

# 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/>.

March 20, 2017

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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: <https://www.uidaho.edu/idaho-falls/academic-programs/engr/ne-degrees> or contact Dr. Richard Christensen, [rchristensen@uidaho.edu](mailto:rchristensen@uidaho.edu), or Alice Allen, [alicew@uidaho.edu](mailto: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. GRE general test results are required for all other applicants. 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:

<u>Area</u>	<u>Suggested Scaled Score</u>	<u>Approximate Percentile Rank</u>
Verbal (reading comprehension, scale of 130-170, one-point increments)	151	50 <sup>th</sup>
Quantitative (basic Math and problem solving skill, scale of 130-170, one-point increments)	153	65 <sup>th</sup>
Analytical Writing (critical thinking & writing, scale 0-6, half-point increments)	4.0	50 <sup>th</sup>

### 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 following are acceptable as proof of English competency for students for whom English is not their primary language. The substitutions are considered to be equivalent to a TOEFL (Test of English as a Foreign Language) score of 550.

- TOEFL (Test of English as a Foreign Language) minimum score of 550 on the paper test or 79 on the internet test. (see below)
- IELTS (Internationall English Language Testing System) minimum score, 6.5.
- MELAB (Michigan English Language Assessment Battery) score of 77.
- UI American Language & Culture Program (ALCP with a Level 6 Pass.
- U.S. Education earned degree at an accredited institution OR successfully completed English composition courses at the discretion of the Graduate Admissions Office.

TOEFL:

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Area	Internet Based	Minimum Score
Listening	Score of 0 - 30	21
Structure/Writing	Score of 0 - 30	21
Reading	Score of 0 - 30	21
Speaking	Score of 0 - 30	21
Total	0 - 120	79

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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 70<sup>th</sup> 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 Student Credit Requirement

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:

- when a student is in his/her final semester and does not need full credit to graduate;
- for medical reasons, which requires verification from a doctor;
- 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 580 Linear System Theory
- 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.

A combined total of up to 12 non-degree credits, transfer credits, correspondence credits, and approved credits more than eight years old at the time the degree is awarded are accepted 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 ME or from other appropriate departments as approved by supervisory committee and department chairman	6–9
Research and Thesis	6–9
<b>TOTAL</b>	<b>30</b>

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.

ME 501 Graduate Seminar, 1 credit, should be taken three semesters. Although required, do not include this on your Study Plan.

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
Other technical electives in ME or from other appropriate departments as approved by supervisory committee and department chairman	9
<b>TOTAL</b>	<b>30</b>

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

Note: ME 500 research credits will not count toward the MEME degree.

ME 501 Graduate Seminar, 1 credit, should be taken three semesters by on-campus students, but does not count toward the 30-credit degree. Do not include it on your study plan.

University of Idaho policy requires that graduate gpas be above 3.0. If the gpa is less than 3.0 in any semester, a student is placed on probation; 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. Additional details of the individual program for the doctoral degree are established by the supervisory committee in consultation with the student.

General university guidelines require:

- A minimum of 78 credits beyond the bachelor's degree;
- At least 52 credits in courses numbered 500 and above, including research and dissertation;
- At least 33 of the 78 credits must be in courses other than Doctoral Research and Dissertation.
- A doctoral student must complete at least 39 of the 78 required credits at UI while matriculated in the College of Graduate Studies.
- Individual departments may require additional course work.
- University of Idaho policy requires that graduate gpas be above 3.0. In any 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:

- At least one-third of credits beyond the bachelor's degree must be in research (26 cr.).
- Additional coursework beyond the 33 credits required above.
- ME 501 Graduate Seminar, 1 credit, should be taken three semesters. It does not count toward your 78 credit total; do not include it on your Study Plan.

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**

- At least one-half of the credits beyond the bachelor's degree must be in M.E. courses.
- A maximum of 30 credits may be more than eight (8) years old when the degree is conferred if approved by the major professor and committee.
- 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.

## Planned Graduate Course Offerings

The plan below lists the courses we intend to teach; it will undoubtedly change.

Class	F14	S15	F15	S16	F16	S17	F17	S18	F18
<b><i>Mechanics and Materials Science</i></b>									
ME 425 Advanced Machine Design									
ME 461 Fatigue & Fracture Mechanics	X		X		X		X		X
ME 534V Mech. of Composite Materials (MSE 536)	X								
ME 539 Advanced Mech. of Materials (MSE 539)	X								X
ME 548V Elasticity (CE 548)		X							
ME 549V Finite Element Analysis (CE 546)			X			X			
<b><i>Dynamic Systems</i></b>									
ME 4/513V Engr Acoustics (ECE 579)	X	X	X	X	X	X	X EO	X	X
ME 4/564 Robotics: Kinematics, Dynamics & Control	X		X		X	X			X
ME 472 Mechanical Vibrations	X	X	X	X	X	X	XEO	X	X
ME 481 Control Systems (ECE470)	X		X		X				X
ME 578V Neural Network Design (ECE 578)		X		X				X	
ME 580V Linear System Theory (ECE 572)									
ME 581V Fuzzy Logic Control Systems (ECE 573)									
<b><i>Fluid Mechanics and Heat Transfer</i></b>									
ME 412V Gas Dynamics		X		X		X		X	
ME 4/517V Turbomachinery			X		X				
ME 519V Fluid Transients (CE519)									
ME 4/520V Fluid Dynamics (CE 4/520)	X		X			X	X		X
ME 544V Heat Conduction			X						
ME 4/550 Computational Fluid Dynamics		X		X		X		X	
ME 546V Convective Heat Transfer					BSU				
ME 547V Thermal Radiation Processes									X
ME 4/551 Exper. Meth. Fluid Dyn. & Heat Transfer			X						
<b><i>Thermodynamics and Energy</i></b>									
ME 4/514V HVAC Systems		X		X		X		X	
ME 422V Applied Thermodynamics		X		X				X	
ME 433 Combustion Engine Systems		Su15							
ME 444V Air Conditioning Engineering									
ME 526V Statistical Thermodynamics									
ME 527 Advanced Thermodynamics									

	F14	S15	F15	S16	F16	S17	F17	S18	F18
<b>Computational Design and Simulation</b>									
ME 421 Advanced Computer-Aided Design	X	X	X	X	X	X	X	X	X
ME 490 Solid Modeling, Simulation & Mfg	X		X		X		X		X
ME 521 Design Synthesis with Solid Modeling									
<b>Manufacturing and Engineering Management</b>									
ME 410 Lean Manufacturing		Su15		Su16		Su17		Su18	
ME 4/577 Design for Manufacture and Assembly		X				X			
ME 583V Reliability of Engr Systems (CE 541)									
ME 585 Design for Six Sigma									
ME 587V Quality Engineering (EM 587)									
EM 504 Lean Management									
EM 510 Engr Management Fundamentals									
EM 599 Engineering Management Project									
<b>Other Classes</b>									
ME 4/523 Human Factors Engineering		X		X		X		X	
ME 529V Combustion and Air Pollution			X		X		X		
ME 540V Continuum Mechanics (CE 540)		X		X		X		X	
ME 541 Mechanical Engineering Analysis	X		X				X		X
ME 4/552 TechVentures:High Tech Entrepreneurship			X						X
ME 571 Building Perf Simulation for Integrated Des			X						
<b>NEW COURSES</b>									
ME 404 ST: Assistive Robotic Technology							X		
ME 4/504 Finite Element Applications in Engineering	X				X				X
ME 404 Computational Design & Optimization			X						
ME 4/550 Computational Fluid Dynamics									
ME 4/551 Experimental Methods in Fluid dynamics									
ME 515 Transport Phenomena									
<b>Nuclear Engineering</b>									
NE 450 Fundamentals of Nuclear Engineering	X		X		X		X		X
NE 565 Reactor Engineering		X		X		X		X	

Please pay attention to this legend:

**Su** indicates course is offered in summer

**V** indicates course is offered through Engineering Outreach (EO)

(ECE), (MSE) or (CE) indicates that the course may be taught by Electrical & Computer Engineering, Materials Science Engineering, or Civil Engineering. Check with those departments to find out.

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: All degree-seeking graduate students are required by the department and the College of Graduate Studies to select or be assigned a major professor within the first year of enrollment in the program. Non-thesis students are strongly encouraged to do this even earlier; preferably by the end of the first semester. The major professor must be a member of the U of I Graduate Faculty. Fill out the Appointment of Major Professor form found here <http://www.uidaho.edu/cogs/forms>, and submit it to the Mechanical Engineering office for the department chair's approval. You must appoint your major professor before submitting your Study Plan.
3. Supervisory Committee: A supervisory committee is not required for the MEME degree.
4. Study Plan: To earn your degree you must first complete a Study Plan which is filled out by you in consultation with your major professor. Your plan must be prepared and submitted on line by the time you have completed three classes. Include only courses needed for your 30-credit degree on the plan. Do not include ME 501 Seminar.

To create your plan:

- Go to your Degree Audit on the web and select "Planner."
- Click on **Study Plan Help** which is in **green print** at the upper right-hand on the Planner, then select "Creating & Entering a New Study Plan" for COMPLETE and simple instructions. It's a piece of cake. You can't fail if you follow the instructions.
- On the planner, enter courses you have already taken for your master's degree, 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; rather use Plan Part 1, and if necessary, Plan Part 2.
- Save your plan and submit it for approval. Your major professor will either approve your plan and send it on, or send it back to you for alteration.
- After approval by the department chair, the plan is sent electronically to the College of Graduate Studies.

Your study plan is just a plan and may need changing. The best time to correct your plan is early in the semester you will graduate.

To change an approved study plan, go to Vandal web, choose "Students," then "Degree Audit and Transcripts." The study plan change option is at the bottom of the page.

5. Completion: In your final semester, you will choose one of these options:
  - 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.
  - 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.

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:

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

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

Guidelines:

- Presentation time: 20 to 25 minutes (similar to most technical conference presentations), hence 20 to 25 PowerPoint slides.
- Paper length: five pages minimum, single spaced.
- Total duration: reserve one hour block for conference call; reserve two hours for on-campus visit because the presentation time is included.
- Examination committee: three faculty who taught classes relevant to the presentation/paper.
- The Non-Thesis Requirement Report Form, available on the COGS website under FORMS, must be completed by your major professor and delivered to COGS.
- 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. Application is completely electronic on VandalWeb.

NOTE: Each year in April COGS requires that you and your Major Professor complete and submit to COGS the Annual Report of Progress and Performance for Master's Students. This form is on the COGS website in Forms. The student is responsible for initiating the form. You need not complete this form the year you will graduate with your Master's Degree.

Further information on university and general regulations may be found here [www.uidaho.edu/cogs](http://www.uidaho.edu/cogs) and the registrar at [www.uidaho.edu/registrar](http://www.uidaho.edu/registrar) (Appendix B).

The College of Graduate Studies website can be particularly helpful, especially the guides which cover subjects from “...*Tips for Success as a Graduate Student*” all the way to “*Graduation, Commencement, Diplomas, Transcript Requests and Letter of Completion.*” Go to: <http://www.uidaho.edu/cogs/degree-steps>.

## 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. **Nomination of Major Professor:** All degree-seeking graduate students are required by the department and the College of Graduate Studies to select a major professor within the first semester of enrollment in the program. Fill out the Appointment of Major Professor form, found here <http://www.uidaho.edu/cogs/forms>, and submit it to the Mechanical Engineering office for the department chair's approval. 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:** Choose your committee in consultation with your major professor. This is usually done after semesters of course work and research. The committee must include your major professor as chair, and two members. All members must be UI faculty, adjunct/affiliate faculty members, or on the graduate faculty at another institution. At least fifty percent (50%) of the committee members must be graduate faculty.

Additional members may be appointed if desired. Appointment of a committee member not meeting the aforementioned criteria can be granted on a case-by-case basis with permission of the Dean of the College of Graduate Studies.

4. **Study Plan:** To earn your degree you must first complete a Study Plan which is filled out by you in consultation with your major professor. Your plan must be prepared and submitted on line by the time you have completed three classes. Include only courses needed for your 30-credit degree on the plan. Do not include ME 501 Seminar.

To create your plan:

- Go to your Degree Audit on the web and select "Planner."
- Click on **Study Plan Help** which is in **green print** at the upper right-hand on the Planner, then select "Creating & Entering a New Study Plan" for COMPLETE and simple instructions. It's a piece of cake. You can't fail if you follow the instructions.
- On the planner, enter courses you have already taken for your master's degree, 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; rather use Plan Part 1, and if necessary, Plan Part 2.
- Save your plan and submit it for approval. Your major professor will either approve your plan and send it on, or send it back to you for alteration.
- After approval by the department chair, the plan is sent electronically to the College of Graduate Studies.

Your study plan is just a plan and may need alterations before you finish. The best time to correct your plan is early in the semester you will graduate. By then all your changes should have happened.

To change an approved study plan, go to Vandal web, choose "Students," then "Degree Audit and Transcripts." The study plan change option is at the bottom of the page.

5. **Final Defense:** The final defense is scheduled in conjunction with your major professor. All committee members must be present at this examination. Ten days before your defense you are expected to post your abstract with date, time, and location of the event.

The Request to Proceed to Final Defense form (<http://www.uidaho.edu/cogs/forms>) must be submitted to the College of Graduate Studies before your defense. Turn in the completed form to the ME Office for submission, after which 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.

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. After this session, it will be decided if a written examination will be required at a later date.

Submission of your thesis is now 90% electronic. Best advice is to go to this link: <http://www.uidaho.edu/cogs/degree-steps> and find *Thesis & Dissertation Resources, Preparing, Defending and Submitting Your Thesis or Dissertation*.

If at any time during your submission process you have questions please do not hesitate to contact our thesis/dissertation advisor Melinda Deyasi ([melindad@uidaho.edu](mailto:melindad@uidaho.edu)), or Cheri Cole ([cheric@uidaho.edu](mailto:cheric@uidaho.edu)) in the COGS office.

One unbound copy with a completed signature page is required by the Mechanical Engineering Department. This copy need not be on special paper and should be printed front-and-back (duplex).

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 Copy Center.

7. Your Application for Advanced Degree should be submitted on VandalWeb when you are within one semester of completing your degree.

NOTE: Each year in April COGS requires that you and your Major Professor complete and submit to COGS the Annual Report of Progress and Performance for Master's Students. This form is on the COGS website in Forms. The student is responsible for initiating the form. You need not complete this form the year you will graduate with your Master's Degree.

The College of Graduate Studies website can be particularly helpful, especially the "Steps to Your Degree" which cover subjects from ... *Tips for Success as a Graduate Student* all the way to *Graduation, Commencement, Diplomas, Transcript Requests and Letter of Completion*. Go to <http://www.uidaho.edu/cogs/degree-steps>.

## 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:** Select a major professor within the first semester of enrollment in the program. Fill out the Appointment of Major Professor form, found here <http://www.uidaho.edu/cogs/forms>, and submit it to the Mechanical Engineering office for the department chair's approval. 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:
  - Energy and Energy Design—Thermodynamics, Heat Transfer, Fluid Mechanics, and Energy Design. (Course preparation:\* ME 322, ME 345, and Engr 335 or equivalent)
  - Applied Mechanics and Mechanical Design—Statics, Dynamics, Mechanics of Materials and Machine Design. (Course preparation:\* Engr 210, Engr 220, Engr 350 and ME 325 or equivalent)
  - 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. Your Study Plan, filled out in consultation with your major professor, must be prepared and approved soon after completion of your qualifying examination, and by the end of your third semester. Instructions for entering the plan on line can be found here: <http://www.uidaho.edu/cogs/degree-steps>. Scroll down to find, *Doctoral Study Plan and Degree Audit*," at the link above. Include only courses needed for your 78-credit degree on the plan. Do not include ME 501 Seminar. Using the helpful guides is a step which will assure that you fill out the plan correctly the first time. Do not fill out your plan by semester, but use Plan Part I and, if necessary, Plan Part II.

Your study plan is just a plan and may need alterations before you finish. The Study Plan can be changed at the link for this action on VandalWeb. You will be emailed on the approval progress of the change.

5. Committee: Choose your committee in consultation with your major professor. The committee must include your major professor as chair, and three members. All members must be UI faculty, adjunct/affiliate faculty members, or on the graduate faculty at another institution. At least fifty percent (50%) of the committee members must be graduate faculty.

Additional members may be appointed if desired. Appointment of a committee member not meeting the aforementioned criteria can be granted on a case-by-case basis with permission of the Dean of the College of Graduate Studies.

6. Preliminary Examination:

- When the majority of the course requirements on your study plan have been completed, your major professor will administer your preliminary examination. The purpose of the preliminary exam is to ensure that you have adequate technical knowledge to carry out the required research for your doctoral dissertation. The subject matter of the exam is decided by your major professor and committee members, and is primarily based upon your course work and doctoral research topic. We encourage you to visit with your major professor and committee members to decide on the date and time of the examination, but it should be taken no later than two years after the beginning of your doctoral studies.
- 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 one eight-hour session, or two four-hour sessions on successive days.
- At the conclusion of the examination, the Report of Preliminary Examination and Advancement to Candidacy form, [www.uidaho.edu/cogs/forms](http://www.uidaho.edu/cogs/forms), must be filled out and submitted to the College of Graduate Studies.
- Dissertation Proposal: At the discretion of the major professor, the candidate may give to the supervisory committee a presentation which covers the subject and scope of the dissertation research topic and/or a progress report.

7. **Doctoral Dissertation Defense:** At the conclusion of your research project, a date is arranged with your committee for defense of your dissertation, a one-hour presentation followed by 30 minutes of questions. After deliberation, the supervisory committee may require further research or edits to the dissertation.

The completed Request to Proceed with Final Defense of Dissertation/Thesis form (obtained from the COGS website, above) should be submitted to the College of Graduate Studies as soon as a date for the defense has been chosen, or at the beginning of the semester in which you intend to graduate. In return for the completed Request form, you will receive from the College of Graduate Studies the Final Defense Report form to be signed by your committee after the defense, and submitted to the College of Graduate Studies by your major professor.

A draft of your dissertation should be submitted to committee members at least two weeks prior to the date of the defense.

Two weeks before the chosen date, the dissertation defense must be announced on a simple poster: 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.

8. **Submitting the final dissertation:** See page 13 of this Handbook under “Submission of your thesis.”

One unbound copy of your dissertation is required by the Mechanical Engineering Department for our library. **This copy need not be on special paper and should be printed front-and-back (duplex).**

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

NOTE: Each year in April COGS requires that you and your Major Professor complete and submit to COGS the Annual Evaluation and Performance Report for Doctoral Students. You can find this form on the COGS website in Forms. The student is responsible for initiating the form. You need not complete this form the year you will graduate with your PhD degree.

For further information on university and general regulations regarding the Ph.D. degree, see the University of Idaho College of Graduate Studies website at <http://www.uidaho.edu/cogs/>, and especially the guides at <http://www.uidaho.edu/cogs/degree-steps>.

## Appendix A. Faculty Research Areas

### Moscow Faculty

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

Acoustics in fluids and solids; transducer design.

[anderson@uidaho.edu](mailto:anderson@uidaho.edu)

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

Steven W. Beyerlein, Ph.D., Professor; Chair, Mechanical Engineering Department

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](mailto:sbeyer@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/steven-beyerlein>

Dan Cordon, Ph.D., Clinical Assistant Professor

Engine characterization, modeling, modification, calibration, and dynamometer testing; vehicle design including suspension, propulsion, energy storage, and human interface; study and application of active learning in engineering classroom environments.

[dcordon@uidaho.edu](mailto:dcordon@uidaho.edu)

<http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/dan-cordon>

John C. Crepeau, Ph.D., P.E., Professor

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](mailto:crepeau@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/john-crepeau>

Kamal Kumar , Ph.D., Assistant Professor

Energy conversion; combustion; alternative fuels; chemical kinetics; catalytic combustion; internal combustion engines.

[kkumar@uidaho.edu](mailto:kkumar@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/kamal-kumar>

Michael Maughan, Ph.D., Clinical Assistant Professor

Micromechanics of materials; defect behavior in crystalline materials; product design and development; additive manufacturing and material property manipulation.

[maughan@uidaho.edu](mailto:maughan@uidaho.edu)

Homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/michael-maughan>

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

Applied mechanics and manufacturing; experimental stress analysis; TQM.

[edom@uidaho.edu](mailto:edom@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/edwin-odom>

Joel Perry, Ph.D., Assistant Professor

Rehabilitation and surgical robotics; mechanism design; human movement analysis; neurorehabilitation and motor recovery methods; anthropomorphic design.

[jperry@uidaho.edu](mailto:jperry@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/joel-perry>

Gabriel Potirniche, Ph.D., P.E., 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](mailto:gabrielp@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/gabriel-potirniche>

Behnaz Rezaie, Ph.D., Assistant Professor

Energy; renewable energy; district energy; thermal energy storage; environmental impact assessment; integrated energy systems; modeling and simulation of energy systems; thermodynamics; heat transfer.

[rezaie@uidaho.edu](mailto:rezaie@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/behnaz-rezaie>

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

Materials properties measurements and modeling; failure analysis, fatigue and fracture.

[bstephen@uidaho.edu](mailto:bstephen@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/robert-stephens>

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

Robotics, non-linear control, adaptive control, rehabilitation robotics, pneumatic control, and compliant actuation.

[ewolbrec@uidaho.edu](mailto:ewolbrec@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/eric-wolbrecht>

Tao Xing, Ph.D., P.E., Associate Professor

Computational fluid dynamics, renewable energy, turbulence, ship hydrodynamics, cavitation, verification & validation for numerical simulations.

[xing@uidaho.edu](mailto:xing@uidaho.edu)

homepage <http://www.taoring.net/>

## 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](mailto:rbudwig@uidaho.edu)

homepage <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/ralph-budwig>

## Idaho Falls Faculty

Fatih Aydogan, Ph.D., Assistant Professor

Nuclear reactor engineering, advanced nuclear systems, computational modeling, two phase flow, thermal-hydraulics, thermal fluid sciences, light water and advanced reactors, small modular reactors, nuclear safety and thermal-hydraulics experiments and uncertainty-best estimate methodologies.

[fatih@uidaho.edu](mailto:fatih@uidaho.edu)

homepage: <http://www.uidaho.edu/engr/academic-departments/me/our-people/faculty/fatih-aydogan>

Robert Borelli, Ph.D., Assistant Professor, Nuclear Engineering

Safeguards-by-design, modeling, fuel cycle analysis, scientific computing

[rborrelli@uidaho.edu](mailto:rborrelli@uidaho.edu)

Richard Christensen, Ph.D., Director of Nuclear Engineering at Idaho Falls, U of I Idaho Falls Mechanical Engineering Coordinator

Design, fabrication and testing of heat exchangers for advanced reactors, single and two-phase fluid flow, heat transfer

[rchristensen@uidaho.edu](mailto:rchristensen@uidaho.edu)

Donald McEligot, Ph.D., Adjunct Faculty, Mechanical Engineering

Heat transfer, fluid mechanics, experiments

[don.mceligot@ul.ie](mailto:don.mceligot@ul.ie)

## Emeritus faculty

Fred S. Gunnerson, Ph.D., P.E., Professor Emeritus

Nuclear energy, renewable energy, turbomachinery, fire dynamics, laboratory simulation of thermofluid systems.

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

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

[stevep@uidaho.edu](mailto:stevep@uidaho.edu)

homepage <http://www.uidaho.edu/engr/me/faculty/stevepenoncello>

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

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](mailto:jsteciak@uidaho.edu)

**Karen Den Braven**

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

**Richard T. Jacobson**

**Alan Place**

**David Thompson**

## Appendix B. Forms and Handbooks

Form/Handbook	Degree	Where Available
Appointment of Major Professor and/or Committee	ME, MS, PhD	<a href="http://www.uidaho.edu/cogs/forms">www.uidaho.edu/cogs/forms</a>
Study Plan, Change of Study Plan	ME, MS, PhD	On VandalWeb, submit electronically
Change of Curriculum	ME, MS, PhD	<a href="http://www.uidaho.edu/cogs/forms">www.uidaho.edu/cogs/forms</a>
Application for Advanced Degree	ME, MS, PhD	VandalWeb, complete the application online
Add/Drop Form	ME, MS, PhD	<a href="http://www.uidaho.edu/registrar">www.uidaho.edu/registrar</a>
Non-Thesis Requirement Report	ME	<a href="http://www.uidaho.edu/cogs/forms">www.uidaho.edu/cogs/forms</a>
Qualifying Examination Result Memo	PhD	Written by chair of the examination committee, sent to department chair.
Report of Preliminary Examination and Advancement to Candidacy	PhD	<a href="http://www.uidaho.edu/cogs/forms">www.uidaho.edu/cogs/forms</a>
Request to Proceed to Final Defense	MS, PhD	<a href="http://www.uidaho.edu/cogs/forms">www.uidaho.edu/cogs/forms</a>
Report of Final Defense	MS, PhD	College of Graduate Studies (208) 885-6243 <a href="http://www.uidaho.edu/cogs">www.uidaho.edu/cogs</a>
Theses and Dissertation Resources	MS, PhD	<a href="http://www.uidaho.edu/cogs/degree-steps">http://www.uidaho.edu/cogs/degree-steps</a>
Steps to Your Degree	ME, MS, PhD	<a href="http://www.uidaho.edu/cogs/degree-steps">http://www.uidaho.edu/cogs/degree-steps</a>