Mechanical Engineering

Graduate Handbook

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Mechanical Engineering Graduate Faculty and Staff

The Mechanical Engineering Department currently consists of 17 tenure/tenure track faculty members who have a variety of interests, knowledge, and expertise. Note: The Graduate Faculty consists of members of the university faculty and other persons qualified by training and experience who are duly nominated and appointed. Only members of the Graduate Faculty may teach courses for graduate credit, supervise master's programs and theses, or serve on doctoral committees.

Mechanical Engineering Graduate Faculty

Rachel Carter, Associate Professor (Ph.D., Vanderbilt University)
Batteries, Energy storage, Alkali metal anodes, Sulfur cathodes, Battery thermal management
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Shiguang Deng, Assistant Professor (Ph.D., University of Wisconsin-Madison)
Engineering Design, Machine learning, Data Science, and Computational Mechanics
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Anthony DeFilippo, Assistant Professor (Ph.D., University of California-Berkley)
Measurements, models, and financial analyses to characterize and evaluate thermal, fluid, and reactive systems for industrial, power, energy storage, and transport applications
3135B Learned Hall; defilippo@ku.edu

Christopher Depcik, Professor (Ph.D., University of Michigan)
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Ken Fischer, Professor (Ph.D., Stanford University)
Biomechanics, Dynamics, Statics, Mechanics of Materials, Computational Mechanics
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Elizabeth Friis, Professor, Department Chair (Ph.D., Wichita State University)
Biomaterials, Biomedical Product Design and Testing
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Lin Liu, Associate Professor (Ph.D., Iowa State University)
Energy Storage, Energy Conversion, Multi-Scale and Multi-Physics Modeling, Mechanics of Manufacturing Processes, Advanced Manufacturing
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Lorin Maletsky, Professor (Ph.D., Purdue University)
Statics, Dynamics, Strength of Materials, Kinematics, Introduction to Design, Machine Design, Senior Level Design, Design for Manufacturability, Biomechanics, Project Classes
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Steve Soper, Foundation Distinguished Professor (Ph.D., University of Kansas)
Development of Micro- and Nanofabricated Tools for Biological Discovery and Medical Diagnostics
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Robert M. Sorem, Associate Professor (Ph.D., University of Kansas)
Mechanical Design, Computational Mechanics, Finite Element Formation and Application, Mechanics of Materials, Composite Material Mechanics
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Karan S. Surana, Deane E. Ackers Distinguished Professor (Ph.D., University of Wisconsin)
Continuum Mechanics, Computational Mathematics, Computational Mechanics, Finite Element Methods and Software
3124 Learned Hall; (785) 864-2988; kssurana@ku.edu

Candan Tamerler, Wesley G. Cramer Professor (Ph.D., Bogazici University)
Molecular Biomimetics, Bio-nanotechnology, Nanotechnology, Bio-enabled Materials Science, Biomaterials
3132 Learned Hall; (785) 864-2984; ctamerler@ku.edu

Sara Wilson, Associate Professor (Ph.D., Massachusetts Institute of Technology)
Control Systems, Biomechanical Systems
Mechanical Engineering Graduate Director
3141 Learned Hall; (785) 864-2103; sewilson@ku.edu

Xinmai Yang, Professor (Ph.D., Boston University)
Photoacoustic Imaging, Biomedical Ultrasound
3134 Learned Hall; (785) 864-1753; xmyang@ku.edu

Mechanical Engineering Teaching Faculty

The Mechanical Engineering Department currently has 4 teaching track faculty members who have a variety of interests, knowledge, and expertise. Note: Teaching faculty members with approval of graduate studies can serve on graduate thesis and dissertation committees as a member.

Molly McVey, Assistant Teaching Professor (Ph.D., University of Kansas)
Biomechanics, Engineering Design, Numerical Methods, Environmental Life Cycle Assessment
3143 Learned Hall; mam39@ku.edu

Bamdad Pourladian, Associate Professor of the Practice (Ph.D., University of Kansas)
Engineering Design, Metallurgy
3116 Learned Hall; BamdadPourladian@ku.edu

Millicent A. Coil, Associate Professor of the Practice (Ph.D., University of Wisconsin)
Engineering Design, Fluid Mechanics, Computational Modeling
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Beth Ward, Mechanical Engineering and SELF Professor of the Practice (M.S., University of Kansas)
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Mechanical Engineering Emeriti Faculty

Theodore Bergman, Charles E. & Mary Jane Spahr Professor (Ph.D., Purdue University)
Heat Transfer, Energy, Thermal Manufacturing

Ronald L. Dougherty, Professor (Ph.D., P.E., Missouri University of Science & Technology)
Radiative Heat Transfer, Two-Phase Heat Transfer, Thermal Fluid Sciences, Laser Scattering, Dynamic Light Scattering

Terry Faddis, Professor (D.E., University of Kansas)
Mechanical Design, Computer-Integrated Manufacturing

Carl W. Luchies, Associate Professor (Ph.D., University of Michigan)
Biomechanics, Mechanical Measurements and Experimentation, Advanced Dynamics, Statics

Paulette Spencer, Ackers Distinguished Professor and Director of the Institute for Bioengineering Research (Ph.D., D.D.S., University of Missouri-Kansas City)
Biomaterials, Structure/Property Characterization of Material/Tissue Interface

Peter W. TenPas, Associate Professor (Ph.D., Iowa State University)
Computational Fluid Dynamics, Computer Aided Thermal Design

Bedru Yimer, Professor (Ph.D., University of Dayton)
Heat Transfer, Fluid Mechanics, Thermodynamics, Thermal Dynamics

Mechanical Engineering Adjunct Faculty

Huazhen Fang, Associate Professor (Ph.D., University of California, San Diego)
Control Systems, Energy Management, Environmental Monitoring, Mechatronics
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Gibum Kwon, Assistant Professor (Ph.D., University of Michigan)
Superomniphobic Surfaces, Liquid-liquid Separations, Self-healable Coatings, Patterned Surfaces
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Xianglin Li, Associate Professor (Ph.D., University of Connecticut)
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Mechanical Engineering Graduate Staff

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Kaitlyn Burton, Mechanical Engineering Accountant
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Ryan Sassmann, Mechanical Engineering Lab Director
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Bridget Seidl, Mechanical Engineering Administrative Associate
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Genesis Buckhalton, Mechanical Engineering Undergraduate Coordinator
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Mechanical Engineering Department Graduate Programs

The University of Kansas Department of Mechanical Engineering offers the Master of Science in Mechanical Engineering degree and the Doctor of Philosophy degree. Areas of study in Mechanical Engineering include:

1. **Biomechanics and Biomaterials:** biomechanics of human motion, biomaterials, orthopedic biomechanics and biomedical product design, transport phenomena, and drug delivery.
2. **Computational Mechanics and Mathematics of Computations:** computational mechanics, finite element analysis, finite element methods and software
3. **Thermal-Fluid Systems and Heat Transfer:** energy and thermal-power system design, heat transfer and computational fluid dynamics
4. **Mechanical Design, Manufacturing, and Mechatronics:** computer-aided mechanical design, computer-aided mechanical design, continuum mechanics, computer-integrated manufacturing, computational mechanics, finite element analysis, machine stress analysis, mechatronics, material science, and automatic control systems.

Mission

The broad discipline of mechanical engineering enables students to have productive and rewarding careers, and to develop and improve new technologies in both traditional and emerging fields. Mechanical engineers apply fundamental principles to develop, design, manufacture, and test machines and other mechanical devices. Such devices include, but are not limited to power-producing machines, as well as power-consuming machines. Mechanical engineers are employed in diverse areas including, but not limited to the energy and power industries, the automotive and aerospace industries, and industrial manufacturing. Mechanical Engineering graduates also have careers in medicine and medical device development, patent law, engineering and corporate management, forensic engineering, and engineering sales. https://catalog.ku.edu/engineering/mechanical-engineering/

The mission of the Mechanical Engineering Department is to provide our students with a high-quality education, to generate and apply knowledge, and to serve both society and the engineering profession.

Graduates holding the M.S. degree in Mechanical Engineering will have:

1. *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*
2. *An ability to develop and conduct appropriate physical and/or numerical experimentation, analyze and interpret data, and use engineering judgment to draw conclusions*
3. *An ability to read, analyze, and critically assess scientific literature.*
4. *An ability to effectively communicate advanced mechanical engineering concepts in writing and orally at a professional level and an ability to articulate and address critical issues in their field of study.*
5. *An ability to independently acquire new information, learn new concepts, and build new skills.*

An ability to recognize ethical and professional responsibilities.

https://catalog.ku.edu/engineering/mechanical-engineering/ms/

Graduates holding the Ph.D. degree in Mechanical Engineering will have:

1. *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

2. *An ability to develop and conduct appropriate physical and/or numerical experimentation, analyze and interpret data, and use engineering judgment to draw conclusions*
3. *An ability to read, analyze, and critically assess scientific literature.*
4. *An ability to effectively communicate advanced mechanical engineering concepts in writing and orally at a professional level and an ability to articulate and address critical issues in their field of study.*
5. *An ability to independently acquire new information, learn new concepts, and build new skills.*

https://catalog.ku.edu/engineering/mechanical-engineering/phd/

Admission Requirements

To qualify for graduate study in any of the graduate programs in the Department of Mechanical Engineering, a student generally must have earned a baccalaureate degree from an accredited mechanical engineering program. However, a student with good preparation in some other engineering discipline or a related program, such as physics, may qualify by taking appropriate undergraduate courses specified by the Mechanical Engineering Department Graduate Admissions Committee. Application information can be found at the graduate admissions website.
https://catalog.ku.edu/engineering/mechanical-engineering/phd/#admissionstext

Visiting Us

The graduate program staff works with prospective students to determine the fit between the student and the program, and we feel that visiting the Lawrence campus is an important step.

All prospective students are welcome to attend our Open House in early November. Please contact the graduate program coordinator for the date. A few highly qualified admitted students may be invited to participate in Campus Visit Days in late February or early March. These organized visitation opportunities provide a great deal of first-hand information which we hope will help you in making a final decision about whether to attend KU.

Applicants may also arrange to visit us on their own (either in-person or virtual), outside of organized events. With early notification, we will do our best to work with you to provide information and schedule appointments with faculty when possible. Please contact us as early as possible in advance of your visit if you feel that this is the better option for you.

Enrollment

While these are KU's definitions of full-, part-, and half-time enrollment, financial aid providers may have different definitions. Be sure to consult with your financial aid provider before making enrollment decisions. Students with GTA appointments, GRA appointments, GI Bill funding, or dissertation hours are subject to different definitions of full-time and half-time enrollment. More information is provided on these definitions at: Link to policy (7/7/2025).

	Fall/Spring	Summer
Full-time	• Enrollment in 9 credit hours; • Enrollment in 6 credit hours plus a GTA, GRA, or GA appointment, regardless of percentage of appointment; • Enrollment in 6 credit hours for active duty military graduate students; • Doctoral candidates enrolled in dissertation hour(s). See: Doctoral Candidacy (post-comprehensive enrollment) (7/7/2025)	• Enrollment in 6 credit hours; • Enrollment in 3 credit hours plus a GTA, GRA, or GA appointment, regardless of percentage of appointment; • Enrollment in 3 credit hours for active duty military graduate students; • Doctoral candidates enrolled in dissertation hour(s). See: Doctoral Candidacy (post-comprehensive enrollment) (7/7/2025)
3/4-time	• Enrollment in 7 credit hours; • Enrollment in 4.5 credit hours plus a GRA appointment*, regardless of percentage of appointment.	• Enrollment in 4.5 credit hours; • Enrollment in 2 credit hours plus a GRA appointment*, regardless of percentage of appointment.
Half-time	• Enrollment in 5 credit hours; • Enrollment in 3 credit hours plus a GRA, appointment*, regardless of percentage of appointment; • Enrollment in 3 credit hours for active-duty military graduate students.	• Enrollment in 3 credit hours; • Enrollment in 1 credit hour plus a GRA appointment*, regardless of percentage of appointment; • Enrollment in 1 credit hour for active-duty military graduate students.

**Master's students*: Only master's students in their last semester of study are eligible for the 3/4-time and half-time enrollment exception while holding a GRA. For more information, see the policy on Graduate Research Assistant Appointment Eligibility.

**Ph.D. candidates*: Enrollment and Post Comps: Upon successful completion of the doctoral comprehensive examination and all other Graduate Studies and departmental requirements for candidacy to the doctoral degree and upon completion of eighteen (18) post-comprehensive credit hours, the student may enroll in one (1) or more dissertation, thesis, or equivalent credit hours as approved by the student's department, the student's school or College, and the Office of Graduate Studies to qualify for a Graduate Research Assistantship/Graduate Teaching Assistantship/Graduate Assistantship appointment.
https://policy.ku.edu/graduate-research-assistant-appointment-eligibility (8/1/2024)
https://policy.ku.edu/graduate-studies/GTA-appointment-eligibility (8/1/2024)
https://policy.ku.edu/graduate-studies/GA-appointment-eligibility (8/1/2024)

Students enrolled in fewer hours than defined by half-time enrollment are considered part-time. All students should check with their graduate degree programs and Graduate Studies' policies to determine whether additional enrollment requirements or summer enrollment requirements exist.

Graduate students are not normally permitted to enroll for more than 16 hours a semester or more than 8 hours in summer session: Link to policy (7/7/2025).

Discontinued Enrollment

A student may voluntarily resign from their program of study by requesting "discontinuance". Once this request is granted, the student resigns their place in the program and if they choose to return to their

studies at a later date, they must reapply for admission. Discontinuance is requested through the Progress to Degree Form: Link to policy (6/2026)

Leave of Absence

A Leave of Absence may be granted upon request to the graduate program in advance of leave. A leave of absence may be granted in extraordinary circumstances (e.g. cases of illness, disability, emergency, financial hardship, military leave), to pursue family responsibilities, or to pursue full-time activities related to long-range professional goals. Appropriate documentation related to these extraordinary circumstances may be requested from the student directly. Evidence of progress towards degree will also be a determining factor in the decision to grant an exception. The time taken for a leave of absence does not count against the student's time to degree. However, if the total time for the leave extends more than five years, the student will lose the student's place in the program and must reapply for admission. To request a leave of absence, the program must complete a Progress to Degree form: Link to policy (6/2026) LOA Form 1-29

Reduced Course Load (International)

In certain circumstances, an international student in F-1 status may wish to apply for a reduced course load while remaining full-time. For graduate students, full time is defined for the Fall and Spring semesters as:

- 9 credit hours
- 6 credit hours plus a GTA, GRA, or GA appointment
- Doctoral candidates who have passed the Doctoral Oral Comprehensive exam and are enrolled according to Graduate Studies Doctoral Candidacy policy: Link to policy (7/7/2025).

Students *must* obtain permission from an International Student Services Advisor before dropping below full-time. A *reduced course load based on financial need is NOT a qualifying reason*. Students should review the F-1 Reduced Course Load information: http://iss.ku.edu/f1-reduced-course-load.

Seniors and Graduate Study (Co-Enrollment)

Seniors at KU who will complete the requirements for a baccalaureate degree in a given semester, and who have very strong academic records (grade-point average higher than 3.0 on a 4.0 scale), must apply and be admitted provisionally as degree-seeking students and request the permission of the appropriate Graduate Division to co-enroll for the final undergraduate semester. Seniors requesting the privilege of co-enrollment must make formal application through the graduate affairs office of the appropriate school or college: Link to policy (8/1/2024)

Note: Undergraduates currently receiving financial aid and/or scholarships should check the specific requirements of these programs as they may require the student to enroll full-time in their undergraduate program while also enrolling in their graduate career. Moreover, co-enrolled students are not eligible for School of Engineering funding (they would be eligible once they enroll exclusively in their graduate program).

Grading

The basic system is an A, B, C, D, F system, where A designates above-average graduate work; B designates average graduate work; C designates passing but not average graduate work (C- is not considered a passing grade); D and F designate failing graduate work. C-, D, and F work does not count toward fulfilling degree requirements. Link to policy (7/18/2025)

Incomplete (I): The I grade indicates course work that is incomplete but could be completed without re-enrollment in the course. Use of the I grade is optional in some grading scales but is not permitted by others.

- Generally, the I grade is an appropriate option for enrollments other than thesis, dissertation, research, or the first semester of a two-semester sequence course.
- The I grade is not appropriate for enrollment in thesis, dissertation, or research courses and is not allowed by these grading scales.

A student who has an I posted for a course must make up the work by the date determined by the instructor, in consultation with the student, which may not exceed one calendar year, or the last day of the term of graduation, whichever comes first. An Incomplete not removed according to this rule shall automatically convert to a grade of F or U, or the lapse grade assigned by the course instructor, and shall be indicated on the student's record: Link to policy – 2.2.3.2 (FY2023). The student will not be eligible for graduation if they have an incomplete grade on their record, even if it does not count towards their degree

Research Courses

Departments select one of the two following scales to grade their thesis, dissertation, and approved thesis- or dissertation-equivalent courses. Other research courses are graded using the A, B, C, D, F, P scale.

> *Grading Scale: SP, LP, NP*: It evaluates a student's work as demonstrating satisfactory progress (SP), limited progress (LP), or no progress (NP). It is appropriate only in designated thesis, dissertation, and approved thesis- and dissertation-equivalent enrollments.
>
> For departments that use this scale, a grade of SP must be assigned for a student's final semester of enrollment in thesis, dissertation, or approved thesis- or dissertation-equivalent course work. The SP indicates that the final product was of satisfactory quality to earn the degree.

Overall, students must earn at least a B average (i.e., 3.0 GPA) on course work counted toward any master's, specialist, or doctoral degree at KU, and grades of C- and below do not count toward fulfilling degree requirements. For degree- and certificate-seeking graduate students, all graduate-level courses will be included in the calculation of the cumulative graduate GPA. The grades of P, S, SP, LP, NP, U, and I, for which no numerical equivalents are defined, are excluded from the GPA calculation. The graduate GPA calculation only includes courses 500-level and above: Link to policy: (7/18/2023).

Probation

Upon failure to maintain a cumulative graduate grade-point average of 3.0, or upon notification by the department that a student is no longer in good academic standing, the graduate division of the school or College places the student on academic probation. If, by the end of the next semester of enrollment following the placement of probation, the student raises the overall graduate GPA to 3.0 and otherwise demonstrates performance in keeping with departmental standards and timelines, the department or program may request that the graduate division lift the probation and return the student to good academic standing. If the student does not rectify the causes for academic probation, the student is not permitted to re-enroll and will be dismissed unless the graduate division of the school or College acts favorably on a departmental recommendation for the student to continue study while on academic probation.

Departmental Note: Students who do not perform at a level consistent with graduate study will be considered for dismissal based on their class performance, overall Grade Point Average, and/or circumstances.

If admitted provisionally due to deficiencies in grade point average, a student must earn an overall graduate GPA of at least 3.0 during the first semester of enrollment to be permitted to re-enroll. By earning a cumulative graduate GPA of at least 3.0, the student is considered to have achieved good academic standing. A student admitted provisionally who fails to earn a 3.0 GPA in the first semester of enrollment may be dismissed immediately. Such a student may remain on provisional status for one additional semester, if the department or program recommends provisional continuation and the graduate division of the school or College approves.

Students who have been dismissed from a graduate program may be readmitted for further graduate study at KU only by petition of the graduate division of the school or College that will accept the student. The Vice Provost of Graduate Studies must review the petition to determine final action. Link to policy (6/30/2023)

Scholarships, Fellowships, and GTA/GRA Positions

Prospective Students: **All applicants** are considered for scholarships, fellowships, and GTA positions upon submission of a complete application. It is suggested that applicants complete their applications by the priority deadlines (see the application information on the Mechanical Engineering website for current deadlines) to ensure consideration before positions are filled. GRA positions are dependent on faculty research and applicants should contact individual faculty members regarding their research openings.

Current Students: **All currently enrolled** Department of Mechanical Engineering graduate students are considered for scholarships, fellowships, and GTA positions each semester. GRA positions are dependent on faculty research and enrolled students should contact individual faculty members regarding their research openings.

GRAs and GTAs are eligible to have all or some of their tuition paid, including any differential tuition assessed, according to the provisions as follows: Link to policy (8/1/2024):

> GRA: Graduate Research Assistants with an appointment of 40% (0.40 FTE) or more will have the full cost of their tuition sponsored by the same funding source as their salary, or other non-restricted funding within the hiring unit. This tuition sponsorship includes technology, infrastructure, and any course fees for GRAs who are enrolled in schools/programs that charge such fees.
>
> GTA: Depending on the level of appointment, the University pays all or some of a GTA's tuition, including six hours of course fees for GTAs who are enrolled in schools/programs that charge such fees. If the student is eligible for employee and dependent rates, these will be assessed before applying the tuition waiver. Course fees include all school course fees and the Edwards Campus Program Fee as listed in section 1.1 of the Comprehensive Fee Schedule published annually by the Office of the University Registrar.
>
> GTAs with appointments of less than 40% (0.40 FTE) will have a portion of their basic tuition and course fees paid in accordance with the table that appears in Article 7, Section 3, of the MOA and is reproduced here. For GTAs, the University pays required campus fees for three credit hours per semester in accordance with the table and restrictions set forth below.

Table 1. Percentage of tuition and campus fees paid by KU based on level of GTA appointment

Percentage Appointment	Tuition Paid	Campus Fees
40% or more	100%	100% of 3 hours
30% but less than 40%	75%	75% of 3 hours
20% but less than 30%	50%	50% of 3 hours
10% but less than 20%	25%	25% of 3 hours

> The GTA is responsible for paying the remainder of the required campus fee assessment, any applicable off-campus area service fees, (e.g., Edwards Campus construction fee, Union fee, and required fee); mediated course fees; optional fees; Housing costs; and other specialized fees.

Further information regarding Benefits Available to GRAs, GTAs, and GAs is available here:
Link to policy (8/1/2024)

Graduate teaching assistants (GTA) perform a vital role in the Department's education program and their teaching performance is evaluated at the end of the fall and spring semesters. The evaluation is intended to provide objective feedback on performance for each GTA to help them learn and improve their teaching skills. Since effective GTAs are critical to our teaching mission, any student that receives an unsatisfactory performance evaluation will be required to complete an individual improvement plan aimed at improving teaching deficiencies. Failure to complete the individual improvement plan or receipt of a second unsatisfactory teaching evaluation will result in the student being ineligible for appointment as a GTA. The student will also be ineligible for departmental financial support in the form of fellowships, scholarships, and awards. Information about the Mechanical Engineering Department's expectations and a set of the

evaluation forms are distributed to GTAs, at the beginning of each semester. Please take the time to carefully review the evaluation criteria on each of these forms. Understanding these criteria increases the likelihood of achieving a good evaluation.

Advising

First-year graduate students will be advised by the Graduate Program Director for their first semester prior to, or upon their arrival. It is a student's responsibility to identify a research advisor in their first semester. Upon identifying a research advisor, students must complete a Plan of Study in conjunction with their advisor and submit the form to Graduate Plan of Study. Students' advisors will check to be certain the necessary requirements are being met and will answer any questions or help students solve any problems which might arise. The Graduate Program Coordinator and Director will help the students on matters of policy and university requirements throughout the degree.

Procedure for Selection of a Research Advisor

During the first term at KU, it is a student's responsibility to identify a research advisor. Students should arrange meetings with potential faculty advisors and talk to current graduate students about their experiences and insights. No formal lab rotations are required, but students are encouraged to attend lab meetings, shadow current students, and visit multiple labs. This is your opportunity to learn about the lab work and environment/culture, as you consider the best overall fit. Students are encouraged to attend seminars and other meetings to assist in learning about research activities and opportunities in the department. Students are encouraged to take classes their first term with potential research advisors. Choosing an advisor is the most important decision a student will make in graduate school, and it should be done with careful deliberation. Both the student and research advisor need to agree to work together before the advisor selection process is completed.

Advisor Changes and Research Group Transfers

Changing advisors can have negative impacts on both advisor and student and should generally be avoided as it can lead to delays in graduation. All advisor changes and transfers between research groups must be approved by the Graduate Program Director. A student who voluntarily leaves a research group should first identify a new research advisor and is encouraged to consult with the Graduate Program Director during the process and prior to approval. For involuntary advisor changes, advisors and students are expected to consult with the Graduate Program Director and Department Chair. The Graduate Program Director will assist these students in identifying a new research advisor. Students should inform the Graduate Program Coordinator of approval by the Graduate Program Director and new faculty advisor.

Master of Science (M.S.) Degrees

The Department of Mechanical Engineering offers both a thesis and a non-thesis option leading to the M.S. degree. Both options require a minimum of 30 credit hours of graduate work. The thesis option must include a thesis for six hours of credit (ME 899) and 24 credit hours of coursework. The non-thesis option must include three-credit hours of independent investigation (ME 860 or ME 899) and 27 credit hours of coursework. (Faculty Approved: 9/24/2018)

A maximum of 6 hours of engineering courses numbered between 500 and 699 may be included in the program. Other courses outside of mechanical engineering (besides mathematics) between 500 and 699 require approval by the Graduate Director prior to enrolling. Courses either required or used for the B.S. degree may not be used to fulfill M.S. degree requirements. (Faculty Updated: 5/7/2021) Link to course catalog

Course Petition

A student can petition to use courses offered by other engineering and sciences departments numbered 700 or above, or courses offered by the mathematics department numbered 500 or above, to satisfy no more than 6 credit hours of the minimum of 12 credit hours selected from Mechanical Engineering courses to meet Mechanical Engineering degree requirements; the petition must be approved by the faculty advisor and Graduate Director with guidance by the Graduate Academic Standards Committee as needed. (Faculty Approved 5/7/2021)

Plan of Study

The M.S. degree student selects an adviser in the first semester of graduate study. The student and the student's advisory committee determine a program of study during the first semester of enrollment. The program of study must include (1) a minimum of 12 credit hours in a major selected from Mechanical Engineering courses (excluding credit for mathematics and the independent investigation or thesis) and (2) no fewer than three credit hours dealing with advanced mathematics from the approved list of courses. The complete plan of study must be approved by the Advisory Committee and the Graduate Director before the beginning of the second semester of graduate enrollment and filed electronically with the Department and the Graduate Division of the School of Engineering. The online Plan of Study can be found at https://engr.ku.edu/plan-study.

Thesis Option

A thesis-option student is expected to do original work that would be the basis of a paper suitable for publication in a refereed journal. After the final oral examination has been passed, and after any changes required by the examination committee have been made in the thesis, the thesis should be submitted electronically (http://graduate.ku.edu/submitting) in PDF Format to ProQuest/UMI on or before the date specified by the Graduate Studies Office (see http://graduate.ku.edu/graduation for deadlines). Supplementary materials may be added in other formats.

The student is responsible for submitting any bound copies that may be required by the department and/or advisor. Recommended binding services for personal or departmental copies may be found at http://graduate.ku.edu/submitting. Formatting requirements for the thesis are presented here: http://graduate.ku.edu/etd-formatting-and-working-multimedia-files.

Non-Thesis Option

A non-thesis option student must do an analytical or experimental study acceptable to the advisory committee. An oral presentation of the results of the independent investigation before Mechanical

Engineering graduate students and faculty is required. A typed unbound project report must also be provided to the advisory committee.

Final Examination

Each Master's degree candidate must pass a final examination that may be oral, or both written and oral, as determined by the advisory committee. **The examination must be scheduled with department program coordinators three weeks prior to the final exam date and publicized at least one week before the date of the examination**. The examination will cover the field of mechanical engineering for both the thesis and non-thesis options and emphasize the thesis for the thesis option.

The thesis presentation portion of the examination shall be open. The written portion of the examination, if required, will be composed and evaluated by the examination committee. The examination committee, which is normally the advisory committee, must consist of at least three members of the Graduate Faculty and at least two must be Mechanical Engineering Faculty.

For every scheduled examination, the department will report a grade of honors, satisfactory, or unsatisfactory as decided upon by the committee.

The request to schedule the examination must be submitted to the Mechanical Engineering Department at least three weeks prior to the examination date. Unbound or electronic thesis copies are to be submitted to the examination committee two weeks before the examination.

Note: Master's Candidates must be enrolled for at least one credit hour during the semester in which the Master's final examination is taken, or the semester prior if meeting the early graduation deadline in a given semester.

Only two attempts to pass the Master's examination are allowed. If the examination is not passed in two attempts, the student will be terminated from the program and will not receive the degree.

Program Time Constraints

Normal expectations are that most master's degrees (excluding some professional terminal degrees) should be completed in two years of full-time study. However, master's degree students are allowed seven years for completion of all degree requirements.

In cases in which compelling reasons or circumstances recommend a one-year extension, the Graduate Division, on recommendation of the department/committee, has authority to grant the extension. In cases where more than eight years are requested, the appropriate appeals body of the school considers petitions for further extensions and, where evidence of continuous progress, currency of knowledge, and other reasons are compelling, may grant them: Link to policy (7/25/2023).

Credit by Transfer

At the discretion of the major department and the Graduate Division, any graduate student may transfer up to nine (9) hours of graduate credit taken at a regionally-accredited graduate school and apply it to a KU master's degree plan, as long as the credits were taken prior to the final semester of enrollment at KU. In cases where KU has an established Memorandum of Understanding (MOU) with a partner institution, students may be able to transfer more than nine (9) hours of graduate credit, in accordance with the MOU.

Only work graded B (3.0 on a 4.0 scale) or higher may be transferred. KU does not accept transfer credit for courses that have been graded B- or below. KU master's degrees may accept transfer credit graded CR (credit), S (satisfactory), or similar in cases where a school, college, or university employed such

grading scales in response to a natural or other disaster, as indicated by a transcript notation or other documentation.

KU does not accept graduate transfer credit for institutes, workshops, or life/work experience. Credit will not transfer for courses that were previously counted toward the completion of an undergraduate or graduate degree.

A minimum of 15 credits toward a master's degree must be earned in KU coursework. As described in the Master's Degree Requirements policy, a 30-hour master's degree may be reduced to as few as 24 hours for students who are "especially well prepared." If coursework is transferred to KU, the same coursework cannot also be used to establish a student as "exceptionally well prepared."

No graduate credit may be transferred toward a doctoral degree, but departments may take relevant prior graduate work into consideration when setting up programs of study.

Graduate credit from another institution may not be transferred to a KU graduate certificate program.

The department or program and the Graduate Division retain the discretion to deny a student's request to have transfer credit and/or non-degree-seeking credit count toward a degree or certificate. Link to policy (7/18/2023).

Doctor of Philosophy (Ph.D.) Degree

A minimum of 72 credit hours of graduate credit beyond the bachelor's degree is required for a Ph.D. For students with a 30-credit Master's degree in Mechanical Engineering, a minimum of an additional 18 credits hours of graduate course work and 24 credit hours of dissertation are required. If a Master's degree is not sought, 42 credit hours of graduate course work beyond the bachelor's degree and 30 credit hours of dissertation credit are required. A minimum of 9 credit hours of the 18 (or 21 of the 42) must be mechanical engineering courses numbered 700-900 (excluding ME 702, ME 801, ME 899, ME 901, and ME 999). A minimum of 9 credit hours of advanced mathematics beyond the bachelor's degree is required from the approved list of courses.
https://catalog.ku.edu/engineering/mechanical-engineering/phd/#requirementstext

Course Petition

A student can petition to use courses offered by other engineering and sciences departments numbered 700 or above, or courses offered by the mathematics department numbered 500 or above, to satisfy no more than 3 credit hours of the minimum of 18 (or 9 of the 42) credit hours selected from Mechanical Engineering courses to meet Mechanical Engineering degree requirements; the petition must be approved by the faculty advisor and Graduate Director with guidance by the Graduate Academic Standards Committee as needed. (Faculty Approved 5/7/2021)

Doctoral Qualifying Examination

For a student with a Master's degree, a qualifying examination will normally be taken in the first semester of participation in the doctoral program on regular status. It should not be taken later than the end of the second semester. For a direct admit with a bachelor's degree, a qualifying examination will typically be taken after completion of 30 hours of graduate course work.

The Qualifying Examination Committee consists of three or more members of the graduate faculty within the area of emphasis and are normally expected to be members of the Research and Graduate Studies Committee of the Department of Mechanical Engineering. *The student's major advisor is not permitted to be on the Qualifying Examination Committee (faculty approval: October 5, 2020)*. A grade of pass or fail will be assigned and be kept in the departmental records.

Three evaluation criteria for the Qualifying Examination were established by the faculty on August 15, 2008.

> **CRITERION #1:** The student must demonstrate an understanding in a core set of fundamental undergraduate mechanical engineering knowledge.
>
> **CRITERION #2:** The student must demonstrate an understanding in a subset of core advanced mechanical engineering knowledge.
>
> **CRITERION #3:** The student must demonstrate the ability to communicate effectively through writing, oral presentation, and open questioning.

The faculty from the four areas of study in Mechanical Engineering, as defined by the Graduate Student Handbook, are responsible for developing separate methods to evaluate the criteria. The areas of study are: Biomechanics and Biomaterials; Computational Mechanics and Mathematics of Computations; Thermal-Fluid Systems and Heat Transfer; and Mechanical Design, Manufacturing, and Microprocessor Applications. The methods for the four areas to assess the three criteria areas listed below.

Criteria

Three evaluation criteria for the Qualifying Examination were established by the faculty on August 19, 2019.

Criterion #1

This criterion will be assessed and satisfied with the current policies for entrance to the KUME graduate program. This includes the current requirements for satisfying deficiencies in the undergraduate mechanical engineering curriculum. At the time of the Ph.D. qualifying exam, the student must have satisfied and completed all requirements and conditions specified by the Department of Mechanical Engineering and the SOE to address deficiencies.

Criterion #2

A) The student will identify three 3-credit mechanical engineering technical elective courses (excluding courses required for the KU BSME degree, ME 702, ME 801, ME 860, ME 899, and ME 999) and one 3-credit mathematics course from the approved list in the KUME Graduate Handbook (or approved prior by the Graduate Director). The chosen ME courses should reflect three specific subjects in the focus area of study. Equivalent graduate courses that are completed at other institutions may be used to satisfy the requirements. All courses must meet the approval of the student's advisor and the Qualifying Examination Committee including a review by the Graduate Director.

B) **OR, DEPENDING ON ADVISOR PREFERENCE,** the student will be required to demonstrate an understanding of three specific ME subjects and mathematics by passing written exams in each of these four subjects. The series of written exams will be scheduled during one week each fall and/or spring semester. Each exam will be graded separately on an A to F basis and count similarly to a 3-credit course towards this assessment. Scheduling and generation of the exams is the responsibility of the student's major advisor with other faculty assistance.

In order to pass this criterion, the student must achieve at least a cumulative 3.7 GPA over all four courses or exams. A *conditional* pass may be awarded for a 3.5 GPA or greater (up to 3.7 GPA) with the student required to address said deficiency in the lowest graded course by either (depending on advisor preference): (1) completing extra coursework in that subject while achieving an A grade, or (2) re-taking the exam in that subject area and passing with an A grade. The student must address this deficiency before taking the Ph.D. comprehensive exam.

Criterion #3

The student will give an oral presentation that will last 20 minutes or less, and including questions from the Qualifying Examination Committee, the overall presentation will last 60 minutes or less. The material for the presentation will be a summary of one to three pertinent and related papers (with no conflict of interest) to the student's Ph.D. topic area given to the student one week prior to the oral presentation date. These paper(s) will be approved by the advisor and the Qualifying Examination Committee.

Two days before the oral presentation, the student will provide a one-page summary (single-spaced, 12-point font, Times New Roman, 1" margins) to the committee of the material to be presented. *No outside help will be allowed*. To receive a passing grade, the student must demonstrate to the committee their ability to effectively communicate the information. For a student that receives a grade of conditional pass, the committee will recommend appropriate remedies. If a student receives a grade of fail, a second and final attempt will be granted.

Plan of Study

Within the first semester of the PhD, a student should identify a major professor from the Department to serve as the chairperson of the advisory committee and to direct the research. The student and research advisor should work together to begin to draft a plan of study (https://engr.ku.edu/plan-study). After completion of the qualifying exam, an advisory committee of at least five Graduate Faculty members from the School of Engineering with at least three from the Mechanical Engineering faculty is then selected by the student with help from their advisor to conduct the comprehensive examination and to assist the student in planning research. The student should then update the plan of study (https://engr.ku.edu/plan-study).

Courses completed without an approved program of study filed will not necessarily count toward the degree. The complete plan of study must be submitted before the end of the first semester and include the specific courses and all other requirements (research skills, research topic, etc.), and filed electronically with the Department and the Graduate Division of the School of Engineering.

Credit by Transfer

No graduate credit may be transferred toward a doctoral degree, but departments may take relevant prior graduate work into consideration in setting up programs of study.
http://policy.ku.edu/graduate-studies/graduate-credit (7/18/2023)

Proficiency in Responsible Scholarship and Research Skill Area

All doctoral students must meet the Research Skills requirement before proceeding to comprehensive exams (http://policy.ku.edu/graduate-studies/research-skills-responsible-scholarship: 7/27/2023). The requirement must include at least two components:

- Every doctoral student is required to have training in responsible scholarship pertinent to the field of research.
- Every doctoral student is required to obtain research skills pertinent to the doctoral level of research in their field(s).

The responsible scholarship requirement may be met by taking ME 801 Responsible Conduct of Research in Engineering. The Ph.D. student must demonstrate proficiency in at least one research skill area. Since the needs of students differ, the research skills are determined with the advice and approval of the advisory committee. Possible areas may include:

1. *Computer Science.* To establish competence in computer science, one could demonstrate proficiency in a commonly used programming language by creating at least one original program and demonstrating it to the advisory committee. This could also be demonstrated by a B or better in a course on the topic.
2. *Laboratory Training*. Specific training on research skills relevant to the topic of dissertation by the advisor in their respective laboratory with the help of senior students. These could include experimental and/or computational modeling skills. This could also be demonstrated by a B or better in a course on the topic or by demonstration of the use of these skills in a research project that is presented to the advisory committee.

All research skill and responsible scholarship requirements must be satisfied prior to the comprehensive examination and reported to the Graduate Division.

Doctoral Comprehensive Oral Examination

When a doctoral aspirant has met all program and school requirements prerequisite to the comprehensive oral examination (*typically 18 credit hours beyond the Master's degree, or 42 beyond the Bachelor's degree*), the department will request the graduate division of its school to schedule the comprehensive oral examination. The examination request must be submitted at least two (2) weeks in

advance of the intended examination date. The graduate division may indicate an earlier scheduling deadline.

Prior to scheduling the exam, it is the responsibility of the graduate program to verify that:

1. The student has completed the major portion of the coursework at a level satisfactory to the graduate degree program and school.
2. The student is in good academic standing including a 3.0 or higher cumulative graduate grade point average.
3. There are no grades of I (Incomplete) on the student's transcript (per University Senate Rules and Regulations 2.3.3.4).
4. The Research Skills and Responsible Scholarship requirement is completed or will be completed the same semester as the exam.
5. The student has completed the minimum enrollment outlined in the Engagement and Enrollment in Doctoral Programs policy.
6. At least five (5) months have elapsed from the time of the aspirant's first enrollment at KU.

The Graduate Division ascertains whether all pertinent requirements have been satisfied and if reports of any previously scheduled comprehensive oral examinations have been properly submitted and recorded. http://policy.ku.edu/graduate-studies/doctoral-oral-exams (1/2/2024)

The committee for the comprehensive oral examination must consist of at least five members, all of whom must be members of the Graduate Faculty *and at least three of whom must be tenured / tenure track Mechanical Engineering Faculty including the committee chair*. Its members are appointed by the Graduate Division of the school or college on the basis of nominations submitted by the graduate degree program. At least one member must be from a department other than the aspirant's major department. This member represents Graduate Studies and must be a regular member of the Graduate Faculty. The Graduate Studies representative is a voting member of the committee and has full right to participate in the examination. In the case of any unsatisfactory or irregular aspects of the exam or violation of Graduate Studies policy, the Graduate Studies representative shall provide a written report to the Vice Provost of Graduate Studies for consideration of further action. The examination may be scheduled provided that at least five months have elapsed from the time of the aspirant's first enrollment at KU *considering the Qualifying Exam has been successfully passed*.

The comprehensive oral examination covers the major field and any extra-departmental work for which the program wishes to hold the aspirant responsible (*students should discuss the oral examination requirements with their advisor and committee*). For every scheduled examination, the degree program reports a grade of Honors, Satisfactory, or Unsatisfactory. If the aspirant receives a grade of Unsatisfactory on the comprehensive oral examination, it may be repeated on the recommendation of the degree program, but under no circumstances may it be taken more than three times. In any case, the examination may not be repeated until at least 90 days have elapsed since the last unsuccessful attempt. *The schedule for the examination should be announced throughout the Department at least 7 days in advance.*

Post-comprehensive Enrollment

Doctoral candidates are required, after passing the comprehensive oral examination, to be continuously enrolled each fall and spring semester in one (1) or more hours of dissertation or programmatically equivalent coursework (for example, document hours for DMA students) that both moves the student towards degree completion and reflects, as accurately as possible, the candidate's demands on faculty time and university facilities. During this time, until all requirements for the degree are completed (including the filing of the dissertation) or until 18 post-comprehensive hours have been completed (whichever comes first), the candidate must enroll for a minimum of 6 hours a semester.

Post-comprehensive enrollment may include enrollment during the semester or summer session in which the comprehensive oral examination has been passed. If after 18 hours of post-comprehensive enrollment the degree is not completed, the candidate must continue to enroll each semester until all degree requirements have been met. The number of hours of each enrollment must be determined by the candidate's advisor and must reflect as accurately as possible the candidate's demands on faculty time and university facilities.https://policy.ku.edu/graduate-studies/doctoral-candidacy (7/7/2023)

Dissertation

The doctoral candidate must present a dissertation showing the planning, conduct, and results of original research and/or scholarly creativity. The purpose of the dissertation is to encourage and ensure the development of broad intellectual capabilities and to demonstrate an intensive focus on a problem or research area. The dissertation itself should be an evident product of the candidate's growth and attainment of the ability to identify significant problems; organize, analyze, and communicate scholarly results; and bring to bear on an area of scholarly or scientific interest a variety of research skills and scholarly or creative processes. The dissertation must show some original accomplishment (*sufficient quality to merit publication(s) in refereed journals and it is anticipated that the student will submit one or more journal publications prior to their defense*), but it should also demonstrate without doubt the candidate's potential to make future contributions to knowledge and understanding. https://policy.ku.edu/graduate-studies/doctoral-dissertation (11/25/2013)

Furthermore, a candidate for a doctoral degree must satisfy all Graduate School requirements for the degree.

Both the dissertation research and the dissertation itself are to be completed under the guidance and direction of the committee appointed as described in the Doctoral Student Oral Exam Committee Composition policy (http://policy.ku.edu/graduate-studies/doctoral-student-oral-exam-committee-composition: 8/27/2024). The department requires committees to have a minimum of five voting members with at least three tenured or tenure-track faculty in the mechanical engineering department (Faculty Approved: 10/28/2024).

1. Doctoral committees are composed of at least five voting members.
2. All committee members must be members of the Graduate Faculty authorized to serve on doctoral exams.
3. The committee chair must also be authorized to chair doctoral examinations.
4. Except as provided in point 4.1, the majority of committee members must be tenured or tenure-track faculty in the candidate's department or program of study. Tenured and tenure-track faculty who are appointed as courtesy faculty within a program or department are considered to be faculty of that program or department, for the purposes of committee composition.
    a. For approved professional doctorate programs (e.g., Doctor of Education (Ed.D.)), the internal or departmental majority may include one individual who holds a non-tenure-track faculty appointment in the student's department or program.
5. One member must meet the requirements for serving as the Graduate Studies Representative. A faculty member from a different department with a courtesy appointment in the student's department may serve as the Graduate Studies Representative or in fulfillment of the committee majority requirement but cannot serve in both roles at the same time. (For more information on the Graduate Studies Representative, see https://policy.ku.edu/graduate-studies/graduate-studies-representative-on-doctoral-exam-committees: 9/21/2023); and
6. As long as the majority requirement is met, additional committee members may be, but need not be, a member of the candidate's department or program.

As long as the conditions above are met, the committee may include more than five members.

While committees are not required to have a co-chair, the student or the committee members may decide to select a co-chair.

Substitutions of the committee chair (and/or co-chair) are prohibited after the committee has been approved by the Graduate Division of the School or College. If a committee chair (and/or co-chair) needs to be replaced, the revised committee must be approved by the Graduate Division in advance of the exam.

Substitutions of the committee members are permitted as long as the new committee meets the requirements above. Additional members can be added after the committee has been approved by the Graduate Division of the School or College. Additions and substitutions must be approved by the Graduate Division in advance of the exam.

Dissertation Format

The candidate should read the KU Graduate Studies Policy in order to obtain more insight into the Doctoral Dissertation (https://policy.ku.edu/graduate-studies/doctoral-dissertation: 11/25/2013).

An alternative format option for the dissertation exists and may be discussed with the Graduate Director.

Dissertation Oral Examination

Completion of the dissertation, or for some professional programs a comparable culminating effort, is the final academic phase of a doctoral program, culminating in the final oral examination and defense. In all but the rarest cases, tentative approval of the dissertation or its equivalent is followed promptly by the final oral examination. When the completed dissertation or its equivalent has been accepted by the doctoral committee in final draft form and all other degree requirements have been satisfied, the chair of the committee notifies the unit to request the graduate division of its school/College to schedule the final oral examination. ***The examination request must be submitted at least three (3) weeks in advance of the intended examination date.*** The graduate division may indicate an earlier scheduling deadline. Prior to the scheduling of the exam, it is the responsibility of the program to verify that: 1. The student is in good academic standing, including a 3.0 or higher cumulative graduate grade point average. 2. At least one (1) month has elapsed since the successful completion of the comprehensive oral examination. Departments, programs, schools, or the College may require a longer minimum interval between the oral comprehensive exam and the final dissertation defense. 3. The student has enrolled as required by the Doctoral Candidacy policy.

The graduate division ascertains whether all other degree requirements have been met and if reports of any previously scheduled final oral examinations have been submitted and recorded. Upon approval of the request, the final oral examination is scheduled at the time and place approved by the Graduate Division. This information must be published in the University events calendar or other medium that ensures broad dissemination to the University community, whose members are encouraged to attend. https://policy.ku.edu/graduate-studies/final-oral-exams (1/02/2024)

The committee for the final oral examination must consist of at least five members (the members of the dissertation committee plus other members of the Graduate Faculty recommended by the committee chair and the department and appointed by the Graduate Division). At least one member must be from a department other than the major department. This member represents Graduate Studies and must be a regular member of the Graduate Faculty. Before the examination, the Graduate Division provides a list of responsibilities to the Graduate Studies representative. The Graduate Studies representative is a voting member of the committee and has full right to participate in the examination. In the case of any unsatisfactory or irregular aspects of the exam or violation of Graduate Studies policy, the Graduate Studies representative shall provide a written report to the Vice Provost of Graduate Studies for consideration of further action.

The Graduate Division ascertains whether all other degree requirements have been met and if reports of any previously scheduled final oral examinations have been submitted and recorded. Upon approval of the request, the final oral examination is scheduled at the time and place designated by the Graduate Division. This information must be published in a news medium as prescribed by the Graduate Faculty. Interested members of the university community are encouraged to attend these examinations.

For every scheduled final oral examination, the department reports to the Graduate Division a grade of Honors, Satisfactory, or Unsatisfactory for the candidate's performance. If an Unsatisfactory grade is reported, the candidate may be allowed to repeat the examination on the recommendation of the department.

When the candidate has passed the final oral examination and the members of the dissertation committee have signed the dissertation, a title page and acceptance page with original signatures are to be delivered to the Graduate Affairs office of the school/college in which the student's program resides so that completion of degree requirements may be officially certified. As a requirement of graduation, the candidate must arrange publication of the dissertation and payment of all applicable fees, through the electronic submission process (http://graduate.ku.edu/electronic-thesis-and-dissertation).

Moreover, the candidate must provide a bound copy to the student's major advisor, and one bound copy to the Mechanical Engineering Department (see http://graduate.ku.edu/submitting for recommended binding services).

Program Time Constraints

Minimum Tenure

The student must spend three full academic years, or the bona fide equivalent thereof, in resident study at this or some other approved university, including the time spent in attaining the master's degree. Resident study at less than full time requires a correspondingly longer period, but the requirement is not measured merely in hours of enrollment. Because a minimum number of hours for the degree is not prescribed, no transfer of credit is appropriate. However, graduate degree programs take relevant prior graduate work into consideration in setting up programs of study leading to the doctorate.

Residence Requirement

Two semesters, which may include one summer session, must be spent in resident study at KU. During this period, the student must be involved full time in academic or professional pursuits, which may include an appointment for teaching or research if it is directed specifically toward degree objectives. Enrollment in approved distance-learning courses offered through KU cannot be used to meet the doctoral residency requirement. The student must be enrolled in a minimum of 6 credit hours per semester, and the increased research involvement must be fully supported and documented by the dissertation supervisor as contributing to the student's dissertation or program objectives. Research must be performed under the direct supervision of the major adviser if on campus, or with adequate liaison if off campus.

Maximum Tenure

Once admitted, KU doctoral students complete all degree requirements in eight (8) years. When compelling circumstances recommend a one-year (1-year) extension, the Graduate Division has authority to grant such an extension on a case-by-case basis upon the written advice of the department and examining committee. Students who complete the master's degree at KU and subsequently begin doctoral studies in the same academic department have a maximum total enrolled time of ten (10) years to complete both degrees. Normal expectations, however, are that most master's degrees (excluding some professional terminal degrees) should be completed in two (2) years of full-time study, and both master's and doctorate in six (6) years of full-time study.

A student in any of the above categories may petition Research and Graduate Programs through the department for a leave of absence during either the pre- or post-comprehensive period to pursue full-time professional activities related to the doctoral program and long-range professional goals. Leaves of absence also may be granted because of illness or other emergency. Ordinarily a leave of absence is granted for one year, with the possibility of extension upon request. After an absence of five years, however, a doctoral aspirant or candidate loses status as such and must apply for readmission to the program and Research and Graduate Programs.

https://policy.ku.edu/graduate-studies/engagement-enrollment-doctoral-programs (7/7/2025)

Courses

Numbering System

Courses that may give graduate credit are numbered according to the following scheme:

- Courses numbered *500-699* are designed primarily for junior and senior undergraduates, but are also taken by some graduate students who have fewer than 30 hours of graduate credit.
- Courses numbered *700-799* are designed primarily for graduate students who have fewer than 30 hours of graduate credit and may be considered "Master" level classes, but they are also taken by some undergraduates.
- Courses numbered *800-899* are designed primarily for graduate students who have fewer than 30 hours of graduate courses and may be considered "Master/PhD" level classes.
- Courses numbered *900-999* are designed primarily for graduate students who have 30 or more hours of graduate credit and may be considered "PhD" level classes.

No course, regardless of its number, can give graduate credit unless it has been approved for graduate credit by the Graduate Division or the Graduate School, and is taught by a person holding a current appointment to the Graduate Faculty.

Categories for Major

For descriptions of the courses, please consult the KU Catalog:
http://catalog.ku.edu/engineering/mechanical-engineering/#courseinventory

Approved Courses in Mechanical Engineering (that are not typically part of KU BSME Curriculum)

Computational Mechanics and Mathematics of Computations

ME 840 Continuum Mechanics I
ME 841 Continuum Mechanics II
ME 854. Continuum Mechanics for Soft Tissues
ME 861 Theory of the Finite Element Method
ME 961 Finite Element Method for Nonlinear Problems in Solid Mechanics

Mechanical Design, Manufacturing, and Microprocessor Applications

ME 627 Automotive Design
ME 696 Design for Manufacturability
ME 708 Mechatronics
ME 722 Modeling Dynamics of Mechanical Systems
ME 788 Optimal Estimation
ME 808 Advanced Microprocessor Applications
ME 882 Advanced Control Systems

Thermal-Fluid Systems and Heat Transfer

ME 636 Internal Combustion Engines
ME 637 Steam Power Plants
ME 639 Alternative Energy Systems
ME 712 Advanced Engineering Thermodynamics
ME 716 Introduction to Surface and Interface Science
ME 718 Fundamentals of Fuel Cells
ME 733 Gas Dynamics
ME 736 Catalyst Exhaust Aftertreatment Modeling

ME 752 Acoustics
ME 756 Biofluid Dynamics
ME 774 Radiative Heat Transfer
ME 788 Optimal Estimation
ME 789 Energy Storage Systems and Control
ME 797 Materials for Energy Applications
ME 798 Manufacturing for Energy Applications
ME 810 Advanced Fluid Mechanics
ME 831 Convective Heat and Momentum Transfer
ME 832 Computational Fluid Dynamics and Heat Transfer
ME 836 Hybrid and Electric Vehicles
ME 890 Fundamentals of Numerical Heat & Mass Transfer (AHMT)
ME 890 Model Predictive Control (ACE)
ME 890 Manufacturing for Energy Applications

Qualifying Exam: Criterion #2 - The student must demonstrate an understanding in a subset of core advanced mechanical engineering knowledge.

Thermodynamics	Fluid Mechanics	Heat Transfer
ME 636	ME 637	ME 637
ME 637	ME 711	ME 718
ME 712	ME 733	ME 770
ME 716	ME 736	ME 789
ME 718	ME 756	ME 797
ME 733	ME 810	ME 831
ME 788	ME 831	ME 833
ME 797		ME 890 (AHMT)

- Last updated: 9/27/2018
- Note: If a class is indicated under two subject headings, the student may *only* use it for one of the subject headings; i.e., it cannot be double counted.
- Classes Not Applicable for Qualifying Exam: ME 639, ME 752, ME 798, ME 836, ME 890 (ACE)

Biomechanics and Biomaterials

- ME 633 Basic Biomechanics
- ME 750 Biomechanics of Human Motion
- ME 751 Experimental Methods of Biomechanics
- ME 752 Acoustics
- ME 753 Bone Biomechanics
- ME 754 Medical Imaging
- ME 755 Computer Simulation in Biomechanics
- ME 757 Biomechanical Systems
- ME 758 Physiological System Dynamics
- ME 760 Biomedical Product Development
- ME 765 Biomaterials
- ME 767 Molecular Biomimetics
- ME 854 Continuum Mechanics for Soft Tissues

Useable in any of the first three categories

- ME 861 Theory of the Finite Element Method
- ME 862 Finite Element Method for Transient Analysis

Other Courses of Interest

- ME 790 Special Topics (*a faculty member uses this number when they are in the midst of developing a graduate course for Master's students*)
- ME 860 Advanced Mechanical Engineering Problems (*An analytical or experimental study of problems or subjects of immediate interest to a student and faculty member; to be discussed individually with faculty and is independent of thesis/dissertation work*)
  NOTE: If a student wishes to take more than one ME 860 courses, then they must submit a proposal to both the Graduate Director and Department Chair highlighting the work to be accomplished along with how it is (a) not covered in any other ME graduate course and (b) would not be considered as thesis/dissertation work (i.e., not suited for ME 899)
- ME 890 Special Topics (*a faculty member uses this number when they are developing a graduate course for Master/Doctoral students*)
- ME 899 Independent Investigation (*M.S. thesis or project credit hours*)
- ME 990 Special Topics (*a faculty member uses this number when they are developing a graduate course for Doctoral students*)
- ME 999 Independent Investigation (*Ph.D. dissertation credit hours*)

Approved Courses in Mathematics

The following courses may be used to satisfy mathematics requirements for a Mechanical Engineering graduate degree. If the student wishes to select a different course to satisfy the mathematics requirement, they must seek approval by the Graduate Director. When seeking approval for a different course, the student should compare the pre-/co-requisites of a similar class (or classes) in the list below to aid in the Graduate Director's analysis.

ME 702 Mechanical Engineering Analysis
PHSX 718 Mathematical Methods in Physical Sciences
MATH 590 Linear Algebra
MATH 591 Applied Numerical Linear Algebra
MATH 601 Algebraic Coding Theory
MATH 605 Applied Regression Analysis
MATH 611 Time Series Analysis
MATH 624 Discrete Probability
MATH 627 Probability
MATH 628 Mathematical Theory of Statistics
MATH 630 Actuarial Mathematics
MATH 646 Complex Variable and Applications
MATH 647 Applied Partial Differential Equations
MATH 648 Calculus of Variations and Integral Equations
MATH 650 Nonlinear Dynamical Systems
MATH 660 Geometry I
MATH 661 Geometry II
MATH 715 Sampling Techniques
MATH 717 Nonparametric Statistics
MATH 727 Probability Theory
MATH 728 Statistical Theory
MATH 735 Optimal Control Theory
MATH 750 Stochastic Adaptive Control
MATH 765 Intro to the Theory of Functions I
MATH 766 Intro to the Theory of Functions II
MATH 783 Applied Numerical Methods for Partial Differential Equations
MATH 790 Linear Algebra II
MATH 791 Modern Algebra
MATH 865 Intro to Stochastic Processes
MATH 724 Combinatorial Mathematics
MATH 725 Graph Theory
MATH 781 Numerical Analysis I
MATH 782 Numerical Analysis II
MATH 830 Abstract Algebra
MATH 831 Abstract Algebra II
MATH 840 Differentiable Manifolds
MATH 850 Differential Equations and Dynamical Systems
MATH 851 Topics in Dynamical Systems
MATH 865 Introduction to Stochastic Processes
MATH 866 Stochastic Processes II
MATH 881 Advanced Numerical Linear Algebra

MATH 882 Advanced Numerical Differential Equations
MATH 890 Fourier Analysis
BIOS 720 Analysis of Variance
BIOS 725 Applied Nonparametric Statistics
BIOS 730 Applied Linear Regression
BIOS 735 Categorical Data and Survival Analysis
BIOS 740 Applied Multivariate Methods
BIOS/STAT 825 Nonparametric Methods
BIOS/STAT 830 Experimental Design
BIOS/STAT 835 Categorical Data Analysis
BIOS/STAT 840 Linear Regression
BIOS/STAT 845 Survival Analysis
BIOS/STAT 850 Multivariate Statistics
BIOS/STAT 871 Mathematical Statistics
BIOS/STAT 872 Mathematical Statistics II
BIOS/STAT 880 Data Mining and Analytics
BIOS/STAT 900 Linear Models
BIOS/STAT 902 Bayesian Statistics
BIOS/STAT 905 Theory of Statistical Inference