

**GRADUATE PROGRAMS
IN THE DEPARTMENT OF
AEROSPACE AND MECHANICAL
ENGINEERING**



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I. INTRODUCTION

This booklet is prepared for the benefit of graduate students enrolled in the graduate programs (M.S., Ph.D., and M Eng) of Aerospace Engineering, Mechanical Engineering or Nuclear Engineering and those students who are interested in matriculating in these programs. Please note that the program requirements of the Master of Engineering degree is described on page 8. The general degree requirements and regulations of the Graduate College are clearly stated in the current issue of the Graduate Catalog (available on the Web at (<http://grad.admin.arizona.edu>) and are not repeated here. Students are urged to become familiar with all the regulations governing the degree requirements, as it is **their responsibility** to ensure that these are satisfied at graduation.

The graduate program in the Department is administered by the Graduate Studies Committee (GSC) which consists of several faculty members and a graduate student representative. Any serious concern that a student may have should first be discussed with his/her academic advisor and then, if necessary, directed in writing to the Graduate Studies Committee.

II. ADMISSION

A Bachelor of Science degree from an aerospace, mechanical, or nuclear engineering curriculum of a recognized institution of higher education is required of applicants to the graduate program. A grade average of "B+" or better in all previous university-level academic work is expected. Graduates from other engineering, mathematics, and physical sciences curricula may be admitted provisionally, subject to taking a number of undergraduate courses as specified by the Department. No graduate credit is allowed for these undergraduate courses.

Applicants to the M.S. and Ph.D. programs must submit three letters of recommendation, original transcripts and a personal statement. All applicants are required to submit GRE general test scores; these are expected to be in the top 25 percentile on the Quantitative and Analytical parts. Students whose native language is not English must also provide TOEFL examination scores; a minimum score of 550 is required. If you have taken the computer based testing; a minimum score of 213 is required. If you have taken the internet testing; a minimum score of 80 is required. **The TOEFL examination will not be waived.**

Special Note: An applicant who has earned a Master Degree is not admitted into a Master Degree program in the same area of study. An applicant with a Ph.D. is not admitted to the AME MS or Ph.D. programs. (BS then MS then PhD). No double MS or double PhD.

Foreign student applications, with the required credentials, must reach the Graduate College Admissions Office before December 1 for the fall semester and before June 1 for the spring semester. **Domestic** student applications, with the required credentials, must reach the Graduate College Admissions Office before June 1 for the fall semester and before October 1 for the spring semester. If domestic students are applying for department funding they should apply early (December 1 for fall and June 1 for spring).

III. FINANCIAL AID

The department offers a number of teaching assistantships, research assistantships, traineeships, fellowships, and scholarships. An application form for financial aid can be obtained by writing to the department office or on our website at <http://www.ame.arizona.edu>. This application form will not be processed until the student has been formally admitted to the Graduate College.

All students seeking financial aid for the fall semester must submit their applications for **admission** by December 1. The corresponding date for spring admission is June 1. Please note that there usually are only a few openings for aid available in the spring semester since most of the financial aid is committed in the fall semester.

Financial aid is awarded on a merit basis. The grade point average, GRE General and TOEFL scores, letters of recommendation, and experience in teaching and research are considered when evaluating applicants.

All graduate students in the College of Engineering who receive financial aid from or through the University of Arizona are considered to be full-time students and are expected to enroll for some combination of course work, research, or independent study that results in at least 12 units of credit each semester. Supplementary Registration (AME 930) cannot be used to satisfy these minimum enrollment requirements.

All students in the M.S. program who are supported by or through the University are required to complete the thesis or report options of the M.S. degree (see Section V).

The graduate college requires all Graduate Teaching Assistants whose native language is not English to take and pass the SPEAK TEST (\$60) administered on campus in the Center for English as a Second Language (CESL) Office. Alternatively, students may submit a score of at least 50 on the TEST OF SPOKEN ENGLISH and a TOEFL score of 550. Foreign students who are applying for teaching assistant positions should take the Test of Spoken English in their own country and submit their score on this test with the application. ~~for financial aid.~~ Before assuming their assistantship, all new Graduate Teaching Assistants are required to participate in a mandatory one-day, eight hour orientation sponsored by the University Teaching Center that is held just prior to the start of each semester, and a ~~one~~ ½ day orientation given by the College of Engineering. Also, the International Student Orientation is mandatory for all international students.

According to Department policy, teaching assistantships are primarily used for recruitment. Therefore, students in their second year of study are eligible for reduced levels of support (10 hours/week) only. Teaching assistantships are seldom available to students after their second year of study. Thus, it is imperative that students develop a research-relationship with a faculty member so that financial support after the first year of study is shifted to a research assistantship. The renewal of any financial award is contingent on the student satisfying all requirements for the award. In the case of a teaching assistantship, this includes a minimum overall evaluation of adequate to high by the faculty supervisor.

IV. ACADEMIC ADVISOR

Prior to the start of their first semester in the M.S. program, students must meet with their academic advisor to discuss plans for their study program. The academic advisor should also be consulted if

the student subsequently decides to make substantial changes in his/her study program, or experiences unusual difficulties.

If a student is supported by a Research Assistantship related to a specific faculty member's research program, that faculty member generally serves as the student's academic advisor. The Associate Department Head, Dr. John Williams, serves as the academic advisor for all other incoming graduate students who do not have an RA or an advisor identified when they first arrive. Students who choose to pursue the M.S. program thesis/report option or to continue on to the Ph.D. program must find a thesis/report or dissertation advisor, and this faculty member usually replaces the graduate advisor as the student's academic advisor. **Once you have established your advisor, inform the Department Graduate Administrative Assistant.**

Continuing students must fill out the AME Graduate Student Advising-Mentoring Form to plan their studies one semester in advance. This plan is a means for monitoring student progress and providing information for scheduling graduate courses. A time line for satisfactory progress is given in the Appendix 1.

V. M.S. DEGREE REQUIREMENTS AND PROCEDURES

General Requirements

The AME Master of Science program consists of a minimum of 32 units of graduate credit of which at least 26 must be from the AME Department. These 26 units may include up to 6 units of Thesis (AME 910) or 3 units of Master's Report (AME 909). Generally, courses taken outside the AME Department may be in mathematics, physical or biological sciences, or in other branches of engineering. Up to 6 units of management courses (approved in advance by the AME Graduate Studies Committee) may be elected. AME students who have received credit for AME 4XX are not permitted to receive graduate credit for AME 5XX in a combined AME 4XX/5XX course. The only exceptions are the following design courses, AME 520, 522, and 528 that offer considerable latitude for enriching the graduate-level design experience. A maximum of 6 units of graduate coursework done elsewhere may be transferred. Students may choose a thesis, non-thesis, or report option. **AME policy is not to permit GRO for graduate credit. However, in exceptional cases a student may petition the Graduate Studies Committee (GSC) for permission to GRO.**

All M.S. students are required to complete Advanced Engineering Analysis (500A and 500B) and 2 units of Graduate Seminar (AME 696G). In order to receive graduate credit, students must earn at least a C in 500A and 500B. Those students who are unable to obtain graduate credit (because of a D or E) may retake one of these courses as an Independent Study course (AME 599 for 3 units). The student must inform the instructor of 500A/B that a course is being repeated, complete all assignments, tests and final exam, as required by the instructor, and obtain S (superior) or P (pass). Under these conditions, the AME math requirement in one of these courses will be satisfied. Note however that the original grades in 500A/B **will** appear on the transcript and in the calculation of the GPA whereas the new grade earned in the Independent Study will **not** be included in the calculation of the GPA (University Policy).

If a student originally receives D's or E's in both 500A and B or is unable to earn S or P as described above, this person is automatically disqualified from all AME graduate programs.

Core Areas

Each student **must** choose one core area (see Table 2). The purpose of the core area requirement is to ensure that each student receives a grounding, in one core discipline of Aerospace and Mechanical Engineering, that prepares our MS graduates either for professional work or for advanced study. Students must complete three courses, including at least one with a computational emphasis, from the chosen core area. The core areas are:

Dynamics and Control Systems
Fluid Mechanics
Solid Mechanics and Dynamics
Thermal Sciences

Student may choose one option. The purpose of each option is to provide a concentration in one specialism, leading to a career track supported by the curriculum and faculty in the Aerospace and Mechanical Engineering Department.

Options in the MS in Aerospace or Mechanical Engineering

1. Reliability Engineering

To complete the option students must take AME 572, 574, 575 and 577. Students completing the option are only required to complete two courses from a core area.

2. Nuclear Engineering

To complete the option students must take three out of the following four courses: NEE 506, 583, 586, 588. Independent study containing equivalent material may be substituted for these courses.

3. Microelectromagnetic Systems (MEMS)

To complete the option students must take AME 589, AME5xx Micromechanics, and two courses from the following list: ECE/MSE546, ECE 565, CHEE537, MSE572, OPTI580, MSE562, ECE584, ECE552. Students completing the option are only required to complete two courses from a core area.

4. Biomedical _TBA

Table 2
Core Courses and Requirements (approved 2/17/04)

DYNAMICS AND CONTROL SYSTEMS

Chose TWO, or take all THREE classes	550 Advanced Dynamics	ECE 541 Synthesis of Control Systems	Choose ONE, if only two selected from the left side
	553 Computational Multi-body Dynamics	ECE 543 Nonlinear Control Systems	
	558 Advanced Modern Control Theory of Mechanical Systems	560 Advanced Vibration	

FLUID MECHANICS

Choose at Least TWO	536A Fundamentals of Fluid Mechanics	531/431 Numerical Methods in Fluid Mechanics and Heat Transfer	Choose at least ONE
	536B Fundamentals of Fluid Mechanics	561 Finite Element Methods	
	536C Compressible Fluid Dynamics		

SOLID MECHANICS AND DYNAMICS

Choose at least TWO	564A Mechanics of Deformable Solids	561 Finite Element Methods	Choose at least ONE
	564B Mechanics of Deformable Solids	563 Advanced Finite Element Analysis	
	550 Advanced Dynamics	553 Computational Multi-body Dynamics	

THERMAL SCIENCES

Choose at least TWO	530 Advanced Thermodynamics	531/431 Numerical Methods in Fluid Mechanics and Heat Transfer	Choose at least ONE
	532 Convective Transport Phenomena	561 Finite Element Methods	
	533 Conduction and Radiation Heat Transfer		

MS Plan of Study

Each student, in consultation with his/her academic advisor, will select a program of study for the degree. The MS Plan of Study is due **during the second semester in residence**. After you and your advisor have signed the MS Plan of Study, submit the original to the Department Graduate Administrative Assistant. The form can be obtained at the graduate college web site

<http://grad.arizona.edu> under current students and then click on forms.

MS Thesis Option (AME 910)

The thesis option consists of 26 units of coursework and 6 units of Thesis (AME 910). Students who choose the thesis option must complete a thesis and pass a final oral examination. No independent study units or AME 900 research units are allowed for the thesis option.

MS Thesis Advisor

It is the responsibility of the student to reach agreement with a professor who will serve as the thesis advisor. For this purpose, during the first semester of residence, the student should become acquainted with the areas of interest of the individual professors and the research projects underway in the Department. Refer to the Faculty at a Glance for a listing of faculty specialties located on the AME web site <http://ame.arizona.edu> under department and then help and information. Once identified, the thesis advisor usually serves as the student's academic advisor, replacing the previous advisor. After a research project has been selected, in consultation with the thesis advisor the student shall invite two tenure professors to serve examiners in the final oral examination.

MS Thesis

Copies of completed theses may be found in the AME Room N712. **The Department Graduate Administrative Assistant must receive a draft of the thesis one week before the final oral examination in order to perform a departmental format check.** The examiners for the final oral examination must receive copies of the thesis, approved by the student's advisor at least two weeks before the examination. **The AME department will not certify that all requirements have been met for the degree until it receives a bound copy for the AME department library.** Usually the thesis advisor will also require a bound copy. NOT MANDATORY but if you are microfilming or copyrighting, two library-ready copies of the thesis and an abstract must be submitted to the Graduate College 15 days prior to the date on which degrees are awarded. For more information regarding thesis format refer to the Graduate College Homepage <http://grad.arizona.edu>.

Final Thesis Oral Examination

The scheduling of the final oral examination and the fulfillment of all requirements relating to this examination are the sole responsibility of the student. The final oral examination may be scheduled after the thesis has been approved by the examining committee, provided that the student has completed his/her coursework or is in his/her final semester. This examination is open to the general public. The three-member examining committee is made up of the thesis advisor and two tenured or tenure-track faculty members. The examination is scheduled in consultation with the examining

committee members. The results of the examination must be reported to the Graduate College at least four weeks before the date on which the degree is to be conferred. The Department Graduate Administrative Assistant must be informed of the date, time, and place of the examination at least two weeks in advance so that a conference room can be scheduled and the completion of degree requirements form and file can be prepared for the day of the exam.

The examination lasts from one to two hours and includes a defense of the research results. Part of the questioning may involve coursework listed on the student's study program. Although the examination is open to the public, only members of the examining committee are permitted to ask questions.

The result of the examination is reported to the Graduate College on the **Completion of Degree Requirements** form. This form will be prepared by the Administrative Assistant to the Graduate Program and submitted to the faculty advisor before the examination. In the event of failure, the examining committee will determine what the student must do before a second examination may be scheduled. Upon recommendation of the Graduate Studies Committee and approval by the Graduate Council, a second examination will be granted after a lapse of at least one semester.

The second examination must be scheduled through the Graduate College at least three weeks in advance. The examining committee must be the same as for the first examination, except that a representative of the University Committee on Graduate Study will preside. A third final examination will not be granted.

Non-Thesis Option

This option is not available to students who have received financial support from the University in the form of teaching or research assistantships or fellowships.

The non-thesis option consists of 32 units of coursework following the general requirements of the M.S. degree program. A maximum of 3 units of Independent Study (AME 599) or 3 units of research (AME 900) may be included in the study program. A student who wishes to enroll in independent study must make arrangements for supervision by a faculty member in the Department. The non-thesis option does not require a final oral examination, however, the completion of DEGREE REQUIREMENTS FORM is still required.

Report Option (AME 909)

The report option consists of 29 units of coursework and 3 units of Master's report (AME 909) following the general requirements listed above. No other independent study units are allowed for the report option. Students who choose the report option must complete a report and pass a final oral examination. This examination consists of a 30-minute presentation by the student followed by 15 minutes of questioning. The presentation will be open to the public, but the question period will be closed. The exam should not exceed 1 hour. Three tenure-track faculty members will be required to attend the presentation and sign the final Completion of Degree Requirements form.

Master/Specialist Completion of Degree Requirements

Following the submittal of the plan of study, the student may take the comprehensive exam and/or defend his/her thesis. Be sure to schedule these with the Departmental Graduate Administrative Assistant and verify fulfillment of all Departmental requirements. **All** students, including those fulfilling the M.S. degree requirements by the non-thesis option, must submit the Completion of Degree Requirements form to Graduate Degree Certification at least one month before graduation. Note that courses with a grade of “D” cannot be included on this form.

Master Students Planning to Pursue a Ph.D. Degree

Students planning to continue their graduate studies toward the Ph.D. degree in the AME Department are strongly advised to read the following sections describing the Ph.D. degree requirements and the separate booklet entitled, "Qualifying Examination Guidelines" before selecting their program of study for the M.S. degree. The student will find that the Ph.D. requirements may have a strong impact on their choice of courses for the M.S. degree.

The M Eng Requirements for AME:

- 9 units of core in the MS core areas – flexible with respect to courses to accommodate distance learning
- 6 units of math – flexible with respect to courses to accommodate distance learning
OR 3 units AME 500A and 3 units AME 500B (if student is in Tucson)
- 3 units of management/business
- 6 units of pre-approved other COEM classes in math/management/business
- 0-6 units of Practice-Oriented Project (AME 900 or AME 699) **optional**
OR 6 units of pre-approved other COEM classes

(30 units total)

VI. PH.D. DEGREE REQUIREMENTS AND PROCEDURES

Ph.D. Degree Requirements for students with a recent Master’s Degree in Aerospace or Mechanical Engineering or closely related discipline

33 units of coursework	Of the 33 units
And 18 units dissertation (AME 920)	12 must be in area of major subject. Each student’s transcript will be evaluated and,

	depending on background, a student may be required to take more than the minimum number of credits.
During the final year of study, each student must present a department seminar describing research. This presentation is in addition to the requirement for 3 units of credit in AME 696G.	To meet the minimum Graduate College residence requirement, the student must spend two regular semesters of full-time work or complete a minimum of 30 units of graduate credit in residence at The University of Arizona.
	6 units of individual study (AME 599,699,799,900,908) are allowed but MAY NOT exceed 6 units. 3 graduate seminars (696G, 1 unit each)
	MINOR UNITS COUNT towards the 33 units requirement BUT the courses may not be used in both the minor and major.

For those students without a recent Master's Degree in Aerospace or Mechanical Engineering or closely related discipline the coursework requirement is 57 units, of which 36 must be in the major subject area. Up to 30 units may be transferred from an MS degree, subject to graduate college rules for credit transfer, and if they are appropriate for inclusion in the student's PhD Plan of Study.

AME students who have received credit for AME 4XX are not permitted to receive graduate credit for AME 5XX in a combined AME 4XX/5XX course. The only exceptions are the following design courses, AME 520, 522, and 528 that offer considerable latitude for enriching the graduate-level design experience

Students Minor in Aerospace or Mechanical

Students from other departments proposing to minor in AE or ME no longer need to take the qualifying examination in their minor area. Effective Spring 2003 students are required to take 12 units of minor course work (approved by their minor advisor) and maintain a 3.0 or higher in the minor.

Qualifying Examination

In order to continue their doctoral studies, all Ph.D. students are required to pass the Qualifying Examination. This examination is given twice a year, usually around the middle of September

and the beginning of February. The written portions for the three subject areas will be administered as follows: **2 subjects on Monday and math on Tuesday. The oral portion will be on Thursday and Friday.** Students who completed the requirements for the M.S. degree in the AME Department must take the Qualifying Examination no later than their second semester in residence for the Ph.D. degree. Students who completed the requirements for the M.S. degree at another institution must take the Qualifying Examination no later than their third semester in residence for the Ph.D. degree. **A student is not eligible to register for dissertation units (AME 920) until the Qualifying Examination has been passed.**

There shall be at least two designated preparatory courses for each subject area of the Qualifying Exam. A candidate for admission to the PhD program may be exempted from the written part of the Qualifying Examination in any subject exam in which the student has earned grades in two of the designated preparatory courses for that exam, with grades no worse than one A and one B. A candidate may also be exempted from the written part of any subject exam if the student has, without being enrolled in the courses, taken the regularly scheduled final examination of two of the designated preparatory courses, and earned grades in those final exams equivalent to no worse than one A and one B.

Prior to taking the oral examination and no later than the end of the third semester of the candidate's enrollment in the PhD program, all candidates must earn exemption in the manner described in the above paragraph. If there are not two designated preparatory courses offered in a chosen subject area during the first year of a candidate's enrollment in the PhD program, then the examination committee for that subject area must prepare and conduct a written examination for that candidate. The same shall be done during the second year of a candidate's enrollment, if that candidate has not otherwise had two opportunities to either earn exemption or pass the exam.

A candidate may be exempted from the written and/or oral part of any subject exam in which the student has, at a previous attempt, passed that exam with a clear pass. A clear pass shall be any numerical score equal to or greater than 60% when the passing score is 50%.

The examination areas and designated courses are: Some areas have more than two courses identified. Only two of the courses will be required.

Biomedical Engineering	AME 556 and BME 511
Engineering Mathematics	AME 500A, AME 500B
Controls, Stability, and Optimization	AME 558, AME 554
Fluid Mechanics	AMAE 536A, AME 536B
Kinematics and Dynamics	AME 550, AME 553, AME 560
Micro Electromechanical Systems (MEMS)	AME 586, AME 589
Nuclear Engineering	NEE 586, NEE 586, AME 530
Reliability Engineering	AME 572,574,575,577
Solid Mechanics and Structures	AME 561, AME 564A

Thermal Sciences

AME 530, AME 532, AME 533

Each student must choose Engineering Mathematics and two other examination areas. For each area, the test consists of a closed-book, written portion of two-hours duration and an oral portion of one-hour duration. Material on the tests is at the Master level. The Associate Department Head to the Graduate Program selects two examiners in each area. Students planning to take the examination should obtain the booklet "Qualifying Examination Guidelines" from the department, Room N712. In this booklet, typical textbooks illustrating the topics covered and the level of the material are listed for each subject area.

In the event of failure, a second qualifying examination is generally granted the following Semester. **No more than two attempts to pass this examination are permitted within AME, even if the student transfers between Aerospace Engineering and Mechanical Engineering.** The student is notified by mail as soon as possible after the results of the examinations are decided

The intent of the qualifying examination is both (1) to evaluate the student's knowledge and understanding of the materials covered in the examination, and (2) to evaluate the candidate's potential to successfully complete a Ph.D. research program. Thus, while knowledge of the material and mathematical techniques covered in the individual examinations is important, the faculty look for much more than the ability to just memorize material. It is important that the candidate also have a good overall integrated understanding of the fundamentals of the material so that he/she can: properly relate the mathematical techniques and physical principles and apply these to engineering problems; apply the material to a wide range of situations including situations the student may not have previously seen; and be able to demonstrate the ability to think about problems in a logical and appropriate manner.

PhD Advising Committee

The Ph.D. advising committee consists of the dissertation advisor and two tenure faculty members. It is the duty of the committee to conduct the preliminary examination and to guide the student through the research for the dissertation.

PhD Plan of Study

Each student, in consultation with his/her major and minor advisors, chooses a program of study that will satisfy the general requirements and be helpful in the dissertation work. After the signatures of the major advisor, the minor department head and minor advisor are obtained, submit the original PhD Plan of Study to the Administrative Assistant to the graduate program in room AME N712. The approved PhD Plan of Study is submitted to the Graduate College on a standard form and must be submitted in the third semester in residence. Each student must check

with the Departmental Graduate Administrative Assistant for specific deadlines!

Comprehensive Examination

Before admission to candidacy for the Ph.D. degree, the student must pass the Comprehensive Examination. This examination should be taken approximately one year after the Qualifying Examination, when the student has completed most of the course work outlined in his/her Study Program and has made a substantial start toward a dissertation. Normally, this would be during the fifth semester of study. **Note that a student cannot register for dissertation units (AME 920) until the Qualifying Examination has been passed.**

The Comprehensive Examination is intended to test the student's knowledge in advanced subjects in the major/minor areas of study, as well as in the specialized dissertation area. The members of the student's Advising Committee shall meet to agree on the content, scope, format and schedule of the written and oral examinations. The committee will consider the student's performance on the Qualifying Examination and the scope of that examination in relation to the student's Plan of Study for the Ph.D.

Major Area - Written Portion: If the committee determines that sufficiently comprehensive knowledge has not been previously demonstrated in all areas of the PhD Plan of Study, the student will be provided with a list of the deficient areas together with a format for the written examination on them. Otherwise, the written portion of the exam for the major will consist only of the dissertation proposal, which is a requirement of all students.

The dissertation proposal is a properly prepared technical document which describes the proposed Ph.D. research. This document should consist of an abstract, introduction, description of proposed work, presentation and discussion of preliminary results, summary, and references. The proposal should be prepared by the student with limited but critical guidance from the advisor. The student should realize that the proposal is also an important part of the Comprehensive Examination. The purpose of the proposal is to indicate, not only the academic preparation of the student, but also his/her ability to carry out original and creative research and to communicate this effectively in a professional manner. The proposal should be about 20 pages long, typewritten and double-spaced.

The proposal may be based on discussions between the student and the advisor, appropriate references, independent research, and other material such as books, course work, or input from faculty. All second-hand information in the proposal (including private communications) must be clearly referenced, and the wording of the proposal must be that of the student. The advisor is not permitted to examine any version of the proposal prior to its submission, although general guidance may be given by the faculty. Under no circumstances can a faculty member rewrite or modify any part of the proposal. Student and faculty must realize that the proposal is an independent contribution of the student, based on material absorbed from several sources.

The student passes the Written Comprehensive Examination if the proposal is deemed

satisfactory and if the written comprehensive examination formulated by the Committee is passed. Committee members signify passing by signing the Application for Oral Comprehensive Exam. If the proposal is judged unsatisfactory for minor reasons, the student will be asked to revise it and resubmit it within two weeks. Only one revision is permitted. If the proposal is considered substandard (usually for technical reasons), it will be rejected outright and the student will be asked to reformulate his/her approach (perhaps even to change his/her thesis topic) and to rewrite the proposal completely. A period of six months is given for resubmittal in the latter case.

Minor Area--Written Portion: Since the examination in the minor area is given by the minor Department, it is not possible to describe all the alternatives here. The student should check with his/her minor Department to learn the requirements of the examination.

Major and Minor Areas--Oral Portion: Before the oral examination may be scheduled, the student must pass the written portions. There is only one oral examination which lasts at least two hours but not more than three. A reporter is assigned which can be one of the committee members. The student's advisor can not be the reporter. The oral examination must be held no sooner than two weeks and no later than six months after the written examinations. Usually the examining committee consists of three faculty members from the major department and two from the minor. The student must submit the Application for Oral Comprehensive Examination and Committee Approval form to the Graduate Degree Certification Office at least two weeks before the examination.

The oral examination begins with a 20-minute formal presentation (including visual aids) by the student on his/her proposed research. In general, this presentation should not be interrupted by questions from the audience (the advisor is the moderator). The student's presentation is followed by questions on the proposed work and the research area. The student's presentation and subsequent questioning should take about 1 hour.

For the remainder of the examination, the committee members shall ask questions of a more general and comprehensive nature. These questions may be based on course work, fundamentals relating to the student's area of research, or specific issues related to the proposal or the student's presentation.

Based on the student's combined performance in the written and oral portions, the examining committee awards the grade of pass or fail. If the student fails, he/she must take the entire examination over at a later date **if so recommended by the examining committee. No more than two attempts at this examination are permitted within AME, even if the student transfers between Aerospace Engineering, Mechanical Engineering or Nuclear Engineering.**

IT IS THE RESPONSIBILITY OF THE STUDENT TO ARRANGE HIS/HER ORAL COMPREHENSIVE EXAMINATION IN A TIMELY FASHION. A request to schedule the

oral comprehensive examination must be submitted on a standard form to the Department Graduate Administrative Assistant at least two weeks prior to the requested examination date.

Advancement to Candidacy

Six months **prior** to the final oral defense examination the Advancement to Candidacy form will be due. For more information contact the Department Graduate Administrative Assistant.

Final Oral Defense Examination

The final oral defense examination may be scheduled after the dissertation has been approved by the advisor and readers. It is the responsibility of the dissertation advisor to propose the membership of the oral defense examining committee to the Dean of the Graduate College, who will make the final appointment. Usually, the members of the existing advising committee are named to the oral defense examining committee. Either the dissertation advisor or the minor department may request the addition of one or more representatives of the minor field to the committee. The proposed membership is submitted to the Graduate College on the Announcement of Oral Defense Examination form no later than 7 working days prior to the proposed examination date.

It is the responsibility of the student to arrange for the examination. He/she must consult with the oral defense examining committee members to arrive at a suitable date and time. The location of the examination is reserved with the assistance of the Department Graduate Administrative Assistant. This information is submitted to the Graduate College on the Announcement of Oral Defense Examination form.

The final examination is an oral defense of the dissertation and may appropriately include any general questioning related to the field of study related to the dissertation. A representative of the University Committee on Graduate Study will preside, and the seminar presentation is open to the public. The examination is expected to last at least two hours, but should not exceed three.

Electric Format Check

The graduate college can now accept drafts of dissertations electronically. Send an e-mail to formatcheck@grad.arizona.edu with your dissertation as a WORD attachment. Place your major in the SUBJECT line of the e-mail. Within 48 hours, the appropriate degree auditor will check the format and e-mail you back, either accepting the format or informing you of any format problem.

Dissertation

Following the final examination, two copies of the dissertation, approved by the advising committee, must be filed with the Graduate College. A candidacy fee must be paid to the

University Cashier. The AME Department requires a navy blue leather bound copy of the dissertation. A manual of instructions for preparing a dissertation, A Manual for Theses and Dissertations, is available on the Graduate College Homepage (<http://grad.admin.arizona.edu>).

Appendix 1 Guidelines for Satisfactory Progress Towards Degree

MASTER OF SCIENCE

Year	Time Line
Year 1	Meet with graduate advisor and prepare study plan Complete core courses offered during first year and 696G For report or thesis track, identify research area and advisor
Year 2	Meet with graduate advisor and update study plan (changes will be reflected on the final completion of degree requirements form. NO second study plan is submitted). Complete courses Carry out research Select examination committee File forms required for MS degree Prepare and defend thesis/report

DOCTOR OF PHILOSOPHY

(The student is required to hold an MS degree prior to continuation for the Ph.D.)

Year	Time Line
Year 1	Meet with graduate advisor and prepare study plan

	<p>Complete courses according to study plan Take 696G both semesters Identify dissertation area and advisor Prepare for the qualifying examinations (Semester 2) Pass the qualifying examinations*</p>
Year 2	<p>Meet with graduate advisor and update study plan (changes are submitted on the study records of study – doctoral) NO second study plan is submitted. (Semester 1) Pass qualifying exams** Begin doctoral research Complete additional courses and 696G according to study plan Select minor area courses</p>
Year 3	<p>Complete all coursework Continue with research Form comprehensive examination committee Pass comprehensive examinations in major and minor areas (5th semester) File for Doctoral Application to Candidacy</p>
Year 4	<p>Select committee for final examination Complete research Present dissertation research at AME seminar Prepare dissertation Schedule and Pass Final Examination File dissertation with AME Department and the Graduate College</p>

* Applicable to those holding MS from The University of Arizona

** Applicable to all other