



UNIVERSITY
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MĀNOA

MECHANICAL ENGINEERING GRADUATE PROGRAM HANDBOOK

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October 30, 2014

This handbook provides information on areas of specialization in graduate studies, procedures, and requirements for advanced degrees. The purpose of this handbook is to provide graduate students in Mechanical Engineering with certain detailed information, which does not appear in the General and Graduate information Catalog. This handbook is intended to supplement the Catalog, not to supersede or replace it. For additional information, the student should consult the *General and Graduate Information Catalog*, and *The Graduate Assistant Handbook* published by the University of Hawaii.

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I. INTRODUCTION

The campus of the University of Hawaii at Manoa (UH Manoa) is located on some 300 acres of land on a green slope in Manoa Valley close to the heart of the famous Waikiki Beach and metropolitan Honolulu. The city's superb climate coupled with beautiful beaches and gorgeous mountains offers excellent outdoor recreational activities year round. The diverse ethnical background of the island's population provides rich cultural activities with colorful customs and traditions.

The University, founded in 1907, offers course work leading to bachelor's, master's and doctorate's degrees. UH Manoa is one of the public universities classified by the Carnegie Foundation as a Research I university. It is also one of the few Sea Grant, Land Grant, and Space Grant Institutions in the United States of America.

The College of Engineering has three degree-granting departments: Civil and Environmental, Electrical and Computer, and Mechanical Engineering. Engineering degrees have been awarded since the founding of the University in 1907. The College's academic strengths in providing a high-quality education are demonstrated by the number of alumni who serve as presidents of regional engineering companies, senior project managers in national and international high-tech corporations and research centers, and senior managing engineers in government agencies.

The Mechanical Engineering Department (ME) has three areas of concentration: Materials and Manufacturing; Mechanics, Systems, and Controls; and Thermal and Fluid Sciences. The Department has a number of instructional laboratories as well as a machine shop. The dedicated and dynamic faculty together with excellent laboratory facilities offers engineering education and research opportunities of the highest quality.

II. GRADUATE PROGRAMS

The Mechanical Engineering Department offers graduate programs leading to MS and PhD degrees in Mechanical Engineering. Students may also pursue the Direct PhD Program beyond a BS degree in ME or related fields.

II.A. Student Learning Outcomes

In general, a student who has successfully completed the graduate degree requirements should be able to:

- Demonstrate mastery of the methodology and techniques specific to the field of study.
- Communicate both orally and in writing at a high level of proficiency in the field of study.
- Conduct research or produce some other form of creative work.
- Perform in their field of study at a professional level.

II.B. Areas of Concentration

The Department has three areas of concentration as listed in the following.

MATERIALS AND MANUFACTURING:

Mechanical properties, corrosion, phase transformations, marine materials, composite materials, and nanomaterials with applications in processing and advanced manufacturing engineering.

MECHANICS, SYSTEMS, AND CONTROLS:

Dynamics and controls, mechanics, vibration, and nanotechnology with applications in design, robotics, mechatronics, biomedical, renewable energy, and advanced materials.

THERMAL AND FLUID SCIENCES:

Thermodynamics, fluid mechanics, heat and mass transfer, and combustion, with applications in energy conversion, thermal environmental engineering, acoustics, design optimizations, biomedical, renewable energy, and nanofluids.

II.C. Credits and Registrations for Seminar, Directed Reading or Research, Thesis and Dissertation

Seminar (ME691)

The Department organizes a number of seminars each academic year. ME691 Seminar is normally taken for credit during the student's last semester of residence. Once admitted in the graduate program, the student is expected to attend the seminars regardless of whether he/she registers in ME691 for credit. To earn the credit, students must attend 15 seminars and submit a report after each seminar. Students register for the course in the semester that they can complete all the requirements. Seminars can be attended for credit in different semesters prior to registration in the course (and from different departments with the prior approval of the faculty in charge of ME691 for that semester) provided the reports are submitted at the time the seminar is attended. A letter grade will be given only when the student registers for credit. Students are required to take one credit of ME691 for MS degree and an additional credit for PhD degree. For the Direct PhD degree, two credits of ME691 are required (see Section VI for details).

Directed Reading or Research (ME699)

The function of ME699 is to permit a student to explore a thesis or dissertation possibility. Registration in ME699 is on a credit/no-credit (CR/NC) basis. With approval by the Graduate Chair (ME graduate chair in this handbook), the academic advisor may permit up to 3 credits for MS students, 4 credits for students pursuing the Direct PhD degree but fail the Qualifying Examination, and 8 credits for students pursuing the Direct PhD degree but fail the Comprehensive or Final Dissertation Defense Examination to be applied toward the credits required for thesis (ME700). Only credits that were registered under the academic advisor may be applied toward the thesis credits. To enroll

in ME699, students must obtain a course number from the instructor. Students are required to submit a final written report in order to earn credits.

Thesis Research (ME700) or Dissertation Research (ME800)

Registration in ME700 (Thesis Research) or ME800 (Dissertation Research) is on CR/NC basis. MS students may register for ME700 only after their **MS Form II** is approved by the Graduate Division. PhD students may register for ME800 only after their **PhD Form II** is approved by the Graduate Division. To enroll in ME700 or ME800, students must obtain a course number from their thesis/dissertation advisor. These Forms must be approved by the student's thesis/dissertation committee members and the Graduate Chair before submitting to the Graduate Division for approval. The students must register for a minimum of 1 credit every semester even if they have already completed all the credits required for graduation. *Eight (8) credits of ME700 are required as part of the 30-credit requirement for MS (Plan A) students. ME800 credits are not counted toward the 50-credit requirement for PhD students. Students must register for ME700 or ME800 in the semester graduating.*

II.D. Submission of Forms

Students are required to submit various Forms to the Graduate Division during their study to report their progress. The schedule to submit these Forms will be described in subsequent sections. When submitting the Forms, the students shall submit a copy to the Departmental Secretary.

III. THE MASTER OF SCIENCE DEGREE PROGRAM

The MS program is intended to extend and broaden the students' undergraduate background

and/or equip practicing engineers with state-of-art knowledge in their respective fields.

III.A. Prerequisites for Admission

Applicants for the MS program must have completed a bachelor's degree in mechanical engineering or related programs such as other engineering fields, physics, chemistry and mathematics, from a reputable institution. Generally, an applicant must have a minimum grade point average of 3.0 (A = 4.0) or equivalent.

III.B. Admission to Program

Completed applications are first screened by the Graduate Division admissions office. Only those applications that meet the minimum requirements established by the Graduate Division, including a minimum GPA of 3.0/4.0 and, for international students, satisfactory TOEFL score (see the Graduate Division Web Site for more details and requirements), are forwarded to the respective graduate programs for further consideration. The Graduate Chair, on the basis of applicants' qualifications, including any potential deficiencies as well as a satisfactory General GRE Score, reviews applications and admits applicants to the program. Upon the Graduate Chair's recommendation, admission may be granted by the Dean of the Graduate Division.

Deficiencies are undergraduate courses students should have passed, but have not taken before their enrollment in ME. The deficiency courses are determined based on the student's area of concentration. They are ME331 for Materials and Manufacturing; ME371 and ME375 for Mechanics, Systems, and Controls; and ME311 and ME322 for Thermal and Fluid Sciences.

III.C. Initial Interview and MS Form I (Plan A)

The purpose of the initial interview is to *determine undergraduate deficiencies*, if any, in the student's preparation for MS studies. The initial interview shall be conducted upon the student's arrival on campus and prior to initial registration. The student shall make an appointment with the Graduate Chair for the interview. For Plan A students, **MS Form I** shall be completed at the conclusion of this meeting and submitted to the Graduate Division.

III.D. Residency Requirement, Full Time Status, and Time Allowed for Degree Completion

Residency Requirement: The minimum residency requirement is an equivalence of two semesters of full-time work or four summer sessions at UH Manoa. For part-time students, each 8 credits completed as a classified student is equivalent to one full-time semester.

Full Time Status: To maintain full-time status, research and teaching assistants must take 6 credits or more, while others must take 8 credits or more per semester. Plan A students may take 1 credit of ME700F to be considered full-time after all course requirements are fulfilled except for the final thesis examination.

Time Allowed: Candidates for the MS degree must complete all requirements within *seven (7) years* after admission to the program. Candidates who fail to complete all requirements in the specified time are dismissed from the program.

III.E. Course and Credit Requirements

Students in the MS program normally concentrate in one of the three areas described in Section II.B. They must satisfactorily complete a minimum of 30 credits beyond the bachelor's degree. Courses from other

departments are acceptable with academic advisor's approval.

Two degree options are available to students in the MS program: Plan A (thesis option) and Plan B (non-thesis option). Plan A is a combination of course work and research, culminating in the preparation of a thesis. Plan B involves course work and the completion of a written project report. The credit requirements for these two plans are as follows:

Plan A (thesis option)

4 courses in ME600 series ⁽¹⁾ (C or better)	12
ME691 Seminar	1
ME700 Thesis (after Form II is approved)	8
<u>3 Technical Electives⁽²⁾ (C or better)</u>	<u>9</u>
Total Credits	30

Plan B (non-thesis option)

6 courses in ME600 series ⁽¹⁾ (C or better)	18
ME691 Seminar	1
ME699 Directed Reading	2
<u>3 Technical Electives⁽²⁾ (C or better)</u>	<u>9</u>
Total credits	30

(1) ME691 and ME699 cannot be applied to fulfill the course requirement.

(2) Technical Electives are 400-level or 600-level courses except for ME499, ME691 and ME699.

Minimum GPA: Students must maintain a minimum of B average (3.0/4.0 GPA) for all courses completed as a classified graduate student at UH toward the degree.

III.F. Transfer of Credits

Up to 14 credits may be transferred from: (a) an accredited institution, and (b) UH Manoa as an unclassified student. These credits must be at graduate level with a grade of B or higher and in excess of what are required for the bachelor's degree. ME699 and ME700 are not transferable. For UH Manoa graduates, excess credits earned at 400 or 600 level during the senior year can be transferred towards MS credits. To transfer credits, students must submit the **Petition to Transfer Credits** Form to the Graduate Division for approval via the

Graduate Chair during the first semester of enrollment.

III.G. Program Committee and Advisor

The selection of a thesis advisor for Plan A students and an ME699 (Directed Reading or Research) supervisor for Plan B students should be done as early as possible.

Plan A: For a research assistant, the professor providing the assistantship becomes the student's academic and thesis advisor, and the student's thesis topic is usually related to the research project. For teaching assistants, the faculty selects the student and becomes the student's academic and thesis advisor. Other students may select their thesis topic and advisor after discussing possible thesis topics with professors in their major area of study.

Plan B: Students may select their ME699 (Directed Reading/Research) supervisor after discussing possible project topics with professors in their major area of study. The ME699 supervisor is also the student's academic advisor. Plan B students do not need to submit any Forms (including **MS Form I**).

For MS students who have not decided an academic advisor, the Graduate Chair acts as the student's temporary advisor until the student has chosen an academic advisor.

The Thesis Committee for Plan A and the Project Committee for Plan B must be made up of at least three members of the graduate faculty. The committee chair should be the student's academic advisor. At least half of the committee members (excluding the committee chair) must be the graduate faculty or cooperative graduate faculty of ME. The committee shall be formed by the student after consulting with his/her academic advisor.

III.H. MS Form II (Plan A)

A Plan A student should decide a thesis title with his/her thesis advisor, and form a thesis committee, usually at the end of the 2nd semester. Students shall submit **MS Form II** with these information to the Graduate Division via the Graduate Chair. Plan A students may take ME700 credits only after this form is submitted. If **MS Form II** is not approved, students may register for 3 credits of ME699 and request to have them applied toward ME700 later. Students must register for at least 1 credit of ME700/700F for the semester they will be graduating. They may register for 1 credit of ME700F to keep full-time status after all the requirements are satisfied. To register for ME700F, student must submit a **Petition to Enroll in GRD 700F** Form to the Graduate Division for approval.

Both Plan A and B students should apply for graduation within the first 3 weeks of the semester they intend to graduate (June 1 for graduation in Summer session). They should defend the thesis/project report and submit the final version of thesis to the Graduate Division or project report to the Graduate Chair before the established deadlines. If the students cannot meet the deadlines, they may request, in advance, for an extension from the Graduate Division via the Graduate Chair.

III.I. Thesis (Plan A) or Project (Plan B) Report

For a Plan-A student, copies of the MS thesis must be submitted to the members of the thesis committee at least two weeks prior to the date of the final examination. The format of the thesis should follow the *Style and Policy Manual for Theses and Dissertations* specified by the Graduate Division. For a Plan-B student, copies of the ME699 final report must be submitted to the student's project examination committee at least two weeks before the date of the final examination.

III.J. Final Examination and MS Forms III and IV (Plan A)

MS candidates are required to pass a final oral examination. For Plan A students, the final examination will cover the thesis and related topics. For Plan B students, it will cover the project studied in ME699 and related topics.

All the committee members must be present for the entire examination, including the presentation, questioning period, deliberation, and verbal voting until the committee decides whether a student has passed or failed the examination. At the conclusion of deliberations, the committee chair shall determine the outcome by voice vote. Every member must vote either "pass" or "fail" – there shall be no abstentions or neutral votes.

Under special circumstances, committee members may participate remotely with approval by the Graduate Division. The student must submit the **Petition for Remote Committee Participation** Form for this purpose.

A student who fails the final examination may be permitted to repeat the examination once in the following semester at the discretion of the examination committee. A student who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time is dismissed from the program.

Plan A Students who pass the final examination shall submit **MS Form III** to the Graduate Division via the Graduate Chair with the thesis committee's approval. **MS Form IV** shall be submitted when the thesis is submitted to the Graduate Division with all recommended revisions approved by the thesis committee.

Plan B Students who pass the final examination shall submit the final project report to the Graduate Chair with all recommended revisions approved by the project examination committee.

III.K. Procedures for MS Students

Listed below is a summary of the procedures leading to the award of an MS degree in ME. It is the student's responsibility to take the required steps during his/her course of study:

III.K.1. The newly admitted student meets with the Graduate Chair for an initial interview prior to initial registration. The student's undergraduate deficiencies are identified by the Graduate Chair. Plan A students shall submit **MS Form I**, which lists these deficiencies, to the Graduate Division at the conclusion of the initial interview.

III.K.2. Plan-A student must select a **thesis advisor** while Plan-B student must select a **ME699 supervisor**, who also serves as the student's **academic advisor**, as early as possible.

III.K.3. Plan A student submits **MS Form II** to Graduate Division via the Graduate Chair, usually at the end of the 2nd semester. The thesis title and committee members shall be included in this form. Plan A students may take ME700 credits only after this Form is submitted.

III.K.4. Apply for graduation within the first 3 weeks during the semester the student intends to graduate (June 1 for graduation in Summer session). Defend and submit thesis before the established deadline. At least two weeks prior to the date of the final examination, Plan-A student shall submit copies of his/her **thesis** to the members of the thesis committee while Plan B student shall submit copies of his/her **project report** to the project examination committee.

III.K.5. After the student passes the final oral examination satisfactorily, Plan A student submits **MS Form III** to Graduate Division via

the Graduate Chair while the academic advisor of Plan B student sends a memorandum to the Graduate Chair informing that the student has passed the final examination. *Deadlines for submitting all the Forms can be found in the Academic Calendar section of the General and Graduate Information Catalog.*

III.K.6. After the manuscript of the student's thesis (for Plan A) has been revised and approved by the thesis committee, and the format of the thesis meets the Graduate Division publication requirements, a revised thesis (bound or electronic copy) with all committee members signatures shall be submitted to all committee members. A CD containing the thesis shall be submitted to the Graduate Division with **MS Form IV**. For Plan B students, a revised report approved by the committee (bound or electronic copy) shall be submitted to all committee members and the Graduate Chair (following the same deadlines as Plan A). *Deadlines for submitting the thesis to the Graduate Division can be found in the Academic Calendar section of the General and Graduate information catalog.*

III.K.7. The Graduate Chair checks and certifies that all the degree requirements are met. The student receives the MS Degree, granted by the Board of Regents upon the recommendation of the Dean of the Graduate Division, if all the requirements are fulfilled.

IV. CONTINUE TO DOCTOR OF PHILOSOPHY DEGREE PROGRAM AFTER THE MASTER OF SCIENCE DEGREE PROGRAM

Plan A students may continue into the PhD program after the completion of MS program. They should submit a **Doctorate in Same Discipline Admissions Application** Form to the Graduate Division via the Graduate Chair during the semester they receive their MS

degree. The deadlines are: (a) June 15 for Fall admission, and (b) November 15 for Spring admission. The approval of the petition will be based on a minimum of 3.0/4.0 GPA as well as the Graduate Chair and advisor's consent.

V. THE DOCTOR OF PHILOSOPHY DEGREE PROGRAM FOR STUDENTS WITH A MASTER OF SCIENCE DEGREE

The PhD program is designed to train students who will be prepared upon graduation to pursue an academic career in a university or to work as specialists or researchers in industry or government organizations. Such graduates must have acquired during their training, a sound knowledge of basic theory through course work and reading plus the capacity to do original research through the completion of doctoral dissertation. An original contribution to the field of specialty through the dissertation research is required.

V.A. Prerequisites for Admission

Applicants for the PhD program must have completed the requirements for the MS degree in mechanical engineering at the University of Hawaii, or its equivalent from a reputable institution.

V.B. Admission to Program

Completed applications are first screened by the Graduate Division admissions office. Only those applications that meet the minimum requirements established by the Graduate Division, including a minimum GPA of 3.0/4.0 and, for international students, satisfactory TOEFL score (see the Graduate Division Web Site for more details and requirements), are forwarded to the respective graduate programs for further consideration. The Graduate Chair,

on the basis of applicants' qualifications, including any potential deficiencies as well as a satisfactory General GRE Score, and the availability of departmental resources reviews applications and admits applicants to the program. Upon the Graduate Chair's recommendation, admission may be granted by the Dean of the Graduate Division.

V.C. Initial Interview

The purpose of the initial interview is to *determine undergraduate deficiencies*, if any, in the student's preparation for PhD studies. The initial interview should be conducted upon the student's arrival on campus and prior to initial registration the same as those for the MS program (see Section III.C). The deficiency courses are the same as those listed in Section III.B. A Departmental PhD Deficiency Form shall be submitted to the Graduate Chair at the conclusion of the interview.

V.D. Residency Requirement, Full Time Status, and Time Allowed for Degree Completion

Residency Requirement: The minimum residency requirement is an equivalence of three semesters of full-time work at the University of Hawaii at Manoa. An MS degree earned at UH in the same field may be considered to satisfy two semesters of the requirement, and hence an additional semester at PhD level is required. For part-time students, each 8 credits completed as a classified student is equivalent to one full-time semester.

Full Time Status: To maintain full-time status, research and teaching assistants must take 6 credits or more, while others must take 8 credits or more per semester.

Time Allowed: Candidates for the PhD degree must complete all requirements within *seven (7) years* after admission to the program. This time

may be extended to *ten (10) years* with approvals from the Student's academic advisor, the Graduate Chair, and the Graduate Division. Candidates who fail to complete all requirements in the specified time are dismissed from the program.

V.E. Course and Credit Requirements

Students in the PhD program are required to concentrate in one of the three areas of concentration (see Section II.B).

Students must satisfactorily complete a minimum of 50 credits beyond the BS Degree. ME800 credits are not counted toward the 50 credits requirement.

With the approval of the Graduate Chair, students may be granted an equivalence of up to 30 credits of their MS programs toward fulfilling the PhD credit requirement. Among the 30 credits, up to 8 may be assigned for the MS thesis work and 1 must be equivalent to ME691 Seminar. All the remaining 20 credits must be at 600-level, including five 3-credit (A-F) courses (i.e., 15 credits), four credits of ME699 during the semester the student takes the Qualifying Examination, and one credit of ME691. Out of the five 3-credit courses, at least three (i.e., 9 credits) must be in the student's major area of concentration (see Section II.B) and one outside the major area of concentration. Courses from other departments are acceptable with academic advisor's approval. Students must take an extra credit of ME691 if they did not take an equivalent course in their MS program. The requirements for earning the ME691 credit is described in Section II.C.

Course Transfer: No other course transfers are allowed.

Minimum GPA: Students must maintain a minimum of B average (3.0/4.0 GPA) for all courses completed toward the degree.

V.F. Qualifying Examination and PhD Form I

The purpose of the Qualifying Examination is to assess students' ability to conduct independent research at the doctoral level. Students should pass their qualifying examination no later than their second semester of enrollment (may be extended to the fourth semester with approval by the Graduate Chair) in their PhD program. To take the qualifying examination, a student must register for 4 credits of ME699 Directed Reading or Research under the supervision of his/her academic advisor (in the student's major area of study). If the student holds a research assistantship, the professor providing the support will be the student's academic advisor. The student's ability to conduct independent research at doctoral level will be judged by a Qualifying Examination Committee at an oral examination prior to the end of the semester mentioned above.

The Qualifying Examination Committee shall consist of at least three faculty in the student's major area of study, with the student's academic advisor serving as the committee chair. At least half of the committee members (excluding the committee chair) must be the graduate faculty or cooperative graduate faculty of ME. The examination committee shall be formed by the student after consulting with his/her academic advisor.

The student is required to complete a research project assigned by his/her academic advisor. Prior to the examination, the committee chair writes a memo to the Graduate Chair containing the names of the committee members, project title, and time of the qualifying oral examination. The student must submit a project report to members of the examination committee *at least two weeks* prior to the date of the examination. After the examination, the committee chair writes a memo to the Graduate Chair, with all committee members' signatures, informing the result of the examination and

remedies if the student fails the examination. The qualifying examination includes the content of the student's project report as well as his/her fundamental knowledge relating to the project. The student passing the examination shall submit a copy of the Qualifying Examination Report to the Graduate Chair.

A student who fails the Qualifying Examination may be permitted to repeat the examination once in the following semester at the discretion of the Qualifying Examination Committee. A student who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time is dismissed from the program.

After passing the qualifying examination, the student will be admitted to the status of "Candidate" in the PhD program, and **PhD Form I** will be submitted to the Graduate Division via the Graduate Chair.

V.G. Comprehensive Examination and PhD Form II

The purpose of this examination is to ascertain the student's comprehension of areas of study relevant to his/her dissertation topic. Each PhD student/candidate must take the Comprehensive Examination after all the course requirements are fulfilled (except ME691), and at least one semester prior to the Final Dissertation Defense Examination.

The Comprehensive Examination committee shall consist of at least five (5) graduate faculty with the student's academic advisor serving as the committee chair. Among the other members, at least 2 must be in the student's major area of study and 1 be an outside member (not an ME faculty or cooperating graduate faculty). At least half of the committee members (excluding the committee chair) must be the graduate faculty or cooperative graduate

faculty of ME. The outside member fulfills many roles: 1) provides disciplinary expertise and a perspective that may not be possessed by members of the graduate field of study; 2) represents the Graduate Division on the committee, ensuring that correct procedures are followed and that the student is treated fairly; and 3) ensures that the level of research is of doctoral quality. The committee shall be formed by the student after consulting with his/her academic advisor. A student shall pass the comprehensive examination upon a favorable recommendation by the majority of the committee members.

The Comprehensive Examination covers the following two areas: 1) Fundamentals of the Course Work the student took in his/her PhD program; 2) PhD dissertation research proposal. The research proposal must be prepared in form of a technical research report and submitted to members of the examination committee at least two weeks prior to the date of the oral examination. It must contain a clear statement of the problem to be investigated, a detailed explanation of the methodology to be employed, together with a statement of the anticipated results and an estimated date of completion. It must also demonstrate a scholarly investigation which will be an original contribution to the field of mechanical engineering. In addition, the student is required to compile a list of five graduate courses counting towards his/her PhD degree with majority of them in his/her major area of study. This list must be approved by the student's academic advisor and submitted to the examination committee with the dissertation research proposal.

Prior to the examination, the committee chair writes a memo to the Graduate Chair containing the names of the committee members, dissertation title, and time of the Comprehensive oral examination. After the examination, the committee chair writes a memo to the Graduate Chair, with the List of the Courses attached, informing the result of the examination and

remedies if the student fails the examination. The student passing the examination shall submit a copy of the Comprehensive Examination Report to the Graduate Chair.

A student who fails the Comprehensive Examination may be permitted to repeat the examination once in the following semester at the discretion of the Comprehensive Examination Committee. A student who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time is dismissed from the program.

After passing the Comprehensive Examination, **PhD Form II** shall be submitted to the Graduate Division via the Graduate Chair and the PhD student/candidate will be admitted to the status of "ABD: All-But-Dissertation" in the PhD program if all other requirements (except the dissertation) are fulfilled.

The student may register for 1 credit of ME800 and be considered full-time after the comprehensive examination is passed. The student must register for 1 credit of ME800 in the semester he/she intends to graduate.

V.H. Final Dissertation Defense Examination and PhD Forms III and IV

The Final Dissertation Defense Examination Committee shall consist of the same faculty members as the Comprehensive Examination Committee. The Committee Members may be changed with approval by the Graduate Division via the Graduate Chair. The **Doctorate Petition to Revise Dissertation Committee Form** must be used for this purpose.

Prior to the examination, the committee chair writes a memo to the Graduate Chair containing the names of the committee members,

dissertation title, and time of the Final Dissertation Defense Examination. The student must submit the dissertation to members of the examination committee at least two weeks prior to the date of the examination. Arrangements for the examination must be made at least one month in advance, and the examination must be conducted prior to the deadline specified by the University (see the Academic Calendar section of the General and Graduate information Catalog as well as the information on the Graduate Division Web Page). The examination must be announced in the Ku Lama (UH Bulletin) and be open to the public.

The dissertation must contain results of an original contribution to the field of mechanical engineering, which will be suitable for publication(s).

Each PhD candidate will be required to pass the oral final examination based primarily upon his/her dissertation. The examination shall be administered by the student's full dissertation committee. Candidates shall pass the final examination upon a favorable recommendation by the majority of the committee members.

A candidate who fails the Final Dissertation Defense Examination may be permitted to repeat the examination once in the following semester at the discretion of the examination committee. A candidate who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time is dismissed from the program.

Candidates passing the Final Dissertation Defense Examination shall submit **PhD Form III** to the Graduate Division via the Graduate Chair with the dissertation committee's approval for passing the examination.

If required by the Dissertation Examination Committee, the candidate shall revise his/her dissertation incorporating comments and suggestions made by the committee. **PhD Form IV** shall be submitted with the dissertation to the Graduate Division with all recommended revisions approved by the committee.

V.I. Student Teaching Experience

In recognition that some PhD graduates will seek to enter the teaching profession, PhD students are offered an opportunity to obtain teaching experience as part of their training in accordance with the following procedure. A student may, with the approval of his/her dissertation advisor, request the Department Chair to give him/her a teaching assignment for a particular ME course at the undergraduate level. The Department Chair will determine whether the student is qualified to teach the course requested and, if the student is deemed qualified, he/she may be given the assignment. Students who teach a course or courses shall take 3 credits of ME799 (Directed Instruction) under the Department Chair and will be awarded the credits towards their PhD course requirements if the teaching evaluations are satisfactory.

V.J. Rules Governing Examinations

All PhD examinations (qualifying, comprehensive, and final defense) are administered by committees. It is the duty of the chair of those committees to schedule the examinations with sufficient advance notice and at times convenient to all members of the committees and to the students. All members of a committee must be present for the entire examination, including the presentation, questioning period, deliberation, and verbal voting until the committee decides whether a student has passed or failed the examination. At the conclusion of deliberations, the committee chair shall determine the outcome by voice vote.

Every member must vote either “pass” or “fail” – there shall be no abstentions or neutral votes.

Under special circumstances, committee members may participate remotely with approval by the Graduate Division. The student must submit the **Doctoral Petition for Remote Committee Participation** Form for this purpose.

If, for any reason, an examination needs to be terminated before all committee members are satisfied that the questioning has been sufficient to provide a basis for voting, the examination can be “adjourned for continuation.” In such a case, a concluding examination session must be scheduled within 15 days.

V.K. Procedures for PhD Students

Listed below is a summary of the procedures to be followed leading to the award of a PhD degree in Mechanical Engineering. It is the *student's responsibility* to take the required steps during his/her course of study.

V.K.1. The newly admitted PhD student meets with the Graduate Chair for an initial interview *prior to initial registration*. The student's undergraduate deficiencies are identified by the Graduate Chair. The undergraduate deficiencies must be made up by the students during their PhD studies and prior to the Comprehensive Examination.

V.K.2. For a research assistant, the professor providing the assistantship becomes the student's academic advisor. For teaching assistants, the faculty who selects the student becomes the student's academic advisor. Other students may select their dissertation topic and advisor after discussing with professors in their major area of study. The Graduate Chair will act as their temporary academic advisor until they have chosen a dissertation advisor.

V.K.3. The student registers for 4 credits of ME699 (Directed Reading or Research) and form a **Qualifying Examination Committee** *no later than the second semester of attendance (may be extended to fourth semester with approval by the Graduate Chair)*. The student's academic advisor will be his/her ME699 supervisor and the Examination Committee Chair.

V.K.4. The student takes the **Qualifying Examination** described in V.K.3 *prior to the end of the semester*, and submits **PhD Form I** to the Graduate Division via the Graduate Chair if passing the examination. The student becomes a PhD Candidate.

V.K.5. The Candidate selects a **Comprehensive Examination Committee** after consulting with his/her PhD advisor.

V.K.6. The Candidate takes the **Comprehensive Examination** *after completing all the course work*, and submits **PhD Form II** to the Graduate Division via the Graduate Chair if passing the examination. He/she will have the **ABD** status if all the requirements (except for the dissertation) are fulfilled.

V.K.7. The Candidate may register for ME800 only after **PhD Form II** is submitted.

V.K.8. The Candidate submits copies of the dissertation to members of the dissertation committee at least *two weeks* prior to the date of the final examination. He/she should request the Department Secretary to announce the date of the final examination in the UH Bulletin. The Graduate Division requires that the final examination be held while the university is in session and is open to the public.

V.K.9. After passing the final examination, **PhD Form III** is submitted to the Graduate Division via the Graduate Chair.

V.K.10. After the manuscript of the student's dissertation has been revised and approved by

the dissertation committee, and the format of the dissertation meets the Graduate Division publication requirements, a revised dissertation (bound or electronic copy) with all committee members signatures shall be submitted to all committee members. A CD containing the dissertation shall be submitted to the Graduate Division with **PhD Form IV**.

V.K.11. The Graduate Chair checks and certifies that all the degree requirements are met. The student receives the PhD Degree, granted by the Board of Regents upon the recommendation of the Dean of the Graduate Division, if all the requirements are fulfilled.

VI. DIRECT DOCTOR OF PHILOSOPHY DEGREE PROGRAM

VI.A. Students with a bachelor's degree in Engineering, Science, or related areas may be admitted to the Direct PhD Program in ME.

VI.B. Students admitted to the Direct PhD Program shall schedule an initial interview with the Graduate Chair upon their arrival on campus and prior to their initial registration the same as those for the MS program (see Section III.C). The purpose of the initial interview is to *determine undergraduate deficiencies*, if any, in the student's preparation for PhD studies. The deficiency courses are the same as those listed in Section III.B. A Departmental PhD Deficiency Form shall be submitted to the Graduate Chair at the conclusion of the interview.

VI.C. Fifty (50) credits (plus any potential ME deficiencies) of courses beyond the bachelor's degree are required as described in the following.

VI.D. Twenty one (21) credits of ME courses must be passed before the student takes the Qualifying Examination, out of which three

courses (i.e., 9 credits) can be technical electives as described in Section III.E. Courses from other departments are acceptable with academic advisor's approval. Up to 12 credits may be transferred from an accredited institution or UH Manoa as an unclassified student. These credits must be graduate level with a grade of B or better and in excess of what are required for the bachelor's degree. For UH Manoa graduates, excess technical electives are transferable.

VI.E. Students shall take the Qualifying Examination following the procedure described in Section V.F by the fourth semester (may be extended to the fifth semester with approval by the Graduate Chair). Students failing to take the Qualifying Examination according to this scheduled are considered withdrawn from the Program and will be transferred to the MS Program.

VI.F. Students should register for 1 credit of ME691 and pass the course as described in Section II.C in the semester when the Qualifying Examination is taken.

VI.G. A student who fails the Qualifying Examination may be permitted to repeat the examination once in the following semester at the discretion of the Qualifying Examination Committee. A student who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time will be transferred to the MS Program. The procedures and requirements for the MS program are described in Section III.

VI.H. The 4 credits of ME699 taken for the Qualifying Examination for a student failing the Qualifying Examination will be graded as incomplete. If the student decides to pursue Plan A MS program, these credits will be applied toward ME700. He/she must take another 4 credits of ME700, write an MS thesis

and defend it, to earn an MS Degree in ME. He/she may have to take extra credits to maintain full-time status if necessary. If the student decides to pursue Plan B MS program, these credits will be changed to CR after passing the Plan B project examination.

VI.I. Students who pass the Qualifying Examination shall submit **PhD Form I** to the Graduate Division via the Graduate Chair. They are required to take an additional fifteen (15) credits of graduate (600-level or higher) courses. Courses from other departments are acceptable with academic advisor's approval. The PhD student's status will change to **PhD Candidate** after submitting **PhD Form I**.

VI.J. The candidate must take four (4) credits of ME799 (Directed Instruction) under and with coordination with the Department Chair and schedule to teach an undergraduate course after **PhD Form I** is submitted.

VI.K. The candidate should take four (4) credits of ME699 for the Comprehensive Examination according to the requirements described in Section V.G. The Comprehensive Examination should be taken after the completion of all required courses and at least one semester prior to the Final Dissertation Defense Examination. Following Section V.G guidelines, a list of five graduate courses counting towards student's PhD degree with majority of them in his/her major area of study, approved by the student's academic advisor should be submitted to the comprehensive examination committee with the comprehensive examination report and dissertation research proposal. **PhD Form II** shall be submitted to the Graduate Division via the Graduate Chair after passing the Comprehensive Examination. The candidate should also register for 1 credit of ME691 and pass the course as described in Section II.C in the semester when the Comprehensive Examination is taken. The status will be changed to **ABD** after submitting **PhD Form II**.

VI.L. A candidate who fails the Comprehensive Examination may be permitted to repeat the examination once in the following semester at the discretion of the Comprehensive Examination Committee. A candidate who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester without approval by the academic adviser and Graduate Chair, or fails the examination for the second time will be transferred to the MS Program.

VI.M. A candidate who fails the Comprehensive Examination and decides to pursue Plan A MS program will have the 4 credits of ME699 that were taken for the Qualifying Examination be graded as incomplete and applied toward ME700. He/she must write an MS thesis and defend it to earn an MS Degree in ME. If the student decides to pursue Plan B MS program, the 4 credits of ME699 that were taken for the Qualifying Examination will be graded as CR and the student will be able to receive the MS degree in ME immediately. The Qualifying Examination Report the student had already passed will be accepted as his/her Plan B project report.

VI.N. After passing the Comprehensive Examination, the candidate should take one credit of ME800 every semester until graduation.

VI.O. Upon completion of his/her dissertation, the candidate shall take the Final Dissertation Defense Examination and submit **PhD Forms III** and **IV** as described in Section V.H.

VI.P. A candidate who fails the Final Dissertation Defense Examination may be permitted to repeat the examination once in the following semester at the discretion of the Final Dissertation Defense Examination Committee. A candidate who has not been given the opportunity to repeat the examination, does not retake the examination in the following semester

without approval by the academic adviser and Graduate Chair, or fails the examination for the second time will be transferred to the MS Program. The Final Dissertation Defense Examination Committee may pass the failing dissertation as an MS thesis. In this case, the committee becomes the student's MS thesis committee and the student is able to earn his/her Plan A MS degree after all the MS Forms are submitted

VI.Q. A student who fails the Final Dissertation Examination and his/her dissertation is not considered as a sufficient MS thesis may decide to pursue Plan A MS program. He/she will have the 8 credits of ME699 that were taken for the Qualifying and Comprehensive Examinations applied toward ME700. He/she must write an MS thesis and defend it to earn an MS Degree in ME. If the student decides to pursue Plan B MS program, He/she will receive the MS degree in ME immediately. The Qualifying Examination Report the student passed will be accepted as his/her Plan B project report.

VI.R. PhD students/candidates are allowed to switch to the MS Program anytime during the above-mentioned Direct PhD Program process. If they choose to pursue the PhD Program after the completion of their MS Degree, they must apply to the PhD Program.

VI.S. The students who fail the Qualifying, Comprehensive, or Final Dissertation Defense Examination and are transferred to the MS program cannot be re-admitted to the PhD Program upon the completion of their MS Degree.

VI.T. Current MS students are allowed to transfer to the Direct PhD Program. These students shall submit a request for the transfer to the Graduate Division via the student's academic advisor and the Department Graduate Chair.

VI.U. The ME Direct PhD Program will go into effect starting in Fall 2014.

VII. LEAVE OF ABSENCE

VII.A. Students who will be away for up to a year may request a leave of absence.

VII.B. An additional year may be approved for maternity leave or taking care of an ill family member.

VII.C. Students requesting a leave of absence shall submit a **Petition for Leave of Absence** Form to the Graduate Division via the Graduate Chair.

VII.D. Failure to return within the approved date is considered as withdrawn from the University.

VIII. FINANCIAL AID

For qualified graduate students, the Department has a number of half-time teaching and research assistantships available. These graduate assistantships enable graduate students to pursue full-time study at the University of Hawaii. A half-time assistantship carries with it a tuition waiver. With tuition exempted, the stipend of a half-time graduate assistantship is sufficient to cover minimum living expenses. During the academic year, a half-time graduate assistant is expected to work 20 hours per week on teaching or research work, and can register for a maximum of 9 credits and a minimum of 6 credits per semester. All current graduate students of ME and applicants to the ME graduate program are eligible for consideration for an assistantship. The assistantships are based on the availability of funds and satisfactory performances. An assistantship shall be automatically terminated when a recipient completes his/her degree program (at the end of the semester of such completion),

completely withdraw from the program (as of the date of such withdrawal), or enrolls as a part-time student. The assistantship may be terminated if a student falls below the required 3.0 GPA or if performances prove unsatisfactory.

For more detailed information about assistantships, see *The Graduate Division Web Page*.

VIII.A. Teaching Assistantships

Teaching Assistantships are awarded to MS (Plan A) and PhD students by the Department on the basis of instructional needs, academic performance, experience, and background. In general, a Teaching Assistantship is given to an ME Faculty by the Department Chair. The Faculty selects a student, and will serve as the student's academic and research advisor. The duty of a teaching assistant is to aid professors by leading laboratory and discussion sections, as well as grading projects, reports, and homework. The teaching performance of a teaching assistant is evaluated by the instructor-in-charge at the end of each semester (the research performance will be evaluated by the student's academic advisor). Teaching assistantships can be renewed based on the availability of funds, satisfactory performance of teaching duties, maintenance of good academic standing (3.0 or better GPA), and satisfactory progress in research (thesis/dissertation) work. Normally, MS students may be appointed as a teaching assistant for no more than three (3) semesters while PhD students for no more than four (4) semesters. The duty period for all teaching assistants is from one week prior to the start of the Fall semester through the graduation commencement of the Spring semester. Semester break and Spring recess are not considered to be off-duty periods for graduate assistants. The teaching assistantship has a 9-month duty and pay period per academic year. Depending on the availability of research funds

and satisfactory performance of research work, a teaching assistant may receive research assistantship from his/her academic advisor during the summer.

VIII.B. Research Assistantships

Individual professors award research assistantships to students who aid them in their funded research. Renewal of a research assistantship depends on the availability of funds, satisfactory research work, and maintenance of good academic standing (*3.0 or better* GPA). Normally, the results of research work performed by the research assistant can be used as the students' thesis or dissertation. *The research assistantship has a 11-month duty and pay period per academic year.* The duty period for all research assistants is for 11 months working 20 hrs/week during semesters and up to 40 hrs/week during off-semester periods. *Semester break and Spring recess are not considered to be off-duty periods for graduate assistants.* Depending on the availability of research funds and satisfactory performance of research work, a research assistant may receive overload during the summer to perform additional research.

VIII.C. Scholarships

The Department has a limited amount of scholarships available to qualified graduate students. The competition for these scholarships is very keen, and the awarding of these scholarships is based on academic record and financial needs.

The East-West Center, a federal institution on campus, awards a number of scholarships to U.S. and Asian students to pursue full-time graduate study at the University of Hawaii. These scholarships cover tuition, room, and board. To apply for one of these scholarships, the applicant should obtain application forms from: Grant Officer, East-West Center, 1601

East-West Road, Honolulu, Hawaii 96822, U.S.A., Tel: 808-944-7735, Fax: 808-944-7730.

VIII.D. Grader Opportunities

ME faculty often have a need for students to assist in grading homework and projects for undergraduate courses. Students can inquire with the Department Chair about openings during the first week of a semester.

IX. OTHER PERTINENT INFORMATION

IX.A. Registration Procedures

IX.A.1. Continuing graduate students receive registration packages (with detailed instruction on registration procedures) prior to the pre-registration period. It is recommended that students register for courses during the pre-registration period, which is usually held in April and November of each year. Graduate courses with insufficient pre-registration may be cancelled before the semester begins. To ensure that a course will not be cancelled because of low enrollment, continuing graduate students should register during the pre-registration period. Any student who has not utilized the Pre-Registration must register for classes during the Late Registration period. This usually begins on the first day of the new semester and extends for two weeks. There is a penalty fee for missing the deadlines.

IX.A.2. Newly admitted graduate students should first report to the Department upon arrival on campus. They should enroll at the beginning of the semester during the new student registration period.

IX.B. Change in Committee Membership

Changes in the committee membership may be made by petition to the Graduate Division via the Graduate Chair. The **Petition to Revise Thesis or Dissertation Committee** Form must be used for this purpose.

IX.C. Preparation of Theses and Dissertations

The Graduate Division has specific instructions for the preparation of theses and dissertations. To ensure that their thesis or dissertation manuscript is acceptable to the Graduate Division, students should read the pamphlet entitled *Thesis and Dissertation Guidelines* published by the University's Graduate Division before writing the manuscript.

IX.D. Orientation and Training Program for New Teaching Assistants

An orientation and training program sponsored by the Graduate Division is usually held a few days preceding every Fall semester. All new teaching assistants are required to participate in the program.

IX.E. Rules and Regulations Concerning Foreign Students

IX.E.1. Foreign students must have a minimum TOEFL score of 100 IBT, with 25 in each of the four categories, or equivalent tests approved by the Graduate Division, to be eligible for consideration for a teaching assistantship. Other graduate students should also have satisfactory TOEFL or equivalent tests score.

IX.E.2. Newly admitted foreign students should report to the International Students Office (ISO) and the English Language Institute (ELI) before their initial registration. Foreign students whose TOEFL score is less than 100 IBT are required to take an ELI Placement Test. Depending on their results, they may be required to take some

ELI courses to remedy their English deficiencies.

IX.E.3. Newly admitted foreign students are required to take TB skin tests at the Student Health Center prior to registration.

IX.E.4. Federal regulations require that each individual must have a social security number in order to receive compensation. Foreign students, therefore, should apply for their social security numbers as soon as they arrive in Honolulu. They should also ask for a receipt when applying. It takes approximately two months to receive the social security number and another month for processing the paperwork for payroll at the University. Thus, a foreign student, although awarded a graduate assistantship, may not receive his/her stipend until three months after arrival in Honolulu. To alleviate the financial burden, foreign students may apply for an emergency loan (equal to the amount they would receive as a graduate assistant) at the UH Credit Union to cover their living expenses until they receive their first paycheck. To apply for the loan, a receipt showing their application for a social security number and a copy of the partially completed SF5B form are required.

IX.E.5. All foreign students must purchase health insurance coverage while attending the university. Teaching and research assistants are eligible to participate in the State health insurance plan if they sign up for the plan within 30 days of employment.

IX.E.6. *Immigration authorities do not allow foreign students holding a student visa to earn income by working off campus.*

X. PETITIONS

All departmental rules and regulations promulgated herein may be modified if special or unforeseen circumstances so warrant. Such a modification may be granted, based upon a

written petition to the Graduate Chair. A petition may be originated by a concerned graduate student, by any member of a student's thesis/dissertation committee, or by any member of the ME Graduate Faculty. Upon receipt of such a petition, the Graduate Chair will either convene a meeting of the Graduate Program Committee or ask the Department Chair to convene a meeting of the entire ME graduate faculty for consideration of the petition.

XI. DEPARTMENT WEB PAGE

For more information on the ME Department, please visit: <http://www.me.hawaii.edu/>