Related Area Course	3
	Total	**3**

Ninth Semester

ME 5XX	ME Primary Area Course	3
ME 5XX	ME Related Area Course	3
ME 698 (thesis option) or ME 5XX	Thesis or ME Primary Area Course	3
	Total	**9**

Tenth Semester

ME 5XX	ME Related Area Course	3
ME 698 (thesis option) or ME 5XX	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 698 MS Thesis Research* or *ME 597 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 electives.

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.

APPENDIX F

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 C105 Principles of Chemistry I	3
CHEM C125 Experimental Chemistry I	2
MATH 165 Analytic Geometry and Calculus I	4
MATH 171 Multidimensional Mathematics	3
SCI I120 Windows on Science	1
ENG W131 Elementary Composition I	3
Total	**16**

Second Semester	
PHYS 152 Mechanics	4
CHEM C106 Principles of Chemistry II	3
CHEM C126 Experimental Chemistry II	2
MATH 166 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 251 Heat, Electricity, and Optics	5
MATH 261 Multivariate Calculus	4
CSCI Course	4
HIST H114 History of Western Civilization II	3
Total	**16**

Fourth Semester	
PHYS 330 Intermediate Electricity and Magnetism	3
PHYS 342 Modern Physics	3
PHYS 353 Electronics Laboratory	2
MATH 266 Ordinary Differential Equations	3
COMM R110 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 310 Intermediate Mechanics	4

ME 272 Mechanics of Materials	4
ME 330 Modeling and Analysis of Dynamic Systems	3
CAND 991 Candidate for Graduation (with B.S. in Physics)	0
Physical or biological science elective	5
Total	**16**

Sixth Semester

PHYS 416 Thermal Physics	3
ME 462 Engineering Design	4
MATH Course	3
Physical or biological science elective	3
General education elective	3
Total	**16**

SENIOR YEAR

Seventh Semester

PHYS 550 Introduction to Quantum Mechanics	3
ME 500-level ME primary area course	3
Elective: 400 or 500 level Engineering or Physics	3
MATH 537 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 528 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 698 (thesis option) or	
ME 500-level ME primary/related area course	3
ME 698 (thesis option) or	
ME 500-level ME primary/related area course	3
CAND 991 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.

Revised 8/2009

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 597 – Mechanical Engineering Projects I could be taken instead of ME 698 – Master's Research Thesis
2. Science electives (5th and 6th semesters) could be replaced by engineering courses with approval.

3. Students should take Physics 550 and one other physics or math course, e.g., Physics 510 (Physical Mechanics) or Physics 600 (Methods of Theoretical Physics) during the last two years. Note that P600 could be taken in lieu of Math 538 in the BPMME program. Alternatively, P510 or P600 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 G

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, SL 164, 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 SL 164 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 (SL 164) 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 (SL 164). 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, SL 164. 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 bound.

8. Deposit thesis at the IUPUI Graduate Office in the Union Building, Rm. 207. Thesis must be deposited at the IUPUI Graduate Office by appointment. Call 274-4023 to schedule an appointment at least 5 days in advance.

APPENDIX H

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 597 AND ME 697 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 597 AND ME 697 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 698 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 698 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