

GRADUATE STUDENT HANDBOOK*

DEPARTMENT OF MECHANICAL ENGINEERING

University of Idaho
College of Engineering

Degrees offered:

Master of Science in Mechanical Engineering
Master of Engineering in Mechanical Engineering
Ph.D. in Mechanical Engineering
Master of Science in Nuclear Engineering
Master of Engineering in Nuclear Engineering
Ph.D. in Nuclear Engineering

* This information supplements general information in the current University of Idaho Catalog. A summary of University requirements for graduate degrees can be found at <http://www.uidaho.edu/catalog/>.

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Undergraduate Preparation for Graduate Students in Mechanical Engineering

Admission to the College of Graduate Studies is open to any student who holds a baccalaureate degree and who presents a scholastic record indicating probable success in graduate work. The General Catalog lists the University's GPA admission requirements. Admission to the Mechanical Engineering Graduate Program is open to any student with the above qualifications if his or her baccalaureate degree is with a major in mechanical engineering from an A.B.E.T. accredited U.S. program.

Students with a B.S. degree from an accredited U.S. engineering program with a major other than mechanical engineering may also be admitted to the Mechanical Engineering Graduate Program. However, such students must demonstrate a basic proficiency in the areas of energy and mechanical systems. This generally requires the student to include courses on the study plan that are assigned as undergraduate deficiencies, in addition to the 30 credits of graduate courses required for the Master's degree. The subjects included in the following list define the areas for which proficiency is expected as an entrance requirement.

a. Mechanical Systems: Statics (Engr 210), Dynamics (Engr 220), and Mechanics of Materials (Engr 350)

b. Energy: Thermodynamics (Engr 320), Fluid Dynamics (Engr 335), and Heat Transfer (ME 345)

Each applicant to the program is evaluated individually which may lead to exceptions and/or substitutions to the above requirements.

Students who do not have a B.S. degree from an accredited U.S. engineering program may also be admitted to the Mechanical Engineering Graduate Program. However, such students must demonstrate a proficiency in the basic subjects included in a B.S.M.E. program. This requires the student to include courses, in addition to the 30 credits of graduate courses required for the Master's degree, which are assigned as a part of the student's study plan as undergraduate deficiencies. The subjects included in the following list define the areas for which proficiency is expected as an entrance requirement.

a. An appropriate combination of mathematics and basic science including multivariable calculus (Math 275), ordinary differential equations (Math 310), probability and statistics (Stat 301), chemistry (Chem 111), and calculus-based physics (Phys 211, 212, 213).

b. Sixteen credits of humanities and social sciences including both breadth and depth.

c. Forty-eight credits of engineering topics which include engineering science and engineering design. Engineering science will include mechanics (Engr 210, Engr 220, Engr 350), thermodynamics (Engr 320), electrical circuits (Engr 240), materials science (MSE 201), and transport phenomena (Engr 335, ME 345). Engineering design must include a meaningful, major engineering design experience that was built upon the fundamental concepts of mathematics, basic science, humanities and social science, engineering topics, and communication skills (a capstone design experience like ME 424/426 is required).

- d. Appropriate laboratory experience such that the student is competent to conduct experimental work. (Laboratory classes are required which include an instrumentation class like ME 330).
- e. Appropriate computer-based experience including computational techniques needed to solve specific engineering problems.
- f. Competence in written and oral English communication. This requires both English composition (e.g., Eng 102) and English technical writing (e.g., Eng 317).
- g. An understanding of the ethical, social, economic, and safety considerations in engineering practice (see engineering design under item c above).
- h. Appropriate classes in the energy stem and the mechanical systems stem of mechanical engineering (included under engineering science in c above).

The evaluation of equivalent classes will be done on an individual basis. If a student does not have the equivalent of one of the above classes (except capstone design), the student may take the class or challenge it (see procedures for challenge in UI General Catalog) after appropriate self-study.

Undergraduate Preparation for Nuclear Engineering

The Mechanical Engineering Department also administers the U. of I. Nuclear Engineering Program, an interdisciplinary graduate program leading to master's and doctoral degrees. The program is available to students in Idaho Falls, and to a limited extent to students in Moscow and Pocatello, and is taught by faculty with selected nuclear expertise from nuclear, mechanical and chemical engineering, materials science, computer science and chemistry. Program research is closely aligned with U.S. Department of Energy (DOE) missions and enhanced by Idaho Falls-University Place partners: the Idaho National Laboratory (INL)—the nation's leading nuclear laboratory, Idaho State University (ISU), the Center for Advance Energy Studies (CAES) and the Center for Space Nuclear Research (CSNR).

Research activities include next-generation nuclear power sources, nuclear fuels, radioisotope separation processes, high-temperature nuclear materials, space nuclear applications, nuclear process heat for hydrogen production, modeling and simulations and nuclear thermal-hydraulics.

The Nuclear Engineering Program is open to any student who holds a baccalaureate degree in Nuclear Engineering, Mechanical Engineering, or Chemical Engineering from an A.B.E.T. accredited school, and has maintained a minimum 3.0 GPA. Students with other undergraduate degrees will be considered on an individual basis.

A limited number of Graduate Research Assistantships (GRAs) are available for highly-qualified students. For additional information about the UI Nuclear Engineering Program, go to this website: <http://www.if.uidaho.edu>, or contact Dr. John Crepeau, crepeau@uidaho.edu, or Alice Allen, alicew@uidaho.edu.

Graduate Record Examination and GPA

Graduate Record Examination (GRE) test results are recommended but not required for applicants with an engineering baccalaureate degree from a U.S. ABET accredited program. For all other applicants, GRE general test results are required (the engineering subject test is no longer available). These GRE scores and the applicant's grade point average (gpa) aid the faculty in estimating the applicant's scholastic abilities, which are suggestive of probable success in graduate work and are helpful in counseling students in their courses of graduate study. The GRE areas of interest and expected minimum scores are as follows:

Area	Suggested Scaled Score	Engineering Approximate Percentile Rank
Verbal (Reading Comprehension)	470	50th
Quantitative (Basic Math and Problem Solving Skills)	680	50th
Analytical Writing (critical thinking and writing)	4.0	50th

Explanation of the Analytical Writing score:

- SCORE 6 - presents a cogent, well-articulated analysis of the complexities of the issue and conveys meaning skillfully.
- SCORE 5 - presents a generally thoughtful, well-developed analysis of the complexities of the issue and conveys meaning clearly.
- SCORE 4 - presents a competent analysis of the issue and conveys meaning adequately.
- SCORE 3 - demonstrates some competence in its analysis of the issue and in conveying meaning but is obviously flawed.
- SCORE 2 - demonstrates serious weaknesses in analytical writing.
- SCORE 1 - demonstrates fundamental deficiencies in analytical writing skills.
- SCORE 0 - off topic, in a foreign language, merely copies the topic, consists of only keystroke characters, or is illegible, blank, or nonverbal.

English Requirements for Students Whose Primary Language is NOT English

The results of the Test of English as a Foreign Language (TOEFL) are required for all students whose primary language is not English and are used as a measure of the student's skills in these areas:

Area	Paper Based Minimum Score	Internet Based Minimum Score
Listening	54	21
Structure/Writing	54	21
Reading	54	21
Speaking	NA	21
Total	550	79

A part of the TOEFL paper-based test also reports an essay rating, the Test of Written English (TWE). This writing test provides information about an examinee's ability to generate and organize ideas on paper, support those ideas with evidence or examples, and use the conventions of standard written English. A minimum 70th percentile score of 4.2 is recommended. Explanation of the scores follows:

- 6 Effectively addresses the writing task, is well organized and well developed, uses clearly appropriate details to support a thesis or illustrate ideas, displays consistent facility in the use of language, demonstrates syntactic variety and appropriate word choice.
- 5 May address some parts of the task more effectively than others, is generally well organized and developed, uses details to support or illustrate an idea, displays facility in the use of the language, demonstrates some syntactic variety and range of vocabulary.
- 4 May address some parts of the task more effectively than others, is generally well organized and developed, uses details to support a thesis or illustrate an idea, displays facility in the use of the language, demonstrates some syntactic variety and range of vocabulary.
- 3 Inadequate organization or development, inappropriate or insufficient details to support or illustrate generalizations, a noticeably inappropriate choice of words or word forms, an accumulation of errors in sentence structure and/or usage
- 2 Serious disorganization or underdevelopment, little or no detail or irrelevant specifics, serious and frequent errors in sentence structure or usage, serious problems with focus.
- 1 May be incoherent, undeveloped, and may contain severe and persistent writing errors.

International Students

International students must carry nine (9) credit hours per semester to be in compliance with the rules and regulations of the U.S. Immigration Service. Exceptions to this requirement permitted by the Immigration Service are:

1. when a student is in his/her final semester and does not need full credit to graduate;
2. for medical reasons, which requires verification from a doctor;
3. for graduate students who have completed all course work and have only thesis or dissertation work remaining.

Degree Requirements for M.S. and M.E. Degrees

Thirty credits are required for the M.S. and M.E. degrees in Mechanical Engineering.

- At least 18 credits (including thesis for M.S.) must be at the 500 level.
- No credits may be at the 300 level or lower.
- In addition, no classes required in our B.S.M.E. curriculum can be used as part of the graduate program. This restriction does not include technical elective classes which include graduate-level courses. (Technical Electives beyond an undergraduate student's required curriculum may be taken as graduate credit if the undergraduate student submits a Course-Level Adjustment Form early in the semester.)
- University of Idaho policy requires that graduate gpas must be above 3.0. If there is a semester when the gpa is less than 3.0, a student is placed on probation, and if it occurs for two semesters, the student is disqualified.

At least three classes that consist primarily of subject material focused in mechanical engineering at the 500 level are required. MEME students must take at least two additional mechanical engineering classes in lieu of thesis/research.

Mechanical engineering classes are offered in the following areas:

mechanics and materials science	design and manufacturing
dynamic systems	fluids and heat transfer
thermodynamics and energy	

Classes planned for future semesters are listed on pp. 8-9. This plan is subject to change.

MEME students must take at least two additional ME classes in lieu of thesis/research.

Courses that satisfy the M.E. mathematics requirement include:

- ME 541 Mechanical Engineering Analysis
- ME 544 Conduction Heat Transfer
- ME 545 Numerical Heat Conduction
- any 400 or higher-level course in mathematics, numerical methods or statistics as approved by the Major Professor and Department Chair. This class cannot be a duplication of material covered in the required B.S.M.E. curriculum (such as the numerical methods taught in ME 123/223 or the statistics taught in Stat 301).

One class is required that focuses on the model/equation formulation (not solution) in energy and mechanical system stems. ME 540 Continuum Mechanics is the only class that presently satisfies this requirement.

The combined total of transfer credits, correspondence credits, non-degree credits, and approved credits more than eight years old at the time the degree is awarded shall not exceed 12 credits for master's programs requiring 36 or fewer credits.

Credits earned at an institution that does not grant graduate degrees cannot be transferred to the UI for graduate credit.

All other credits submitted to meet the requirements for a Master's degree must have been earned within the eight consecutive years immediately preceding the academic session in which the degree is completed. Required course distributions for the two degrees follow.

M.S.M.E. DEGREE
(Available only in Moscow, IFCHE, and Boise)

<u>Course Area</u>	<u>Credits</u>
Mathematics/statistics/numerical methods	3
Continuum Mechanics	3
Mechanical Engineering Technical Electives	9
Other technical electives in Mechanical Engineering or from other appropriate departments as approved by supervisory committee and department chairman	6 – 9
Research and Thesis	6 - 9
TOTAL	30

Final Defense and Comprehensive Exam: One hour presentation and defense of thesis followed after a break by a one hour oral exam. A written examination on course work will be given at a later date if necessary.

University of Idaho policy requires that graduate gpas must be above 3.0. If there is a semester when the gpa is less than 3.0, a student is placed on probation, and if it occurs for two semesters, the student is disqualified.

M.E.M.E. DEGREE

<u>Course Area</u>	<u>Credits</u>
Mathematics/Statistics/Numerical Methods	3
Continuum Mechanics	3
Mechanical Engineering Technical Electives	15
Electives - Mechanical Engineering or Other Appropriate Departments As Approved by Supervisory Committee and Department Chairman	9
TOTAL	30

Completion: Upon completion of all course work, the student will choose one of the options found on pages 10-11.

Note: Research credits will not count toward the MEME degree.

University of Idaho policy requires that graduate gpas must be above 3.0. If there is a semester when the gpa is less than 3.0, a student is placed on probation, and if it occurs for two semesters, the student is disqualified.

Degree Requirements for the Ph.D. Degree

The applicant must satisfy our requirements for the M.E.M.E. or M.S.M.E. degree. The additional details of the individual program for the doctoral degree is established by the supervisory committee in consultation with the student.

General university guidelines require:

1. A minimum of 78 credits beyond the bachelor's degree;
2. At least 52 credits in courses numbered 500 and above, including research and dissertation;
3. At least 33 of the 78 credits must be in courses other than Doctoral Research and Dissertation.
4. A doctoral student must complete at least 39 of the 78 required credits at UI while matriculated in the College of Graduate Studies.
5. Individual departments may require additional course work.
6. University of Idaho policy requires that graduate gpas must be above 3.0. If there is a semester when the gpa is less than 3.0, a student is placed on probation, and if it occurs for two semesters, the student is disqualified.

Mechanical Engineering Department requirements:

1. The Department of Mechanical Engineering requires that at least one-third of the credits beyond the bachelor's degree be in research (26 credits).
2. The Department requires additional coursework beyond the 33 credits required above.

Two examples of the requirements are given below. One example assumes completion of a master's thesis (MSME) and the other assumes no thesis (MEME).

With Master's Thesis

	24 credits M.S. course work
	24 credits Ph.D. course work
Total	48 credits course work
	6 credits MS research and thesis
	24 credits Ph.D. research and dissertation
Total	30 credits research
Total	78 credits

Without Master's Thesis

	30 credits master's course work
	21 credits Ph.D. course work
Total	51 credits course work
Total	27 credits Ph.D. research and dissertation
Total	78 credits

- Of the total course work, at least one-half of the credits beyond the bachelor's degree must be in M.E. courses.
- Of the 78 credits submitted to satisfy the degree requirements, a maximum of 30 credits may be more than eight (8) years old when the degree is conferred if the supervisory committee determines that the student has kept current in the subjects.
- All other degree requirements must be completed no later than five (5) years after the date on which the candidate passed his/her preliminary examination.

Graduate Course Offerings

The departments at the University of Idaho (UI) and Washington State University (WSU) offer some courses co-operatively. Graduate students register at their own institution to take classes at the other school. The plan below lists the courses we intend to teach; it may change.

Class	Co-op	F10	S11	F11	S12	F12	S13
<i>Mechanics and Materials Science</i>							
ME 404 Micro Electronic Mechanical Systems		WSU					
ME 415 Materials Selection and Design (MET 415)							
ME 425 Advanced Machine Design		X				X	
ME 461V Fracture Mechanics		X		X		X	
ME 508V Mechanics of Plates and Shells							
ME 534V Mech. of Composite Materials (MSE 536)	Y			X			
ME 539 Advanced Mech. of Materials (MSE 539)			X		X		
ME 548V Elasticity (CE 548) WSU ME 530		X					
ME 549V Finite Element Analysis (CE 546)		X		X		X	
<i>Dynamic Systems</i>							
ME 4/513V Engr Acoustics (ECE 579) WSU ME 523	Y			X			
ME 464/564 Robotics			X		X		
ME 472 Mechanical Vibrations WSU ME 449	Y	X					X
ME 481 Control Systems (ECE470) WSU ME 481	Y	X		X			
ME 578V Neural Network Design (ECE 578)			X		X		X
ME 580V Linear System Theory (ECE 572)		X				X	
ME 581V Fuzzy Logic Control Systems (ECE 573)							
<i>Fluid Mechanics and Heat Transfer</i>							
ME 412V Gas Dynamics			X		X		
ME 515 Transport Phenomena (ChE 515)							
ME 417/517V Turbomachinery							
ME 519V Fluid Transients (CE519)							
ME 420/520V Fluid Dynamics (CE 4/520)*			X				
ME 544V Heat Conduction*		X				X	
ME 546V Convective Heat Transfer WSU ME 515	Y			X			
ME 547V Thermal Radiation ProcessesV*					X		
ME 4/551 Exper. Meth. Fluid Dyn. & Heat Transfer		X Boise only					
<i>Thermodynamics and Energy</i>							
ME 414/514V HVAC Systems					X		
ME 422V Applied Thermodynamics			X				X
ME 433 Combustion Engine Systems		Su10					
ME 443V Thermodynamic Topics—Solar		X					
ME 444V Air Conditioning Engr* WSU ME 419	Y		X				X
ME 526V Statistical Thermodynamics			X				
ME 527 Advanced Thermodynamics WSU ME 529	Y					X	

	Co-op	F10	S11	F11	S12	F12	S13
Computational Design and Simulation							
ME 4/521 Advanced Computer-Aided Design		X	X	X	X	X	X
Manufacturing and Engineering Management							
ME 410 Lean Manufacturing		Su10		Su11		Su12	
ME 4/577 Design for Manufacture and Assembly							
ME 583V Reliability of Engr Systems (CE 541)		X				X	
ME 585 Design for Six Sigma							
ME 587V Quality Engineering (EM 587)							
EM 504 Lean Management							
EM 510 Engr Management Fundamentals			X				
EM 599 Engineering Management Project							
Other Classes							
ME 404 Human Factors Engineering			X				
ME 529V Combustion and Air Pollution*				X			
ME 540V Continuum Mechanics (CE 540)			X		X		
ME 541 Mechanical Engineering Analysis		X		X		X	
NEW COURSES							
ME 4/552 TechVentures:High Tech Entrepreneurship		X					X
ME 5XX Plasticity						X	
ME 4XX Energetic Components and Systems							
Nuclear Engineering							
NE 450 Fundamentals of Nuclear Engineering		X		X		X	
NE 504 Intermediate Nuclear Engineering			X		X		
NE courses offered on Idaho Falls campus can be seen at http://www.if.uidaho.edu/docs/Three_Yr_Plan-2008.html							

PLEASE PAY ATTENTION TO THIS **LEGEND**

Su COURSE IS OFFERED IN SUMMER

* TAUGHT IN BOISE & DELIVERED VIA COMPRESSED VIDEO THROUGH ENGR OUTREACH

X COURSE IS OFFERED BY MECHANICAL ENGINEERING

CE COURSE IS TAUGHT BY CIVIL ENGINEERING

ECE COURSE IS ALSO OFFERED THROUGH ELECTRICAL & COMPUTER ENGINEERING

Y COURSE IS CO-OPERATIVELY LISTED WITH WSU

V COURSE IS OFFERED VIA COMPRESSED VIDEO THROUGH ENGINEERING OUTREACH

Procedures for the Master of Engineering in Mechanical Engineering (non-thesis) Degree

1. Upon acceptance into the degree program, you will be notified of any undergraduate course deficiencies which must be fulfilled.
2. Nomination of Major Professor: Before completion of three classes, you must concur on the nomination of your major professor with your department chair, and your potential major professor. The Appointment of Major Professor and/or Committee form, found at <http://www.uidaho.edu/cogs/forms>, must be submitted to the Mechanical Engineering office to officially make the appointment. You must appoint your major professor before you can create and submit your Study Plan.
3. Supervisory Committee: A supervisory committee is not required for the MEME degree.
4. Study Plan: Awarding of your degree is contingent upon completion of a Study Plan which is filled out by you in consultation with your major professor. Your plan must be prepared by the time three classes are completed. Include only courses needed for your 30-credit degree on the plan, which you complete and submit for approval on line; no paper forms are used.

Your study plan is just a plan and may need alterations before you finish. To change an approved study plan, go to <http://www.uidaho.edu/registrar/graduation/audit> and choose the video, "Updating an Approved Study Plan," for complete instructions.

To create your plan:

- A. Go to your Degree Audit on the web and select "Planner."
 - B. Select "Study Plan Help" and view the 8-minute tutorial. This is an important step which will assure that you fill out the plan correctly the first time. The tutorial is short, pertinent, and complete. PLEASE USE IT!
 - C. On the planner, enter courses you have already taken for your master's degree, any courses you intend to transfer, and those you still plan to take. Do not include any specific semesters on your plan, as course offerings can and will change.
 - D. Save your plan and submit it for approval. Your major professor will then either approve your plan, or send it back to you for alteration.
 - E. After approval by the department chair, the plan is sent electronically to the College of Graduate Studies.
5. Completion: Upon completion of all course work, you will choose one of these options:
 - A. An oral (PowerPoint) presentation of 20-25 minutes, given on campus to a committee of three professors who taught courses relevant to the topic. The presentation will be followed by a question/answer period for a total of about one hour duration.
 - B. An oral (PowerPoint) presentation of 20-25 minutes submitted electronically. Three professors who taught courses relevant to the topic will view the presentation, and then take part in a conference call to allow questions, comments, etc. between the committee and the student.

- C. A paper of no less than five pages of single spaced text in a 12-point font (inclusion of figures, equations, tables, and references is encouraged but does not contribute to the page count) will be sent and reviewed by a committee of three professors who taught classes relevant to the topic. This will be followed by a conference call to allow questions, comments, etc., between committee and student.

The topic of the presentation or paper will be your choice and should:

- A. expand on a project or problem from a class or classes required for the degree, or
- B. describe a project from your profession that used knowledge you gained from a class or classes required for the degree, and
- C. be approved by your major professor.

A one-hour follow-up examination may be required.

Guidelines:

- A. Presentation time: 20 to 25 minutes (similar to most technical conference presentations), hence 20 to 25 PowerPoint slides.
- B. Paper length: five pages minimum, single spaced.
- C. Total duration: reserve one hour block for conference call; reserve two hours for on-campus visit because the presentation time is included.
- D. Examination committee: three faculty who taught classes relevant to the presentation/paper.
- E. The Non-Thesis Requirement Report Form, available on the COGS website under FORMS, must be completed by your major professor and delivered to COGS.
- F. You must be enrolled in the university the semester that you complete the final presentation/paper, either in a class or for ME 502 DS: Comprehensive Exam.

Remember to fill out your application for advanced degree when you are within one semester of completing your requirements. You can find the form on the Registrar's website at <http://www.registrar.uidaho.edu/graduation/apply-to-graduate>.

Further information on university and general regulations may be obtained from the University of Idaho College of Graduate Studies at www.uidaho.edu/cogs/ and the registrar at www.uidaho.edu/registrar/forms.html (Appendix B).

Procedures for the Master of Science in Mechanical Engineering (thesis) Degree

1. Upon acceptance into the degree program, you will be notified of any undergraduate course deficiencies which must be fulfilled. To prepare to choose a major professor to work with, review the faculty research area information in this handbook (Appendix A) and contact faculty with mutual research interests.
2. **Major Professor:** Before completion of three classes, you must concur on the nomination of your major professor with your department chair and your potential major professor. The Appointment of Major Professor and/or Committee form, found at <http://www.uidaho.edu/cogs/forms>, must be submitted to the Mechanical Engineering office to officially make the appointment. You may appoint your major professor before selection of your graduate committee, and must do so before you can create and submit your Study Plan.
3. **Committee:** Your supervisory committee will be nominated by your major professor in consultation with you and the department chair. The committee must include:
 - A. the major professor as chair
 - B. an additional member from the Mechanical Engineering Department;
 - C. one member from another department.

Additional members may be appointed if desired. All committee members must be UI faculty or UI affiliate faculty members. At least fifty percent (50%) of the committee members must be graduate faculty.

4. **Study Plan:** Awarding of your degree is contingent upon completion of a Study Plan which is filled out by you in consultation with your major professor. Your plan must be prepared by the time you have completed three classes. Include only courses needed for your 30-credit degree on the plan, which you complete and submit for approval on line; no paper forms are used.

Your study plan is just a plan and may need alterations before you finish. To change an approved study plan, go to <http://www.uidaho.edu/registrar/graduation/audit> and choose the video, "Updating an Approved Study Plan," for complete instructions.

To create your plan:

- A. Go to your Degree Audit on the web and select "Planner."
- B. Select "Study Plan Help" and view the 8-minute tutorial. This is an important step which will assure that you fill out the plan correctly the first time. The tutorial is short, pertinent, and complete. PLEASE USE IT!
- C. On the planner, enter courses you have already taken for your master's degree, any courses you intend to transfer, and those you still plan to take. Do not include any specific semesters on your plan, as course offerings can and will change.
- D. Save your plan and submit it for approval. Your major professor will then either approve your plan, or send it back to you for alteration.
- E. After approval by the department chair, the plan is sent electronically to the College of Graduate Studies.

5. Final Comprehensive Exam: The final comprehensive examination is scheduled and administered by your major professor. All supervisory committee members must be present at this examination. You must prepare and post an announcement of the defense, usually the abstract, at least a week before your defense. This announcement should include the title and abstract, your name as presenter, day, time, and location.

In the first hour of the exam you will present your thesis. Following a ten-minute break, an oral examination will be given on course work and/or matters related to the thesis. At the completion of this oral examination, it will be decided if an additional written examination will be required at a later date.

The Request to Proceed to Final Defense form (found at <http://www.uidaho.edu/cogs/forms>) must be submitted to the College of Graduate Studies before your defense. When you turn in the preceding form, you will receive from COGS the Report of Final Defense form which must be signed by your committee after the defense, and submitted to the College of Graduate Studies by your major professor.

A copy of the title page of your thesis must be attached to the Report of Final Defense form, and the completed thesis submitted within six months of your final defense.

6. Submission of your thesis: Complete instructions for format and submission are found in the Graduate Handbook for Theses and Dissertations (www.uidaho.edu/cogs/). It is important to follow the instructions to the letter!

In addition to the two copies of the thesis required by the College of Graduate Studies, one unbound copy with a completed signature page is required by the Mechanical Engineering Department. The ME Department copy need not be on special paper. It is wise to have extra signature pages completed.

If you desire a bound copy of your thesis for yourself or your major professor, be sure to make arrangements with the ME office staff or with UI Printing and Design.

7. Your Application for Advanced Degree, found on the Registrar's website at <http://www.students.uidaho.edu/default.aspx?pid=19797> should be completed on-line when you are within one semester of completing your degree.

Further information on university and general regulations, including required forms and Graduate Handbook for Theses and Dissertations, is available from the University of Idaho College of Graduate Studies at www.uidaho.edu/cogs/ and the Registrar at www.uidaho.edu/registrar/forms.html (Appendix B).

Procedures for Candidates for Ph.D. Degree

1. Upon acceptance into the degree program, you will be notified of any undergraduate course deficiencies which must be fulfilled. To prepare to choose a major professor to work with, review the faculty research area information in Appendix A of this handbook and contact faculty with mutual research interests.
2. **Major Professor:** Before completion of three classes, you must concur on the nomination of your major professor with your department chair, and your potential major professor. The Appointment of Major Professor and/or Committee form, found at <http://www.uidaho.edu/cogs/forms>, must be submitted to the Mechanical Engineering office to officially make the appointment. You may appoint your major professor before selection of your graduate committee, and must do so before you can create and submit your Study Plan.
3. **Qualifying Examination:** The Ph.D. qualifying examination, administered within the first year and before completion of the bulk of course work, is designed to evaluate your preparation for doctoral course work and provide guidance in planning your Ph.D. program. The examination consists of a two-hour oral in specified subject areas at the advanced undergraduate level, possibly followed by a written exam in the same subject areas. Areas of expected qualification are:
 - A. Energy and Energy Design—Thermodynamics, Heat Transfer, Fluid Mechanics, and Energy Design. (Course preparation:* Engr 320, ME 345, and Engr 335 or equivalent)
 - B. Applied Mechanics and Mechanical Design—Statics, Dynamics, Mechanics of Materials and Machine Design. (Course preparation:* Engr 210, Engr 220, Engr 350 and ME 425 or equivalent)
 - C. Mathematics, numerical methods and programming. (Course preparation:* Math 310, ME 123/223 and additional computer and mathematics experience)

In lieu of the foreign language proficiency requirement, the ME department requires demonstrated proficiency in numerical methods and computer programming. This requirement may be satisfied by successful completion of courses, or other evidence of proficiency.

The department chair in consultation with the major professor will appoint examiner(s) in each area. You may, at the discretion of the examining committee, be exempted from the written part of the exam because of exemplary performance on the oral portion.

Dates for the oral examination are to be arranged with personnel in the Mechanical Engineering Department office.

Results of the examination must be communicated to the department chair in a memo from the committee chair which is put into the student's file.

*Course numbers shown are from the current University of Idaho General Catalog.

4. **Study Plan:** Your Study Plan, filled out in consultation with your major professor, must be prepared and approved soon after completion of your qualifying examination. To create your plan, go to your Degree Audit on the web and select “Planner.” Select “Study Plan Help” and view the 8-minute tutorial. This is an important step which will assure that you fill out the plan correctly the first time. The tutorial is short, pertinent, and complete. PLEASE USE IT!

Your study plan is just a plan and may need alterations before you finish. To change an approved study plan, go to <http://www.uidaho.edu/registrar/graduation/audit> and choose the video, “Updating an Approved Study Plan,” for complete instructions.

5. **Committee:** Your supervisory committee will be nominated by your major professor in consultation with you and the department chair. The committee must include:
 - A. the major professor, a full member of the UI graduate faculty, as chair;
 - B. an additional member from the major field;
 - C. one member from a supporting field;
 - D. one member from outside the major field.

All of these must be UI faculty or affiliate faculty members. Additional members may be appointed if needed. At least fifty percent (50%) of the committee must be members of the graduate faculty.

6. **Preliminary Examination:** When a majority of the course requirements on the study plan have been completed, a preliminary exam, written and oral, will be given under direction of your major professor. The purpose of this exam is to ensure that you adequately review and integrate completed course work, and have the necessary technical knowledge upon which to base the doctoral research. You are encouraged to seek additional direction from your graduate committee on preparation for the exam.

You will be expected to complete an eight-hour written examination on graduate-level concepts in either open or closed book form at the discretion of the supervisory committee. This examination is usually scheduled in two four-hour sessions on successive days.

A two-hour oral examination will follow the written examination at a later date. Broad areas to be covered are those listed in the study plan. Upon successful completion of the exam, you are advanced to candidacy.

Dissertation Proposal: The examination includes presentation of a written dissertation proposal and/or progress report to the supervisory committee. Committee members will sign and date the front page of the proposal, indicating acceptance.

Report of Preliminary Examination and Advancement to Candidacy form: Obtained from the COGS website (<http://www.uidaho.edu/cogs/forms>), must be filled out and submitted to the College of Graduate Studies on completion of the exam and presentation.

7. **Final Ph.D. Examination:** Administered by the major professor, this examination may be taken no earlier than five months after advancement to candidacy. Ten days prior to the

examination, a near-final copy of the dissertation must be submitted to supervisory committee members, all of whom must be present at the examination.

8. Request to Proceed with Final Defense of Dissertation/Thesis Form: The completed form (obtained from the COGS website, above) must be submitted to the College of Graduate Studies at the beginning of the semester in which the student intends to graduate.

You will receive from the College of Graduate Studies the Final Defense Report form that must be signed by your committee after the defense, and submitted to the College of Graduate Studies by the major professor.

9. Doctoral Dissertation Defense: At the conclusion of your research project, a date is arranged with the supervisory committee for you to defend your dissertation. Two weeks before the chosen date, the dissertation defense must be announced on a simple poster with your name and that of your major professor; the date, time and location of the defense; the dissertation topic and a short narrative of the subject matter.

A draft of the dissertation is submitted to members of the supervisory committee at least one week prior to the date of the defense. The defense consists of a one-hour presentation followed by 30 minutes of questions. After deliberation, the supervisory committee may require further research or edits to the dissertation.

10. Submitting the final dissertation: Complete instructions for format and submission are found in the Graduate Handbook for Theses and Dissertations. It is important to follow the instructions to the letter.

In addition to the two copies of the dissertation required by the College of Graduate Studies, one unbound copy with a completed signature page is required by the Mechanical Engineering Department. It is wise to have extra signature pages completed.

If you wish to have a bound copy, be sure to make arrangements with ME office staff or with UI Printing and Design.

Further information on university and general regulations, the Graduate Handbook for Theses and Dissertations, and necessary forms are on the University of Idaho College of Graduate Studies website at www.uidaho.edu/cogs/.

Appendix A. Faculty Research Areas Mechanical Engineering Department

Moscow Faculty

Michael J. Anderson, Ph.D., P.E., Professor

Acoustics in fluids and solids; transducer design.

anderson@uidaho.edu;

homepage <http://calvin.engr.uidaho.edu/~anderson/mikea.htm>

Steven W. Beyerlein, Ph.D., Professor

Catalytic ignition systems for spark-ignition and compression-ignition engines. Engine testing. Design and delivery of faculty development activities. Application of educational research methods in engineering courses.

sbeyer@uidaho.edu;

homepage http://222.uidaho.edu/engr/ME/faculty/s_beyerlein.htm

John C. Crepeau, Ph.D., P.E., Professor; Chair, Mechanical Engineering Department

Solidification of materials with internal heat generation; transition to turbulence in fluid flow and fluid stability; flow visualization; high temperature thermocouple measurements.

crepeau@uidaho.edu

Karen R. Den Braven, Ph.D., Professor and Associate Department Chair

Design and installation of geothermal or ground-coupled heat pump systems; alternative snowmobile design.

kdenb@uidaho.edu; homepage <http://www.uidaho.edu/~kdenb>

Donald F. Elger, Ph.D., P.E., Professor

Heat transfer; fluid mechanics; methodologies for engineering problem-solving and design.

delger@uidaho.edu; homepage <http://www.uidaho.edu/~delger/>

Jay P. McCormack, Ph.D., Assistant Professor

Design methodology, computational design, entrepreneurship, artificial intelligence, optimization.

mccormack@uidaho.edu

Edwin M. Odom, Ph.D., P.E., Professor

Applied mechanics and manufacturing; experimental stress analysis; TQM.

eodom@uidaho.edu

Steven G. Penoncello, Ph.D., P.E., Professor

Thermophysical properties of fluids and fluid mixtures, determination of equations of state for fluids and fluid mixtures of engineering interest.

stevep@uidaho.edu; homepage <http://stevep.engr.uidaho.edu/>

Gabriel Potirniche, Ph.D., Assistant Professor

Multiscale modeling of plasticity and damage behavior in metals, fatigue and fracture, constitutive modeling for metallic alloys, atomistic simulations, crystal plasticity, anisotropic plasticity, finite element method, solid mechanics, stress analysis.
gabrielp@uidaho.edu

Karl K. Rink, Ph.D., Associate Professor

Combustion, gas dynamic and thermodynamic research with emphasis in rapid detonations, confined explosions, and energetic materials; combustion component design in propulsion systems including gas turbines and rockets; leak rate determination in small cavity devices.
karlrink@uidaho.edu

Robert R. Stephens, Ph.D., P.E., Professor

Materials properties measurements and modeling; failure analysis, fatigue and fracture.
bstephen@uidaho.edu;
homepage http://www.uidaho.edu/engr/ME/faculty/r_stephens.htm

Eric T. Wolbrecht, Ph.D., Assistant Professor

Robotics, non-linear control, adaptive control, rehabilitation robotics, pneumatic control, and compliant actuation.
ewolbrec@uidaho.edu

Boise Faculty

Ralph S. Budwig, Ph.D., P.E., Professor; Acting Director, U of I Engineering Programs in Boise

Fluid dynamics and turbulent transport; optical measurement techniques; cardiovascular fluid dynamics; hydrodynamic and acoustic manipulation of particles and droplets; laboratory and design pedagogy.
rbudwig@uidaho.edu; homepage http://www.webs1.uidaho.edu/ralph_budwig/

Judi A. Steciak, Ph.D., P.E., Professor

Applied combustion research, especially reducing air pollutants released from combustion systems, including pollutants created from fossil fuels, renewable transportation fuels, and biomass, and contaminants released from unwanted fires caused by industrial accidents.
jsteciak@uidaho.edu; homepage <http://www.webs1.uidaho.edu/niatt/>

Idaho Falls Faculty

Ali Siahpush, Ph.D., , Affiliate Associate Professor
Sr. Mechanical Engineer/Research Scientist
Coordinator, U. of I. Idaho Falls Mechanical Engineering unit

Akira T. Tokuhiko, Ph.D., Associate Professor
Nuclear reactor engineering, nuclear systems design, reactor safety, thermohydraulics, thermal fluid sciences, experiments, ultrasonic and particle image velocimetry, computational fluid dynamics, convective heat transfer, measurement methods, modeling of complex processes, applied facial and voice biometrics and assistive technology robotics, human factors, technology assessment and policy.
tokuhiko@uidaho.edu

An additional Idaho Falls faculty member will be in place soon.

Appendix B. Forms and Handbooks

Form/Handbook	Degree	Where Available
Appointment of Major Professor and/or Committee	ME, MS, PhD	www.grad.uidaho.edu
Study Plan, Change of Study Plan, Change of Curriculum	ME, MS, PhD	www.grad.uidaho.edu
Application for Advanced Degree	ME, MS, PhD	www.uidaho.edu/registrar complete the application online
Add/Drop Form	ME, MS, PhD	www.uidaho.edu/registrar
Non-Thesis Requirement Report	ME	www.grad.uidaho.edu
Qualifying Examination Result Memo	PhD	Written by the chair of the examination committee and sent to the department chair.
Report of Preliminary Examination and Advancement to Candidacy	PhD	www.grad.uidaho.edu
Request to Proceed to Final Defense	MS, PhD	www.grad.uidaho.edu
Report of Final Defense	MS, PhD	College of Graduate Studies (208) 885-6243 uigrad@uidaho.edu
Graduate Handbook for Theses and Dissertations	MS, PhD	www.grad.uidaho.edu
College of Graduate Studies Bulletin	ME, MS, PhD	College of Graduate Studies (208) 885-6243 uigrad@uidaho.edu