

GRADUATE STUDENT HANDBOOK*



University of Idaho

Department of Mechanical 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 www.uidaho.edu/catalog/.

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For additional information on university and general regulations see www.uidaho.edu/cogs and www.uidaho.edu/registrar (Appendix B). The College of Graduate Studies website (www.uidaho.edu/cogs) can be particularly helpful, especially the guides.

Undergraduate Preparation for Graduate Students in Mechanical Engineering

With a B.S. degree in Mechanical Engineering from an accredited U.S. program

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.

With a B.S. degree in a major other than Mechanical Engineering from an 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.

With a B.S. degree from a non-accredited U.S. program

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., Engl 102) and English technical writing (e.g., Engl 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 after appropriate self-study. (See procedures for challenge in UI General Catalog.)

Undergraduate Preparation for Graduate Students in Nuclear Engineering

The University of Idaho Nuclear Engineering Program offers both masters and doctoral degrees. The program is based in Idaho Falls with courses available on a limited basis to students on the Moscow campus. It is taught by faculty from nuclear engineering, mechanical engineering, materials science, computer science, chemical engineering and physics with additional expertise from other professionals in the field. Research areas include those closely aligned with the Department of Energy's (DOE) Idaho National Laboratory (INL) and the Center for Advanced Energy Studies (CAES) at University Place, both located in eastern Idaho. INL is the nation's lead nuclear laboratory. CAES is a collaborative partnership between University of Idaho, Idaho State University, Boise State University, University of Wyoming and INL. The Center for Space Nuclear Research is also located in CAES.

For more information on the program, research capabilities, and assistantship funding, go to www.uidaho.edu/idaho-falls/academic-programs/engr/ne-degrees or contact Dr. Richard Christensen, rchristensen@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. GRE® general test results are required for all other applicants. GRE scores and the applicant's grade point average (GPA) aid our 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:

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

For more information on the GRE®, see <https://www.ets.org/gre>.

International Students

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 (International English Language Testing System) minimum score of 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®

Area	Internet Based	Minimum Score
Listening	Score of 0 - 30	20
Structure/Writing	Score of 0 - 30	19
Reading	Score of 0 - 30	20
Speaking	Score of 0 - 30	20
Total	0 - 120	79

Test of Written English (TWE®)

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:

For more information on the TOEFL®, see <https://www.ets.org/toefl>.

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; and
- for graduate students who have completed all course work and have only thesis or dissertation work remaining.

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

Thirty credits are required for the M.S. and M.Engr. 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.
- 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 Credit Reservation Request Form (www.uidaho.edu/registrar/forms).
- At least three classes that consist primarily of subject material focused in mechanical engineering at the 500 level are required. M. Engr. students must take at least two additional mechanical engineering classes in lieu of thesis/research credits.

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
- A Mathematics/Statistics/Numerical Methods course. 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 currently

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.
- University of Idaho policy requires that graduate GPAs 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.

Classes planned for future semesters are listed beginning on page 15. Please note: The plan is subject to change at any time without notice.

Master of Engineering (M.Engr.) in Mechanical Engineering (Non-thesis Degree)

M.Engr. Degree Requirements

Course Area	Credits
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
TOTAL	30

Upon completion of all course work, students present their work to faculty.

Notes:

- ME 500 research credits will not count toward the M.Engr. 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.**

GPA

University of Idaho policy requires that graduate GPAs be above 3.0. If your GPA is less than 3.0 in any semester, you are placed on probation; if it occurs for two semesters, you are disqualified.

Annual Report of Progress and Performance

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. You are responsible for initiating the form. You need not complete this form the year you will graduate with your Master's Degree.

Procedures for the M.Engr. Degree in Mechanical Engineering (Non-thesis degree)

(Find detailed information on the COGS webpage (<http://www.uidaho.edu/cogs/degree-steps>)).

Upon acceptance into the degree program, you will be notified of any undergraduate course deficiencies which must be fulfilled. More information

Appointment 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 graduate 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 (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.**

Supervisory Committee

A supervisory committee is **not** required for the M.Engr. Degree.

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 entered and submitted online **by the time you have completed three classes** in the program. Include only courses needed for your 30-credit degree on the plan. Do **not** include the ME 501 Seminar.

To create your plan:

- Go to your Degree Audit in VandalWeb and select the "Plans" tab.
- 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 to the College of Graduate Studies.

Study Plan help can be found at <http://www.uidaho.edu/registrar/graduation/audit>. 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.

Completion

You must be enrolled in the university the semester that you complete the final presentation, either in a class or for ME 502 DS: Comprehensive Exam. In your final semester, you will present your work choosing 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. The topic of the presentation will be your choice, however it must be approved by your major professor. The topic 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.

Non-Thesis Requirement Report Form

This form is available on the COGS website (www.uidaho.edu/cogs) under FORMS. It must be completed by your major professor after successful completion of your final presentation. Your form will be given to Debbie Edwards in the ME Department Office, who will submit it to COGS.

Apply for Graduation

Remember to apply for graduation when you are within one semester of completing your degree requirements. The application is on VandalWeb under “Apply to Graduate”.

Master of Science (M.S.) in Mechanical Engineering (Thesis Degree)

Available only in Moscow, Idaho Falls (IFCHE), and Boise

M.S. Degree Requirements

Course Area	Credits
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
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 may be given at a later date. Note: 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.**

GPA

University of Idaho policy requires that graduate GPAs be above 3.0. If your GPA is less than 3.0 in any semester, you are placed on probation; if it occurs for two semesters, you are disqualified.

Annual Report of Progress and Performance

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. You are responsible for initiating the form. You need not complete this form the year you will graduate with your Master’s Degree.

Procedures for the M. S. Degree in Mechanical Engineering (Thesis Degree)

(Find detailed information on the COGS webpage (<http://www.uidaho.edu/cogs/degree-steps>).

Upon acceptance into the program, you will be notified of any undergraduate course deficiencies which must be fulfilled. To prepare to choose a major professor, review the faculty research information in this handbook (Appendix A) and contact faculty with mutual research interests.

Appointment of Major Professor

Review the faculty research information in this handbook (Appendix A) and contact faculty with mutual research interests. All degree-seeking graduate students are required by the department and the College of Graduate Studies to select a major professor by the end of the third semester of enrollment in the program. Complete the Major Professor, Committee Member Appointment or Committee Changes form, 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.

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 entered and submitted online **by the time you have completed three classes** in the program. Include only courses needed for your 30-credit degree on the plan. Do **not** include the ME 501 Seminar.

To create your plan:

- Go to your Degree Audit in VandalWeb and select the "Plans" tab.
- 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 to the College of Graduate Studies.

Study Plan help can be found at <http://www.uidaho.edu/registrar/graduation/audit>. 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.

Committee: Choose your graduate committee in consultation with your major professor. This is usually done after several 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.

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 (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 mostly electronic. See: 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 Kathy Duke, Thesis and Dissertation Advisor for the College of Graduate Studies (phone: 208) 885-6245, email:kduke@uidaho.edu). Submit a PDF file in EDT, www.etdadmin.com/cgi-bin/school?siteId=126, and she will be happy to review a draft of your document for compliance to the requirements listed in the Thesis/Dissertation Handbook.

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.

Apply for Graduation

Remember to apply for graduation when you are within one semester of completing your degree requirements. The application is on VandalWeb under "Apply to Graduate".

Ph.D. in Mechanical Engineering

Ph.D. Degree Requirements

You must satisfy the U of I requirements for the M.S. or M.Engr. Degree. Additional details of the individual program for the doctoral degree are established by your supervisory committee in consultation with you.

General university guidelines require:

- A minimum of 78 credits beyond the bachelor's degree.
- At least 33 of the 78 credits must be in courses other than Doctoral Research and Dissertation.
- At least 39 of the 78 required credits at UI while matriculated in the College of Graduate Studies.
- At least 52 credits in courses numbered 500 and above, including research and dissertation.
- University of Idaho policy requires that graduate GPAs be above 3.0. If your GPA is less than 3.0 in any semester, you are placed on probation; if it occurs for two semesters, you are

disqualified.

- Individual departments may require additional course work.

Mechanical Engineering Department requires:

- 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 and the other assumes no thesis.

With Master's Thesis
24 credits M.S. course work
24 credits Ph.D. course work
6 credits MS research and thesis
24 credits Ph.D. research and dissertation
78 credits total

Without Master's Thesis
30 credits master's course work
21 credits Ph.D. course work
27 credits Ph.D. research and dissertation
78 credits total

Notes:

- 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 passes his/her preliminary examination.

GPA

University of Idaho policy requires that graduate GPAs be above 3.0. If your GPA is less than 3.0 in any semester, you are placed on probation; if it occurs for two semesters, you are disqualified.

Annual Report of Progress and Performance

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. You are responsible for initiating the form. You need not complete this form the year you will graduate with your Master's Degree.

Procedures for Candidates for Ph.D. Degree

(Find detailed information on the COGS webpage (www.uidaho.edu/cogs/degree-steps)).

Upon acceptance into the degree program, you will be notified of any undergraduate course deficiencies which must be fulfilled.

Appointment of Major Professor

Review the faculty research information in this handbook (Appendix A) and contact faculty with mutual research interests. All degree-seeking graduate students are required by the department and the College of Graduate Studies to select a major professor by the end of the third semester of enrollment in the program. Complete the Major Professor, Committee Member Appointment or Committee

Changes form, 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.

Qualifying Examination

The Ph.D. qualifying examination, administered within your first year and before completion of the majority 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 your major professor, will appoint examiner(s) in each area.

- You may, at the discretion of the examining committee, be exempted from the written portion 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. The memo is put into your student file.

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 entered and submitted online by the time you have completed three classes in the program. Include only courses needed for your 30-credit degree on the plan. Do not include the ME 501 Seminar.

To create your plan:

- Go to your Degree Audit in VandalWeb and select the "Plans" tab.
- 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 to the College of Graduate Studies.

Study Plan help can be found at <http://www.uidaho.edu/registrar/graduation/audit>. 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.

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.

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, <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 the supervisory committee a presentation which covers the subject and scope of the dissertation research topic and/or a progress report.

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, <http://www.uidaho.edu/cogs/forms>, 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. Submit a copy to the ME Department Office.

Submission of your thesis is mostly electronic. See: 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 Kathy Duke, Thesis and Dissertation Advisor for the College of Graduate Studies (phone: 208) 885-6245, email:kduke@uidaho.edu). Submit a PDF file in EDT, www.etdadmin.com/cgi-bin/school?siteId=126, and she will be happy to review a draft of your document for compliance to the requirements listed in the Thesis/Dissertation Handbook.

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.

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

Planned Graduate Course Offerings – U of I

The plan below lists the courses we intend to teach. It is subject to change without notice.

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.

Class	F18	S19	F19	S20	F20	S21	F21	S22
CS 578 Neural Network Design (ECE 578)	X							
ME 4/504 Assist. Robotic Technology				X				
ME 4/504 District Heating and Cooling		X						
ME 4/504 Turbulence Modeling		X						
ME 4/513 Engineering Acoustics (ECE 579)	EO	EO						
ME 4/514V HVAC Systems		X		X				
ME 4/517 Turbomachinery				X-EO				
ME 4/520 Fluid Dynamics (CE 4/520)			X-EO					
ME 4/538 Sustainability & Green Design				X-EO				

ME 4/550 Computational Fluid Dynamics		X-EO		X-EO				
ME 4/558 Finite Element Applications in Engr		X-EO						
ME 4/564 Robotics: Kinematics, Dynamics & Control				X				
ME 410 Lean Manufacturing	Su18		Su19					
ME 412 Gas Dynamics		X-EO		X-EO				
ME 415 Materials Selection & Design (MSE 415)	X							
ME 421 Advanced Computer-Aided Design	X	X	X	X				
ME 433 Combustion Engine Systems	Su18V		Su19					
ME 436 Sustainable Energy Sources and Systems	X-EO							
ME 461 Fatigue & Fracture Mechanics	X		X					
ME 472 Mechanical Vibrations	EO	EO						
ME 481 Control Systems (ECE470)		X						
ME 490 Solid Modeling, Simulation & Manufacturing	X		X					
ME 490 Solid Modeling, Simulation and Manuf Capstone	X		X					
ME 529 Combustion and Air Pollution			X-EO					
ME 539 Advanced Mech. of Materials (MSE 539)		X						
ME 540 Continuum Mechanics (WSU ME 501)	WSU	X-EO		X-EO				
ME 541 Mechanical Engineering Analysis	X-EO		X-EO					
ME 548 Elasticity (WSU ME 530)			WSU					
ME 549 Finite Element Analysis (CE 546)				X-EO				
ME 583 Reliability of Engr Systems (CE 541)	X-EO							
NE 450 Principles of Nuclear Engineering	X		X					

Planned Graduate Course Offerings – WSU

See mme.wsu.edu/documents/2017/05/graduate-schedule-of-courses.pdf for more information.

Class	F18	S19	F19	S20	F20	S21	F21	S22
WSU ME 513 Crystal Plasticity	WSU							
WSU ME 514 Thermodynamics of Solids	WSU							
WSU ME 515 Advanced Heat Transfer				WSU				
WSU ME 516 Conduction and Radiation Heat Transfer			WSU					
WSU ME 520 Multiscale Model in Thermomech of Matrl				WSU				
WSU ME 521 Fundamentals of Fluids I	WSU							
WSU ME 526 Statistical Thermodynamics		WSU						
WSU ME 527 Macroscopic Thermodynamics				WSU				
WSU ME 530 Elasticity			WSU					
WSU ME 531 Theory of Plasticity				WSU				
WSU ME 532 Finite Elements		WSU		WSU				

WSU ME 534 Mech. of Composite Materials (MSE 536)	WSU
WSU ME 537 Fracture Mechanics and Mechanisms	WSU
WSU ME 556 Numerical Modeling in Fluid Mechanics	WSU
WSU ME 579 Adv Topics (Applied Fluids)	WSU
WSU ME 579 Adv Topics (Robotics, Kinematics & Dynam)	WSU
WSU ME 579 Advanced Topics (Machine Vision)	WSU

Mechanical Engineering Technical Electives

This is the plan for fall 2018. It may change.

ME 401	Vehicle Design & Testing	2-3	Cordon
ME 404/504-01 +	ST: Compliant Mechanisms Design	3	Robertson
ME 421	Advanced Computer-Aided Design (CAD)	3	Beyerlein
ME 436	Sustainable Energy Sources and Systems	3	Kumar
ME 461	Fatigue and Fracture Mechanics	3	Stephens
ME 481	Control Systems	3	Roberson
ME 490	Solid Modeling, Simulation and Manufacturing Capstone	3	Odom
ME 504-02	ST: Advanced Controls	3	Wolbrecht
ME 527 V	Thermodynamics		McKellar
ME 583	Reliability of Engineering Systems	3	Nielsen
MSE 415	Materials Selection and Design	3	Swenson

V indicates videoconferencing

+Undergraduates should take 400/500-level courses at the 400-level.

Required technical electives—15 credits total

1. Six (6) credits must be from this list:

Mechanical Engineering (ME) 404, 504, 410, 412, 413/513, 414/514, 415/515, 417/517, 418/518, 419/519, 420/520, 421, 422, 433, 443/543, 444, 450/550, 451/551, 452/552, 461, 464/564, 472, 481, 521, 526, 527, 529, 534, 539, 540, 541, 544, 546, 547, 548, 549, 577, 578, 580, 583, 585.

2. Three (3) credits must be in Math, Physics, or Statistics from these lists.

Math (MATH), 371, 420, 428, 432, 437, 451, 452, 453, 471, 472, 480

Statistics (STAT) 301, 431, 446

Physics (PHYS) 305, 351, 411, 425/525, 428/528, 443/543, 444/544, 464, 465/565, 484/584

3. Six (6) credits may be from the following in any combination:

a. ME technical electives listed in number one above;

b. Engineering (ENGR) 360, 2 cr;

c. Math, Physics or Statistics courses listed in number two above;

- d. 400-500 level course in other engineering disciplines, including nuclear, with approval of advisor/department chair;
- e. Other upper-division math/science or statistics courses, with approval of advisor/department chair;
- f. Business 414, 456, 531;
- g. Engineering project courses, ME 401, up to three credits;
- h. ME 307, 308, 407 Mentoring, 1 credit each, either all three fulfilling one TE, or in combination with project courses (ME 401) or other courses on this list to equal 3 credits.

Approved Non-ME Technical Electives Taught Fall 2018*

BE	BE 404/405 Biomechanics BE 441 Instrumentation & Measurements
Business	ENTR 414 Entrepreneurship OM 378 Project Management OM 439 Systems and Simulation OM 456 Quality Management
Engineering	ENGR 360 Engineering Economy (2 cr; prereq: junior standing) ENGR428 Numerical Methods
MSE	Any 400 level courses for which you have prereqs/interest
Math	MATH 428 Numerical Methods MATH 451 Probability Theory MATH 452 Mathematical Statistics MATH 471 Introduction to Analysis I MATH 472 Introduction to Analysis II MATH 480 Partial Differential Equations (prereq: Math 310 or permission)
NE	NE 450 Principles of Nuclear Engineering
Physics	PHYS 443/543 Optics
Statistics	STAT 301 Probability and Statistics (prereq: Math 175) STAT 431 Statistical Analysis (prereq: Stat 251, Stat 301, or Stat 416)

NOTE: Other Math, Physics, Statistics or Engineering courses (including Nuclear) at the 400-level may be counted as Technical Electives if approved by your advisor and the Department Chair, Dr. Beyerlein.

*All courses are three credits unless otherwise noted.

Appendix A. Faculty Research Areas

Moscow Faculty

Michael J. Anderson, Ph.D., P.E., Professor Acoustics in fluids and solids; transducer design.

Email: anderson@uidaho.edu

Profile: <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.

Email: sbeyer@uidaho.edu

Profile: 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.

Email: dcordon@uidaho.edu

Profile: 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.

Email: crepeau@uidaho.edu

Profile: www.uidaho.edu/engr/academic-departments/me/our-people/faculty/john-crepeau

Vibhav Durgesh, Ph.D., Assistant Professor

Experimental fluid dynamics, aerodynamics, biofluids, turbulent flows, low-Re aerodynamics, flow control; flow-visualization, instrumentation development; renewable energy, marine hydro-kinetic devices, wind energy; advanced data analysis.

Email: vdurgesh@uidaho.edu

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Kamal Kumar, Ph.D., Assistant Professor

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

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Profile: 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.

Email: maughan@uidaho.edu

Profile: 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.

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Joel Perry, Ph.D., Assistant Professor

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

Email: jperry@uidaho.edu

Profile: 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.

Email: gabrielp@uidaho.edu

Profile: 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.

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Daniel Robertson, Ph.D., Assistant Professor, Grand Challenge Scholars Program Director

Biomechanics, Agricultural Engineering, Interdisciplinary design.

danieljr@uidaho.edu

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

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

Email: bstephen@uidaho.edu

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Matthew Swenson, Ph.D., P.E., Assistant Professor, Capstone Design Coordinator

Characterize and model radiation effects in metals and alloys, correlating microstructure and mechanical properties, enabling the development and validation of metals and alloys for advanced nuclear reactor applications.

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Profile: www.uidaho.edu/engr/departments/me/our-people/faculty/matthew-swenson

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

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

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

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

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Profile: www.taoxing.net/

Boise Faculty

Ralph S. Budwig, Ph.D., P.E., Professor; Acting Director, U of I Engineering Programs in Boise
Experimental/theoretical fluid dynamics and turbulence; Optical, acoustic, and thermal measurements techniques; Experimental methods; Laboratory pedagogy

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Idaho Falls Faculty

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

Advanced fuel cycle analysis, Open source scientific computing, Pyroprocessing, Safeguards- and security-by-design, Geologic repository design, Neutronics, Nuclear hybrid energy systems analysis, Cybersecurity, plant modernization, digital I&C, Risk assessment, management.

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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.

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Profile: www.uidaho.edu/engr/our-people/richard-christensen

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

Fluid dynamics: complex turbulent and transitional shear flow, entropy generation; convective heat transfer; experimental, analytical and computational approaches/thermal hydraulics.

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Appendix B. Forms and Handbooks

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