



Graduate Handbook

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Mechanical Engineering Faculty

The Mechanical Engineering Department currently consists of 20 faculty members who have a variety of interests, knowledge, and expertise.

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3144B Learned Hall; (785) 864-3181; tbergman@ku.edu

Thomas DeAgostino, Associate Professor of the Practice (M.S., Rensselaer Polytechnic Institute)

Capstone Design, Solid Mechanics
3116 Learned Hall; (785) 864-2254; deagostinot@ku.edu

Christopher Depcik, Docking Faculty Scholar, Associate Professor (Ph.D., University of Michigan)

Automotive Engineering, Internal Combustion Engines, Alternative Fuels and Energy
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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
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Huazhen Fang, Assistant Professor (Ph.D., University of California, San Diego)

Control Systems, Energy Management, Environmental Monitoring, Mechatronics
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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, Associate Professor (Ph.D., Wichita State University)

Biomaterials, Biomedical Product Design and Testing
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Gibum Kwon, Assistant Professor (Ph.D., University of Michigan)

Superomniphobic Surfaces, Liquid-liquid Separations, Self-healable Coatings, Patterned Surfaces
3165B Learned Hall; (785) 864-3181; gbkwon@ku.edu

Xianglin Li, Assistant Professor (Ph.D., University of Connecticut)

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Energy Storage, Energy Conversion, Multi-Scale and Multi-Physics Modeling, Mechanics of Manufacturing Processes, Advanced Manufacturing
3165D Learned Hall; (785) 864-1612; linliu@ku.edu

Carl W. Luchies, Associate Professor (Ph.D., University of Michigan)

Biomechanics, Mechanical Measurements and Experimentation, Advanced Dynamics, Statics
3135B Learned Hall; (785) 864-2993; luchies@ku.edu

Lorin Maletsky, Professor, Associate Dean for Undergraduate Programs (Ph.D., Purdue University)

Statics, Dynamics, Strength of Materials, Kinematics, Introduction to Design, Machine Design, Senior Level Design, Design for Manufacturability, Biomechanics, Project Classes
1415R LEEP2; (785) 864-2985; maletsky@ku.edu

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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Paulette Spencer, Ackers Distinguished Professor and Director of the Institute for Bioengineering
Research (Ph.D., D.D.S., University of Missouri-Kansas City)
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Karan S. Surana, Deane E. Ackers Distinguished Professor (Ph.D., University of Wisconsin)
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Candan Tamerler, Wesley G. Cramer Professor (Ph.D., Bogazici University)
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Control Systems, Biomechanical Systems
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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 Microprocessor Applications:** computer-aided mechanical design, continuum mechanics, computer-integrated manufacturing, computational mechanics, finite element analysis, machine stress analysis, microcomputer applications, and automatic control systems

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.

Graduate Record Examination (GRE) scores are required for *all* applicants and are used in the evaluation process. Applicants are required to submit 3 letters of recommendation, 1 copy of transcripts from each institution of higher education, and a (maximum) 1 page statement of purpose.

Regular Status

- For admission to regular status in the Master's program, the student must have an undergraduate grade point average (GPA) of at least B (3.0/4.0).
- For admission to regular status in the Ph.D. program, the student must have an undergraduate GPA of at least 3.75/4.0 for direct admission into the Ph.D. program ("Fast Track") or 3.5/4.0 for admission with an M.S. degree.

Provisional Status

- For Master's applicants whose undergraduate GPA is below 3.0/4.0, but no lower than 2.75/4.0, admission on provisional status will be considered on a case-by-case basis.
- For Ph.D. applicants whose M.S. GPA is below 3.5/4.0, admission on provisional status will be considered on a case-by-case basis.
- For Ph.D. "Fast Track" applicants whose undergraduate GPA is below 3.75/4.0, admission on provisional status will be considered on a case-by-case basis.
- After the equivalent of one semester of full-time study as a provisional graduate student, the performance of the student is reviewed and will be (1) transferred to regular status, (2) dropped from the Graduate School, or (3) allowed to continue the equivalent of another semester as a provisional student. It is ordinarily expected that provisional status will not exceed two semesters. Provisional students are not eligible for Graduate Teaching Assistantship (GTA) or Graduate Research Assistantship (GRA) appointments, but may be considered for scholarship/fellowship funding based on need and available funding.

Minimum English Proficiency Requirements

These guidelines are subject to change by official action of the appropriate Graduate School governance bodies. Visit the full English Proficiency Requirements for Admission to Graduate Study at <http://policy.ku.edu/graduate-studies/english-proficiency-international-students>.

Admission:

The following are acceptable means for verifying English proficiency for purposes of admitting international students and domestic non-native English speakers:

- Graduation with a baccalaureate degree (or higher) earned in residence from an accredited English-medium U.S. college or university or a college or university in the United Kingdom, Australia, New Zealand, Ireland, English-speaking province of Canada, or an English-speaking Caribbean country, with instruction conducted in English. Degrees earned online may not be used to verify English proficiency.
- Official scores from an English proficiency standardized test scores (e.g. TOEFL, IELTS-Academic, or PTE), sent by the testing agency to the University of Kansas. Official scores must be less than two years old at the time the admission is processed by Graduate Admissions.
- In exceptional cases, a department, with written support from the appropriate School or College, may petition the Dean of Graduate studies to consider alternative documentation of English proficiency. In consultation with the Director of the Applied English Center, the Dean of Graduate Studies will determine whether the alternative documentation demonstrates English proficiency at the level expected for regular admission to graduate study at KU.

All students admitted to campus-based programs, who are international students and/or are not native speakers of English, are required to check in at the Applied English Center (AEC) upon arrival on campus. At that time, the AEC will confirm the student's level of English proficiency and determine whether English courses will be included as a requirement of the student's academic program. In order to graduate, students who are required to complete AEC courses must meet KU's English proficiency standards as demonstrated by their performance in AEC coursework and evaluations.

GTA and GRA Eligibility:

Graduate teaching and research assistant eligibility requirements are distinct from admission requirements. Additional information on eligibility for graduate teaching assistants and graduate research assistants may be found in the GTA, GRA, and GA Appointments: General Guidelines and Eligibility (<http://policy.ku.edu/graduate-studies/GRA-GTA-GA-guidelines-eligibility>).

The Board of Regents policy on spoken English competency for graduate teaching assistants requires that non-native speakers of English demonstrate English proficiency by obtaining:

- A minimum score of 50 on the SPEAK test,
- A 22 on the speaking portion of the TOEFL(iBT) with Reading, Listening, and Writing part scores at least 20, or
- An 8 on the speaking portion of the IELTS (minimum overall score of 6.0, no part score below 5.5)

Moreover, the student *must* be interviewed by three institutional representatives to determine sufficient English proficiency. More information may be found in the Kansas Board of Regents Policy on Spoken English Language Competency of Faculty and Graduate Teaching Assistants (<https://documents.ku.edu/policies/provost/SpokenEnglishLanguageCompetencyBORPolicy.htm>). The Graduate School English Proficiency Score (<http://graduate.ku.edu/english-proficiency-requirements>) requirements for admission and GTA/GRA eligibility are listed in Figure 1 and Figure 2.

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TOEFL (paper)	TOEFL (iBT)	IELTS	SPEAK test (AEC)	In these categories:
Admissions categories and score requirements:				
Regular Admission and obtain waiver from AEC/ Regular admission to Online and Distance Learning programs				
All part scores at least 57 , TWE 5.0	Reading, Listening and Writing part scores at least 23	Minimum overall score 6.5 , at least 6.0 in Listening, Reading & Writing		Student will obtain a waiver from the AEC and be able to begin course work immediately
Regular Admission				
All part scores at least 53	Reading, Listening and Writing part scores at least 20	Minimum overall score 6.0 with no part score below 5.5		Student will require AEC testing
Provisional Admission				
All part scores 51-52	Reading, Listening and Writing part scores 18-19	Minimum overall score 5.5 with no part score below 5.0		Student will require AEC testing
Deny Admission				
One or more part scores below 51	Reading, Listening or Writing score below 18	Overall score below 5.5 or one or more part scores below 5.0		Encourage student to apply directly to the AEC or retake TOEFL or IELTS
Employment:				
GTA				
Meets the criteria for regular admission or is in good academic standing plus must score at least 50 on SPEAK test at KU's AEC	Reading, Listening and Writing part scores at least 20 , Speaking 22	Minimum overall score 6.0 with no part score below 5.5 , Speaking 8	50	English proficiency sufficient for GTA or GRA offer
GRA				
All part scores at least 53	Reading, Listening and Writing part scores at least 20	Minimum overall score 6.0 with no part score below 5.5		English proficiency sufficient for GRA offer

Updated: 2/18/14

Figure 1. University of Kansas - English Proficiency Scores.

	Pearson Test of English (PTE)
Regular Admission	Minimum overall score 55 with no part score below 50
Provisional Admission	Minimum overall score 45 with no part score below 40
Deny Admission	Overall score below 43 or any part score below 36

Figure 2. Use of PTE instead of TOEFL or IELTS to determine English Proficiency (<http://policy.ku.edu/graduate-studies/english-proficiency-international-students>)

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: <http://policy.ku.edu/graduate-studies/fulltime-enrollment>.

	Fall/Spring	Summer
Full-time	<ul style="list-style-type: none"> 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 graduate students using the Montgomery GI Bill – Active Duty (MGIB-AD) and Post-9/11 GI Bill – Active Duty; Doctoral candidates enrolled in dissertation hour(s). See: http://policy.ku.edu/graduate-studies/doctoral-candidacy 	<ul style="list-style-type: none"> 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 graduate students using the Montgomery GI Bill – Active Duty (MGIB-AD) and Post-9/11 GI Bill – Active Duty; Doctoral candidates enrolled in dissertation hour(s). See: http://policy.ku.edu/graduate-studies/doctoral-candidacy
3/4-time	<ul style="list-style-type: none"> Enrollment in 7 credit hours; Enrollment in 4.5 credit hours plus a GRA appointment*, regardless of percentage of appointment. 	<ul style="list-style-type: none"> Enrollment in 4.5 credit hours; Enrollment in 2 credit hours plus a GRA appointment*, regardless of percentage of appointment.
Half-time	<ul style="list-style-type: none"> 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 graduate students using the Montgomery GI Bill – Active Duty (MGIB-AD) and Post-9/11 GI Bill – Active Duty. 	<ul style="list-style-type: none"> 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 graduate students using the Montgomery GI Bill – Active Duty (MGIB-AD) and Post-9/11 GI Bill – Active Duty.

**Master’s students:* If this is your final semester and you are a GRA, you are eligible to enroll in fewer than 6 hours by completing the eligibility form (provided that you will not be continuing in a doctoral program at the University of Kansas) found at <http://policy.ku.edu/graduate-studies/GRA-enroll-masters-under-six-hours>.

**Ph.D. candidates:* If you are a GTA, GRA, or GA and you have successfully completed the doctoral comprehensive examination, all other Graduate Studies and departmental requirements for candidacy to the doctoral degree, and 18 post-comprehensive hours while planning to enroll in less than 6 hours, you will need to complete a Certification of Eligibility to Enroll in Fewer than 6 hours found at <https://policy.ku.edu/graduate-studies/doctoral-GTA-eligibility-fewer-six-hours>.

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 (<http://graduate.ku.edu/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: <http://policy.ku.edu/graduate-studies/enrollment?num2.3>.

Failure to enroll or delays in enrollment directly impact the student's enrollment status and can cause the student to incur additional expense. *Students not enrolled by the first day of classes will be assessed a \$150 late fee to enroll in the Fall/Spring and \$75 in the Summer* (<http://registrar.ku.edu/comprehensive-fee-schedule-2015-16>). *Students not enrolled by the 20th of classes will be automatically discontinued in Enroll & Pay.* Students who wish to leave their graduate program should inform the department of such plans in writing so that a Voluntary Discontinue form may be filed on their behalf.

Leave of Absence

Students who wish to apply for a temporary leave from the graduate program should contact the department to petition for a Leave of Absence (<https://engr.ku.edu/sites/engr.ku.edu/files/docs/pdfs/LOA%20Request.pdf>). Leaves of one to three semesters, including Summer session, may be requested. A Leave of Absence allows the student to temporarily suspend enrollment without discontinuing their place in the graduate program.

Reduced Course Load (International)

In certain circumstances, an international student in F-1 status may wish to apply for a reduced course load; e.g., 6 credit hours in the Fall Semester while remaining full-time. The student *must* obtain permission from an ISS Adviser first before dropping below full-time. Moreover, *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)

A Mechanical Engineering senior at the University of Kansas who has a strong academic record may apply for contingent admission to the Graduate School and request permission of the Graduate Division to co-enroll in the Graduate School for the semester in which all requirements for the BSME degree will be completed. At least a 3.0 GPA is required. <http://policy.ku.edu/graduate-studies/seniors-and-grad-study?num2.8>.

Of 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, average graduate work; C, passing but not average graduate work (C– is not considered a passing grade); D and F, failing graduate work. C–, D, and F work does not count toward fulfilling degree requirements. <http://policy.ku.edu/graduate-studies/grading>.

The letter P is used only to indicate participation in thesis, dissertation, and research enrollments (related to thesis or dissertation), and in the first semester enrollment of a two-semester sequence course. In any semester, an instructor may assign a letter grade of A, B, C, D, or F when evidence about performance is available. Upon completion of thesis/dissertation or research hours leading to a Master's or Doctoral degree, the P remains on the final transcript except for the last semester of enrollment. A letter grade (A, B, C, D, or F) is assigned in the last semester of enrollment to characterize the quality of the final product. The I grade is not appropriate for enrollment in thesis, dissertation, or research, and is not accepted.

For enrollments other than thesis, dissertation, or research, the letter I is used to indicate course work that has been of passing quality, some part of which is, for good reason, unfinished. An incomplete will automatically revert to an F (or a grade selected by the instructor) if not completed within one year. 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.

In the grading system defined above, at least a B average (3.0 GPA) is required on course work counted toward the Master's degree, and only courses graded A, B, or C (excluding C–) may be so counted. Course work counted toward a doctorate, including that for a Master's degree if obtained at KU, should average better than a B (3.0 GPA). Courses graded P, S (Satisfactory), U (Unsatisfactory), or I are excluded from the computation of the average. The graduate GPA calculation only includes courses 500-level and above.

Probation

Upon falling below a cumulative graduate grade-point average of 3.0, computed with the inclusion of grades earned at KU for all courses acceptable for graduate credit, the student is placed on probation by the graduate division of the School of Engineering. The grades of P, S, U, and I, for which no numerical equivalents are defined, are excluded from the computation. If the student's overall graduate average has been raised to 3.0 by the end of the next semester of enrollment after being placed on probation, the student may be returned to good academic standing. If not, the student is not permitted to re-enroll and will be dismissed unless the graduate division of the School of Engineering acts favorably on a departmental recommendation for the student to continue study: <http://policy.ku.edu/graduate-studies/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 on provisional status, a student must earn an overall graduate average (including undergraduate courses taken to make up background deficiencies when applicable) of at least 3.0 during the first semester of enrollment (in which case the student is considered to have achieved good academic standing) to be permitted to re-enroll. A student admitted provisionally who fails to earn a 3.0 average in the first semester of enrollment may be dismissed immediately. If provisional continuation is recommended by the Department, and approved by the graduate division of the School of Engineering, the student may remain on provisional status for one additional semester.

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/college that will accept the student. The petition must be approved by the Dean of Graduate Studies.

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 (December 15 for Fall applicants; September 30 for Spring applicants) in order 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 (<http://policy.ku.edu/graduate-studies/benefits-for-GRAs-GTAs-GAs#payment-tuition>).

GRA: Graduate Research Assistants with an appointment of 40% (0.40 FTE) or more will have their tuition provided by the same funding source as their salary. The full cost of tuition for graduate research assistants must be included in all proposals, renewals, and contracts as part of the proposal budget when permissible by the granting agency or funding source. When not permitted by the funding source, the payment of tuition may be granted by the Graduate Tuition Assistance Pool (<http://policy.ku.edu/graduate-studies/GRA-tuition-assistance-policy>).

GTA: Depending on the level of appointment, the University pays all or some of a GTA’s tuition, including any course fees for GTAs who are enrolled in schools/programs that charge such fees. If the student is eligible for staff 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:

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% - 39%	75%	75% of 3 hours
20% - 29%	50%	50% of 3 hours
10% - 19%	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: <http://policy.ku.edu/graduate-studies/benefits-for-GRAs-GTAs-GAs>

Master of Science (M.S.) Degrees

The Department of Mechanical Engineering offers both a thesis option 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 at least six hours of credit. The non-thesis option must include at least three-credit hours of independent investigation.

Major

The major will be selected from the energy and thermal-fluids category, the mechanical design category, the computational mechanics category, or the biomechanics category (course groups listed later in this handbook). A maximum of six hours of Mechanical Engineering courses numbered between 500 and 699 may be included in the program of study. 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. At least half of the graduate level coursework must be taught by graduate faculty employed full-time by the Department of Mechanical Engineering.

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. 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://gradplan.engr.ku.edu/>.

Thesis Option

The program of study for the thesis option includes the requirements above plus a minimum of six credit hours of thesis. 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, the thesis should be submitted (<http://graduate.ku.edu/submitting>) electronically 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). You are responsible for submitting any bound copies that may be required by your 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

The program of study for the non-thesis option includes the requirements above plus a minimum of three credit hours of independent investigation. 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 Masters' 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 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. Only two attempts to pass the Masters' 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.

The request to schedule the examination must be submitted to the Mechanical Engineering Department at least two 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: Masters Candidates must be enrolled for at least one credit hour during the semester in which the Masters' final examination is taken, or the semester prior if meeting the early graduation deadline in a given semester.

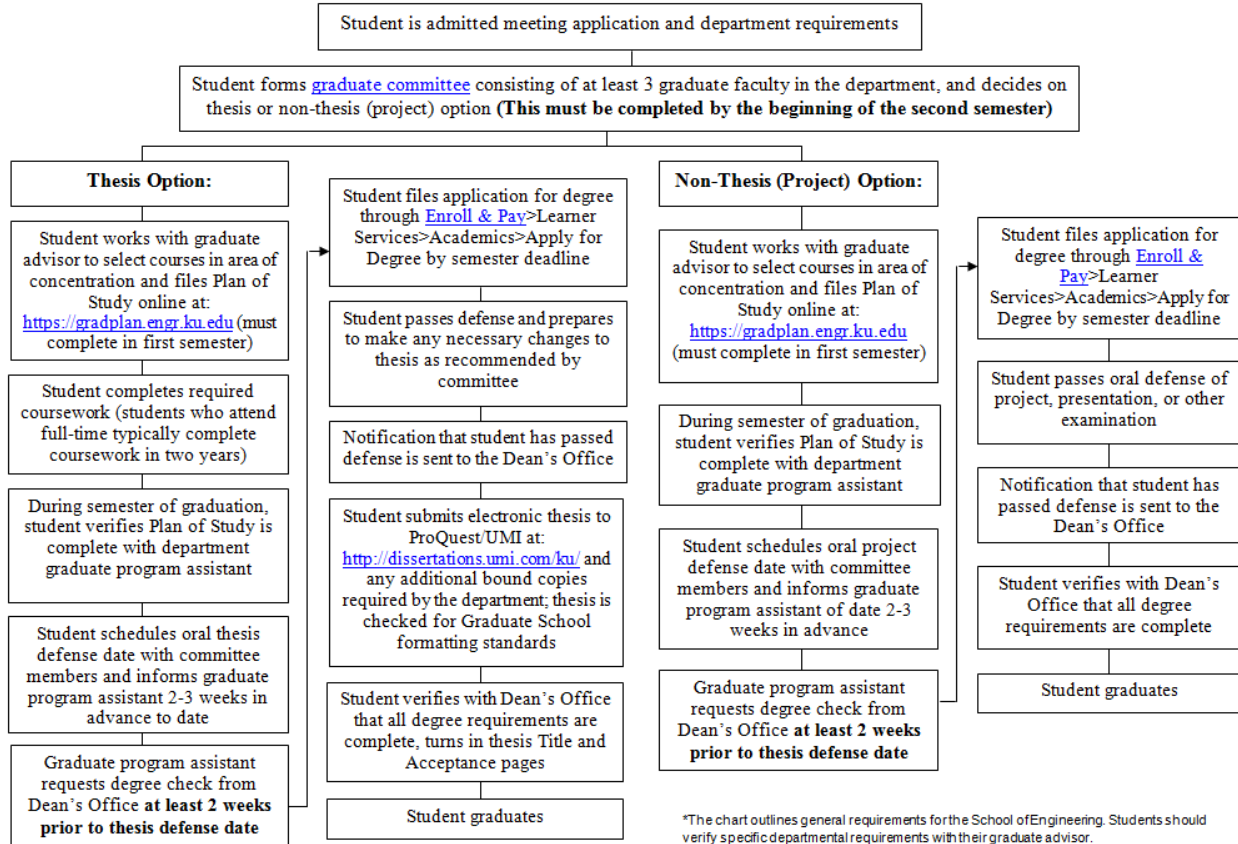
Program Time Constraints

Normal expectations are that most Master's 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 Mechanical Engineering Department, 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 (<http://policy.ku.edu/graduate-studies/ma-program-time-constraints>).

Credit by Transfer

At the discretion of the Mechanical Engineering Department and the Graduate Division, up to nine (9) hours of graduate credit taken at a regionally-accredited graduate school may be transferred and applied to a KU Master's degree plan if the credits were taken prior to the final semester of enrollment at KU. 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 also does not accept transfer for institutes, workshops, or for life/work experience. Credit will not transfer for courses that were previously counted toward the completion of an undergraduate or graduate degree (<http://policy.ku.edu/graduate-studies/graduate-credit>).

School of Engineering Graduate School Timelines
Master's Degree Programs, MS & ME*



Master of Science Degree Checklist

This checklist has been developed for the student to help keep track of meeting the requirements of the M.S. degree; they still have to fill out their plan of study at <https://gradplan.engr.ku.edu/>.

Committee Members (at least 3), Departments, Tenured/Tenure Track (at least 2 ME faculty including chair):

1. A maximum of 6 hours of Mechanical 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.

Course:	Semester:	Credit:
Course:	Semester:	Credit:
Graduate Director Initials for Approval of non-ME courses:		Hours Applied (max 6):

2. The program of study must include *no fewer than three credit hours* dealing with advanced mathematics.

Course:	Semester:	Credit:
Course:	Semester:	Credit:
Of note, if ME 702 is used, students cannot double count it towards their degree, it either acts as the mathematics course <i>or</i> as an ME course		Hours Applied (min 3):

3. The program of study for the *thesis* option includes a minimum of six credit hours of thesis (ME 899). The program of study for the *non-thesis* option includes a minimum of three credit hours of independent investigation (ME 899).

Course:	Semester:	Credit:
Course:	Semester:	Credit:
Thesis Option <input type="checkbox"/> Non-thesis Option <input type="checkbox"/>		Hours Applied:

4. The program of study must include *a minimum of 12 credit hours in a major selected from Mechanical Engineering courses* (excluding credit for mathematics and the independent investigation or thesis; hence, those courses should not appear here).

Course:	Semester:	Credit:
Course:	Semester:	Credit:
Course:	Semester:	Credit:
Course:	Semester:	Credit:
Course:	Semester:	Credit:
Course:	Semester:	Credit:
Of note, the student <i>may apply</i> ME courses in Section 1 above to the ME course requirement. However, do not double count the hours in this section.		Hours Applied:
Total Hours of ME Courses (should be ≥ 12)		Total Hours of Degree (should be ≥ 30)

Courses either required or used for the student's B.S. degree are *not* being used to fulfill M.S. degree requirements.

Date student selected advisor:	Date of final examination:
Date submitted the Plan of Study online:	Date informed grad. program assistant of final exam:
Date applied for degree:	Date submitted corrected thesis or report:
Date thesis submitted to committee:	Last day to meet all degree requirements:

Doctor of Philosophy (Ph.D.) Degree

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. <http://policy.ku.edu/graduate-studies/doctoral-program-time-constraints>

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. 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 area listed below.

Criterion #1

ASSESSMENT #1 (all four groups the same): 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

BIOMECHANICS AND BIOMATERIALS CRITERION #2: The student will select three 3 credit mechanical engineering courses numbered 700-990 (excluding ME 702, ME 860, ME 899, ME 901, and ME 999) with the approval of his/her advisor and the qualifying committee chair. The chosen courses should reflect the student's interest in the area(s) of biomechanics and biomaterials. To satisfy this criterion, the student must complete the three qualifying courses with an average GPA of 3.5 or above.

COMPUTATIONAL MECHANICS AND MATHEMATICS OF COMPUTATIONS CRITERION #2: The student is required to demonstrate an understanding of 1) the fundamentals of mechanics, 2) the theory of finite-

element methods and 3) applied mathematics, by passing written exams in each of these areas. The series of three written exams will be scheduled during one week each spring semester. Each exam will be graded separately. A student must pass all three exams to pass the qualifying requirement. A CONDITIONAL PASS may be awarded in the case of a student passing in two areas and failing in just one area. Additional conditions that must be satisfied may include extra coursework and/or a repeat of the exam in the area failed. A student failing to pass in at least two areas must repeat the entire exam sequence the following year.

THERMAL-FLUID SYSTEMS AND HEAT TRANSFER CRITERION #2: A student must demonstrate that they have an understanding in a core advanced thermal-fluid systems and heat transfer knowledge by completing a graduate level course with grade “A” in the following areas: Fluids, Heat Transfer, Applied Thermodynamics and Advanced Mathematics. A course from each area may be selected from the following.

Fluids	Heat Transfer	Applied Thermodynamics
ME 711	ME 770	ME 636
ME 810	ME 774	ME 637
*ME 733	*ME 831 or C&PE 731	ME 712
*ME 831 or C&PE 731		*ME 733
* Course will count in one area only		

Advanced Mathematics

Courses selected from approved list

Equivalent graduate courses that are completed at other institutions may be used to satisfy the requirements. For a conditional pass, a student must complete with an “A” grade courses in at least two areas and obtain a “B” grade in each of the remaining areas. The student will be required to pass courses with “A” grades in the areas in which they obtained “B” grades, within a year or before taking the Ph.D. comprehensive examination.

MECHANICAL DESIGN, MANUFACTURING, AND MICROPROCESSOR APPLICATIONS CRITERION #2: The student will select three 3 credit mechanical engineering courses numbered 700-990 (excluding ME 702, ME 860, ME 899, ME 901, and ME 999) with the approval of his/her advisor and the qualifying committee chair. The chosen courses should reflect the student’s interest in the area(s) of design, manufacturing, and microprocessor applications. To satisfy this criterion, the student must complete the three qualifying courses with an average GPA of 3.5 or above.

Criterion #3

BIOMECHANICS AND BIOMATERIALS CRITERION #3: This assessment will be done over a three day period. On the morning of the first day, the student will be provided three published manuscripts within his/her research area. The student will briefly review the articles and then select one for the examination. There are two steps to the examination.

Within the first three hours of the examination:

The student will write and submit a one page summary of the chosen manuscript. No outside help or resources are allowed. A computer with word processing will be provided. The written examination will last 3 hours or less.

Within the next three days of the examination:

The student will prepare a PowerPoint presentation to be presented to the qualifying examination committee. The presentation should include a discussion of the manuscript content and an evaluation of its strengths and weaknesses. No outside help will be allowed, although the student may utilize resources such as published manuscripts,

textbooks, and references as needed to clarify the manuscript content. This is not an examination of research methods. It is also not an examination of the student's ability to assimilate a broad research topic. This is an examination of the student's ability to effectively communicate the information contained within the chosen manuscript. Therefore, no other manuscripts should be referred to during the presentation. The oral presentation will last 20 minutes or less. The presentation, including questions on the manuscript content, will last 60 minutes or less.

Note: A set of SAMPLE questions corresponding to a SAMPLE manuscript (i.e. not the manuscript selected by the student) will be provided prior to the exam to give the student insight into the types of questions they should expect on the manuscript content during the exam.

COMPUTATIONAL MECHANICS AND MATHEMATICS OF COMPUTATIONS CRITERION #3: Under development.

THERMAL-FLUID SYSTEMS AND HEAT TRANSFER CRITERION #3: The student will give a 20 minute oral presentation to the qualifying examination committee. The material for the presentation will be from one of the following: the results of the student's M.S. thesis research, the manuscript of the student's published paper, or the results of a special research project assigned by the student's major advisor. The student must provide to the committee an abstract of the presentation ahead of the examination. To receive a grade of pass, the student must demonstrate to the committee his/her 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.

MECHANICAL DESIGN, MANUFACTURING, AND MICROPROCESSOR APPLICATIONS CRITERION #3: This assessment will be done over a three day period. On the morning of the first day, the student will be provided three published manuscripts within his/her research area. The student will briefly review the articles and then select one for the examination. There are two steps to the examination.

Within the first three hours of the examination:

The student will write and submit a one page summary of the chosen manuscript. No outside help or resources are allowed. A computer with word processing will be provided. The written examination will last 3 hours or less.

Within the next three days of the examination:

The student will prepare a PowerPoint presentation to be presented to the qualifying examination committee. The presentation should include a discussion of the manuscript content and an evaluation of its strengths and weaknesses. No outside help will be allowed, although the student may utilize resources such as published manuscripts, textbooks, and references as needed to clarify the manuscript content. This is not an examination of research methods. It is also not an examination of the student's ability to assimilate a broad research topic. This is an examination of the student's ability to effectively communicate the information contained within the chosen manuscript. Therefore, no other manuscripts should be referred to during the presentation. The oral presentation will last 20 minutes or less. The presentation, including questions on the manuscript content, will last 60 minutes or less.

Note: A set of SAMPLE questions corresponding to a SAMPLE manuscript (i.e. not the manuscript selected by the student) will be provided prior to the exam to give the student insight into the types of questions they should expect on the manuscript content during the exam.

Qualifying Exam Checklist: Thermal-Fluid Systems and Heat Transfer

Students should consult their faculty advisor regarding their own specific requirements for the qualifying examination. Dr. Depcik developed this checklist and rubric for his students.

Committee Members (at least 3 ME, members of Thermal-Fluids and Heat Transfer faculty)

- For a student with M.S. degree – exam is being completed prior to the third semester of enrollment
- For direct admit B.S. student – exam is being completed after 30 hours of graduate course work

Criterion #1. *The student must demonstrate an understanding of a core set of fundamental **undergraduate** mechanical engineering topics.*

- The student has satisfied and completed all requirements and conditions specified by the Department of Mechanical Engineering and the School of Engineering to address deficiencies.

Criterion #2. *A student must demonstrate an understanding in a core advanced thermal-fluid systems and heat transfer knowledge by completing a graduate level course with grade “A” in the following areas (consult handbook for approved courses, unapproved courses must be discussed with your Ph.D. committee):*

Fluids Course:	Semester:	Grade:
Heat Transfer Course:	Semester:	Grade:
Applied Thermodynamics Course:	Semester:	Grade:
Advanced Mathematics Course:	Semester:	Grade:

Criterion #3. *The student must demonstrate the ability to communicate effectively through writing, oral presentation, and open questioning. The material for the presentation will be from one of the following: the results of the student’s M.S. thesis research, the student’s published paper, or the results of a special research project assigned by the student’s major advisor.*

Options for Each: P-Pass, CP-Conditional Pass (committee needs to recommend remedy), F-Fail

- The student has provided the committee an abstract of the presentation ahead of the examination
- Less than two attempts at passing has been made

Written Communication:

Oral Communication:

Response to Questions:

Committee Recommendation for Criterion #3: _____

Qualifying Exam Checklist: Biomechanics and Biomaterials

Students should consult their faculty advisor in regards to their own specific requirements for the qualifying examination. Dr. Depcik has developed this draft checklist in order to help with the process.

Committee Members (at least 3 ME, members of Biomechanics and Biomaterials faculty)

- For a student with M.S. degree – exam is being completed prior to the third semester of enrollment
- For direct admit B.S. student – exam is being completed after 30 hours of graduate course work

Criterion #1. *The student must demonstrate an understanding in a core set of fundamental **undergraduate** mechanical engineering knowledge.*

- The student has satisfied and completed all requirements and conditions specified by the Department of Mechanical Engineering and the School of Engineering to address deficiencies.

Criterion #2. *The student will select three 3 credit mechanical engineering courses numbered 700-990 (excluding ME 702, ME 860, ME 899, ME 901, and ME 999) with the approval of their advisor and the qualifying committee chair. The chosen courses should reflect the student’s interest in the area(s) of biomechanics and biomaterials. To satisfy this criterion, the student must complete the three qualifying courses with an average GPA of 3.5 or above.*

Course #1:	Semester:	Credits:	Grade:	Calculated GPA:
Course #2:	Semester:	Credits:	Grade:	
Course #3:	Semester:	Credits:	Grade:	

Criterion #3. *This assessment will be done over a period of three days: Options are P-Pass or F-Fail.*

- Sample questions corresponding to a sample manuscript provided to the student prior to the exam
Date & Time: _____ Three published manuscripts in the student’s research area given
Main Author & Title of Chosen Article: _____
- One-page summary of chosen manuscript written by student and given to the committee within three hours
Presentation Date, Time, and Location (within three days of one-page summary): _____
Presentation Analysis (*Only* student’s ability to communicate information contained within manuscript effectively)

Discussion of Manuscript Content:

Evaluation of Manuscript Strengths and Weaknesses:

Committee Recommendation for Criterion #3: _____

Plan of Study

On successful completion of the qualifying examination, the student selects a major professor from the Department to serve as the chairperson of the advisory committee and to direct the research. 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 and their adviser to assist the student in preparing the plan of study (<https://gradplan.engr.ku.edu/>), to conduct the comprehensive examination, and to assist the student in planning research.

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.

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 of graduate course work and 24 credit hours of dissertation are required. If a Master's degree is not sought, 42 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.

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>). 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, in addition to all other course and credit requirements. 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. *Foreign Language.* The aspirant may demonstrate a reading knowledge in a foreign language in either of two ways:
 - a. Receive a score in the language on the Educational Testing Service Graduate School Foreign Language Test at, or above, the minimal level prescribed by the Graduate Studies Office.
 - b. Complete a language course approved by the advisory committee with a grade of B or better.
2. *Computer Science.* To establish competence in computer science, it is necessary to satisfy the advisory committee by demonstrating proficiency in a commonly used programming language and creating at least one original program.
3. *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.

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>

Doctoral Comprehensive Oral Examination

When a doctoral aspirant has completed the major portion of the course work at a level satisfactory to the graduate degree program and school (typically 18 credit hours beyond the Master's degree, or 42 beyond the bachelor's degree) and met all other program, school, and general requirements prerequisite to the comprehensive oral examination, including the research skills requirement as appropriately applied and established for the student's particular program, the degree program must request the Graduate Division of its school to schedule the comprehensive oral examination. It should be determined that the student is in good academic standing (3.0 or higher grade-point average) before scheduling the examination. The examination request (using the Progress to Degree system) must be submitted in advance of the examination date by at least the period specified by the Graduate Division, normally a minimum of two weeks. 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. The schedule for the examination should be announced throughout the Department at least 7 days in advance. <http://policy.ku.edu/graduate-studies/doctoral-oral-exams>

The committee for the comprehensive oral examination must consist of at least five members, all of whom must be members of the Graduate Faculty (three 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 Dean 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 and the Qualifying Exam has been successfully completed.

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.

Post-comprehensive Enrollment

Doctoral candidates are required, after passing the comprehensive oral examination, to be continuously enrolled in one or more hours of dissertation or programmatically equivalent coursework 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 and 3 hours a summer session.

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 and each summer session 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>

Comprehensive Exam Checklist and Rubric

Students should consult their faculty advisor regarding their own specific requirements for the comprehensive examination. Dr. Depcik developed this checklist and rubric for his students and they are to develop a document and PowerPoint presentation addressing the rubric items below.

Committee Members (at least 5), Departments, Tenured/Tenure Track (at least 3 ME faculty including chair):

Graduate Student Office Representative (can be one of the 5 Committee Members if free from Conflict of Interest):

- Department has requested a record review from SoE Graduate Division prior (at least two weeks) to exam date
- Schedule for examination has been announced by the Department at least seven days in advance
- It has been more than 5 months since the qualifying exam was successfully passed (all three criteria)
- 18 credit hours have been completed beyond a master's degree (or 42 beyond a bachelor's degree)
- If a prior exam was taken and unsuccessful, at least 90 days has elapsed since this attempt

Rubric items are graded as follows: 1-Unacceptable, 2-Acceptable, 3-Very Good, 4-Outstanding
<p><i>Introduction of Problem</i> – The student has effectively defined the problem or issue their research will address. Peer reviewed literature is utilized in order to illustrate the problem's significance.</p> <p><u>Comments:</u></p>
<p><i>Methodology/Approach</i> – Student specifies a detailed plan that they will take (e.g., experimentation and/or modeling) in order to address the different pathways to solve the problem. This can be delineated by dissertation chapters that tackle one (or more) component(s) at a time. Preliminary peer-reviewed research is provided to document important papers for each pathway.</p> <p><u>Comments:</u></p>
<p><i>Results/Analysis</i> – Student describes the intended results of the work, what data that will be generated, and how this information will address the solution of the problem.</p> <p><u>Comments:</u></p>
<p><i>Publications</i> – Student illustrates what publications (e.g., conference papers, journal papers) will result from the work, what these publications will contain, and where these publications will be submitted.</p> <p><u>Comments:</u></p>
<p><i>Timeline</i> – Student has generated a timeline of the effort that is appropriate and doable. Student has considered the time taken to run experiments or computer simulations.</p> <p><u>Comments:</u></p>

Total Score: _____ Satisfactory/Unsatisfactory: _____

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), 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>

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>):

1. Doctoral committees are composed of at least five voting members;
2. The majority of committee members serving on a doctoral student oral examination committee must be tenured/tenure-track faculty holding regular or dissertation graduate faculty status in the candidate's department/program of study. Tenured/tenure-track faculty who are appointed as courtesy faculty within the program/department are considered (for the purposes of committee composition) to be faculty of that program/department;
3. 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, but cannot serve in both roles at the same time; and
4. Beyond the majority requirement, the additional member may hold any graduate faculty status, including regular, dissertation, or special status. This fifth member can be, but need not be, a member of the candidate's department/program.

The doctoral committee chair must hold dissertation status. While committees are not required to have a co-chair, the student or the committee members may decide to select a co-chair. The co-chair can hold any graduate faculty status.

Completion of the dissertation is the final academic phase of a doctoral program, culminating in the final oral examination and defense of the dissertation. In all but the rarest cases, tentative approval of the dissertation is followed promptly by the final oral examination. When the completed dissertation has been accepted by the committee in final draft form, and all other degree requirements have been satisfied, the chair of the committee requests the Graduate Division to schedule the final oral examination. This request must be made in advance of the desired examination by at least the period specified by the Graduate Division (normally at least three weeks). The submission of the request must allow sufficient time to publicize the examination so that interested members of the university community may attend. At least five months must elapse between the successful completion of the comprehensive oral examination and the date of the final oral examination.

<https://policy.ku.edu/graduate-studies/final-oral-exams>

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 Dean of Graduate Studies for consideration of further action.

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 major professor, and one bound copy to the Mechanical Engineering Department (see <http://graduate.ku.edu/submitting> for recommended binding services).

Dissertation Checklist – M.S. Degree Start

This checklist has been developed to help keep track of meeting the requirements of the Ph.D. degree starting with an M.S.; students must still fill out their plan of study at <https://gradplan.engr.ku.edu/>

Committee Members (at least 5), Departments, Tenured/Tenure Track (at least 3 ME faculty including chair):

Graduate Student Office Representative (can be one of the 5 Committee Members if free from Conflict of Interest):

- It has been more than 5 months since the comprehensive exam was successfully passed (date: _____)
- The oral examination has been scheduled three weeks in advance
- The examination has been publicized at least 7 days prior to the date of the examination

<i>1. For students with a 30-credit Masters' degree in Mechanical Engineering, a minimum of an additional 18 credits of graduate course work is required. A minimum of 9 credit hours of the 18 must be mechanical engineering courses numbered 700-900 (excluding ME 702, ME 801, ME 899, ME 901, and ME 999).</i>					
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
ME Courses Credit:			Total Hours:		

<i>2. For students with a 30-credit Masters' degree in ME, 24 hours of dissertation credit (ME 999) are required.</i>					
Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Total Hours:	

<i>3. A minimum of 9 credit hours of advanced mathematics beyond the bachelor's degree is required. This may include classes taken as part of the 30-credit M.S. degree, but you cannot double count these M.S. classes for #1 above.</i>					
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
					Total Hours:

Dissertation Checklist – B.S. Degree Start

This checklist has been developed to help keep track of meeting the requirements of the Ph.D. degree starting with a B.S.; students must still fill out their plan of study at <https://gradplan.engr.ku.edu/>

Committee Members (at least 5), Departments, Tenured/Tenure Track (at least 3 ME faculty including chair):

Graduate Student Office Representative (can be one of the 5 Committee Members if free from Conflict of Interest):

- It has been more than 5 months since the comprehensive exam was successfully passed (date: _____)
- The oral examination has been scheduled three weeks in advance
- The examination has been publicized at least 7 days prior to the date of the examination

1. For students not seeking an M.S. in Mechanical Engineering, a minimum of 42 credits of graduate course work is required. A minimum of 21 credit hours of the 42 must be mechanical engineering courses numbered 700-900 (excluding ME 702, ME 801, ME 899, ME 901, and ME 999).

Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
ME Courses Credit:				Total Hours:	

2. For students not seeking a Masters' degree in ME, 30 hours of dissertation credit (ME 999) are required.

Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Semester:	Credit:
Semester:	Credit:	Semester:	Credit:	Total Hours:	

3. A minimum of 9 credit hours of advanced mathematics beyond the bachelor's degree is required.

Course:	Semester:	Credit:	Course:	Semester:	Credit:
Course:	Semester:	Credit:	Course:	Semester:	Credit:
				Total Hours:	

Dissertation Rubric¹

The committee has the option to evaluate the candidate’s dissertation using the following rubric and upload the results to <http://ku.campuslabs.com/rubrics/uok/DLORME> for data collection. The candidate may wish to review this rubric to help them with their understanding of what is required in a dissertation.

	1-Unacceptable	2-Acceptable	3-Very Good	4-Outstanding
Introduction/ Statement of the Problem	<ul style="list-style-type: none"> Poorly written Does not define the problem or approach Does not show sufficient knowledge 	<ul style="list-style-type: none"> Adequately written Does not explain the problem’s importance 	<ul style="list-style-type: none"> Well written Provides a good problem statement 	<ul style="list-style-type: none"> Exceptionally well written Sets up & defines problem clearly
Grounding in the Literature	<ul style="list-style-type: none"> Inadequate sources Does not understand the literature Does not provide context 	<ul style="list-style-type: none"> Adequate Does not put literature in right context Lacks critical analysis & synthesis 	<ul style="list-style-type: none"> Shows understanding of the literature Provides a meaningful summary of the literature 	<ul style="list-style-type: none"> Provides a thorough, comprehensive and up to date review Uses literature to advance the field
Methodology/ Approach	<ul style="list-style-type: none"> Uses the wrong methodology or tool Methodology is absent or omitted Methodology is misunderstood 	<ul style="list-style-type: none"> Understands & uses theory appropriately Shows basic level of competence 	<ul style="list-style-type: none"> Complete & correct Builds on existing theory Applies method in correct ways 	<ul style="list-style-type: none"> Original Integrates theory & experimental work Uses cutting-edge methodology
Results/ Analysis	<ul style="list-style-type: none"> Analysis is wrong, inappropriate, or incompetent Data are wrong Cannot explain results 	<ul style="list-style-type: none"> Appropriate & correct Produces quality results 	<ul style="list-style-type: none"> Appropriate & correct Produces high-quality results 	<ul style="list-style-type: none"> Results are meaningful and usable Provides plausible interpretations Discusses accuracy, reliability & limitations
Discussion/ Conclusion	<ul style="list-style-type: none"> Inadequate Does not understand the results Does not discuss the implications of the work Does not draw conclusions 	<ul style="list-style-type: none"> Summarizes the dissertation Does not address the significance or implications of the research 	<ul style="list-style-type: none"> Provides a good summary Identifies possible implications & some future directions 	<ul style="list-style-type: none"> Clear & concise Discusses strengths, weaknesses & limitations Puts the study in the larger context Discusses future directions
Overall				

¹ Faculty can review evaluation results at: <https://ku.campuslabs.com/app/ClientWeb/Rubrics/Rubric.aspx?RubricId=158224>

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.

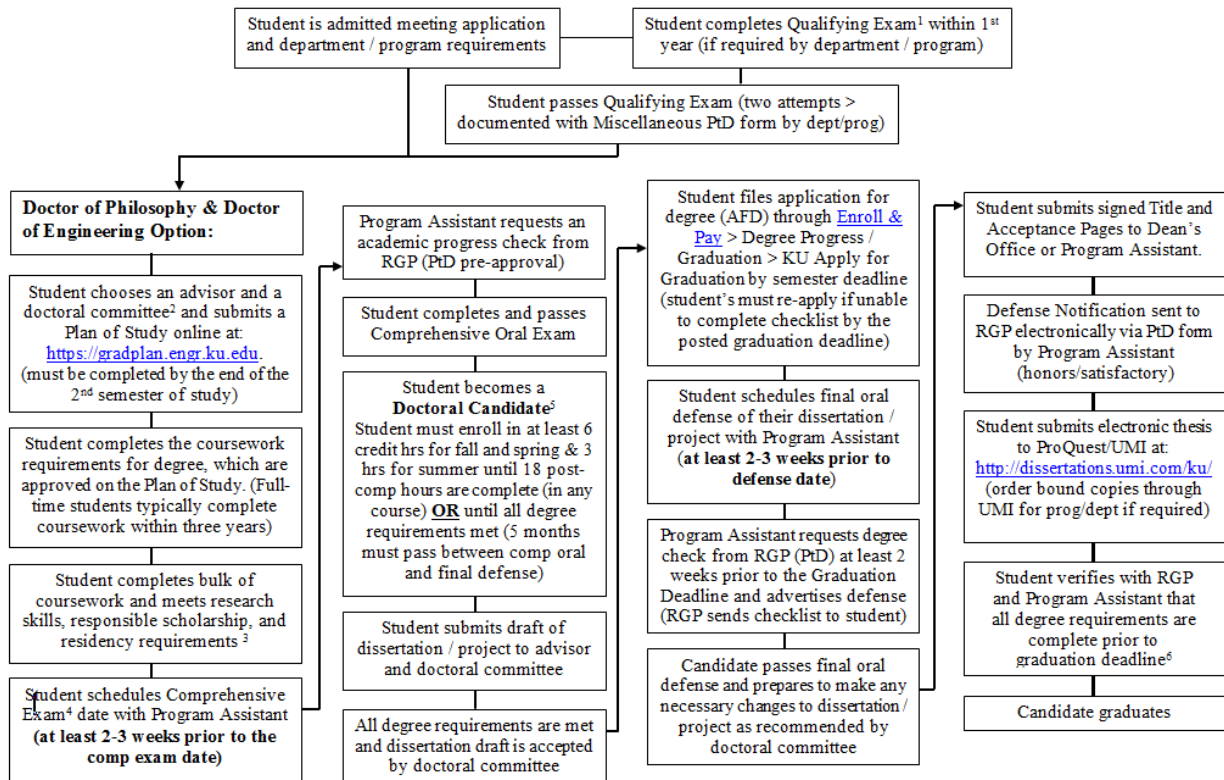
Maximum Tenure

After being admitted to doctoral programs at KU, students complete all degree requirements in eight years. In cases in which compelling circumstances recommend a one-year extension, the Graduate Division has authority to grant the extension on the written advice of the department and dissertation committee. Students who complete the master's degree at KU and subsequently begin doctoral studies have a maximum total enrolled time of 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 years of full-time study, and both master's and doctorate in six years of full-time study. Some graduate degree programs may have more stringent time restrictions. Students should inquire about the policy in effect in the department in which they plan to study.

A student in any of the above categories may petition the Graduate Division 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 the Graduate Division.

<https://policy.ku.edu/graduate-studies/doctoral-program-time-contraints>

School of Engineering Graduate School Timelines
 Doctoral Degree Programs, Ph.D. & D.E.*



* The chart outlines general requirements for the School of Engineering. Students should verify specific departmental requirements with their graduate advisor.

¹. Qualifying Exam (Optional per University / Program Specific) – Tests knowledge & Research Skills (some departments/programs have coursework or area requirements) see departmental requirements.

². The doctoral committee must consist of at least 5 members. At least 3 members must be tenure / tenure track faculty from within the department, including the advisor and include one person from outside the department at KU who will act as the outside member. Students may have co-chairs or members from outside KU, but all members must be approved as a regular or special member of the Graduate Faculty (see requirements at https://documents.ku.edu/policies/Graduate_Studies/gradfacappnts.htm).

³. Students should contact their department/program for more information on the responsible scholarship and research skills requirements, as they are specific to each program. Residency requirements are met when students are in residence as a full-time student for at least two semesters (enrolled in at least 6. See graduate catalog for more details at <http://www.ku.edu/academics/catalogs/>).

⁴. Comprehensive Oral Exam (Required by University / Program Specific) – Completed after major portion of coursework, research skills, responsible scholarship, and residency completed. Student must be in good academic standing with no incomplete grades and have a complete and approved Plan of Study on file.

⁵. After passing the Comprehensive Oral Exam, the candidate must be continuously enrolled, including summer sessions, until all requirements for the degree are completed, and each enrollment must reflect 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 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 and 3 hours a summer session. See graduate catalog for more details at <http://www.ku.edu/academics/catalogs/>.

⁶. The graduation checklist is available online at <http://www.engr.ku.edu/graduate/checklist.html> and graduation deadlines are posted on the KU Graduate Studies webpage at <http://www.graduate.ku.edu/graduation> (see the annual Academic Calendar under Important Information).

Courses

Numbering System

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

- Courses numbered 500-699 are designed primarily for juniors and seniors, 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, 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.
- Courses numbered 900-999 are designed primarily for graduate students who have 30 or more hours of graduate credit.

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 861 Theory of the Finite Element Method
- ME 862 Finite Element Method for Transient Analysis
- ME 864 Mesh Generation and Adaptivity for Finite Element Simulations in Engineering
- ME 882 Advanced Control Systems
- ME 961 Finite Element Method for Nonlinear Problems in Solid Mechanics
- ME 962 p-Approximation, Error Estimation and Other Advanced Topics in the Finite Element Method
- ME 965 Mathematical Modeling and Computational Method in Multi-Scale Processes

Mechanical Design, Manufacturing, and Microprocessor Applications

- ME 627 Automotive Design
- ME 696 Design for Manufacturability
- ME 708 Microcomputer Applications in Mechanical Engineering
- ME 720 Advanced Dynamics of Machinery
- ME 722 Modeling Dynamics of Mechanical Systems
- ME 808 Advanced Microprocessor Applications
- ME 882 Advanced Control Systems
- ME 961 Finite Element Method for Nonlinear Problems in Solid Mechanics

Thermal-Fluid Systems and Heat Transfer

- ME 636 Internal Combustion Engines
- ME 637 Steam Power Plants
- ME 639 Alternative Energy Systems
- ME 711 Bearings and Bearing Lubrication
- ME 712 Advanced Engineering Thermodynamics
- ME 714 Thin Film Flow
- ME 718 Fundamentals of Fuel Cells
- ME 733 Gas Dynamics
- ME 736 Catalyst Exhaust Aftertreatment Modeling
- ME 752 Acoustics
- ME 756 Biofluid Dynamics
- ME 770 Conductive Heat Transfer
- ME 774 Radiative Heat Transfer
- ME 788 Optimal Estimation
- ME 797 Materials for Energy Applications
- ME 810 Advanced Fluid Dynamics
- ME 831 Convective Heat and Momentum Transfer
- ME 832 Computational Fluid Dynamics and Heat Transfer
- ME 836 Hybrid and Electric Vehicles

Biomechanics and Biomaterials

- ME 633 Basic Biomechanics
- ME 696 Design for Manufacturability
- ME 720 Adv. Dynamics of Machinery
- ME 750 Biomechanics of Human Motion
- ME 751 Experimental Methods of Biomechanics
- ME 753 Bone Biomechanics
- ME 754 Biomedical Optics
- 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 810 Advanced Fluid Dynamics
- ME 831 Convective Heat and Momentum Transfer
- 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
- ME 962 p-Approximation, Error Estimation and Other Advanced Topics in the Finite Element Method

Other Courses of Interest

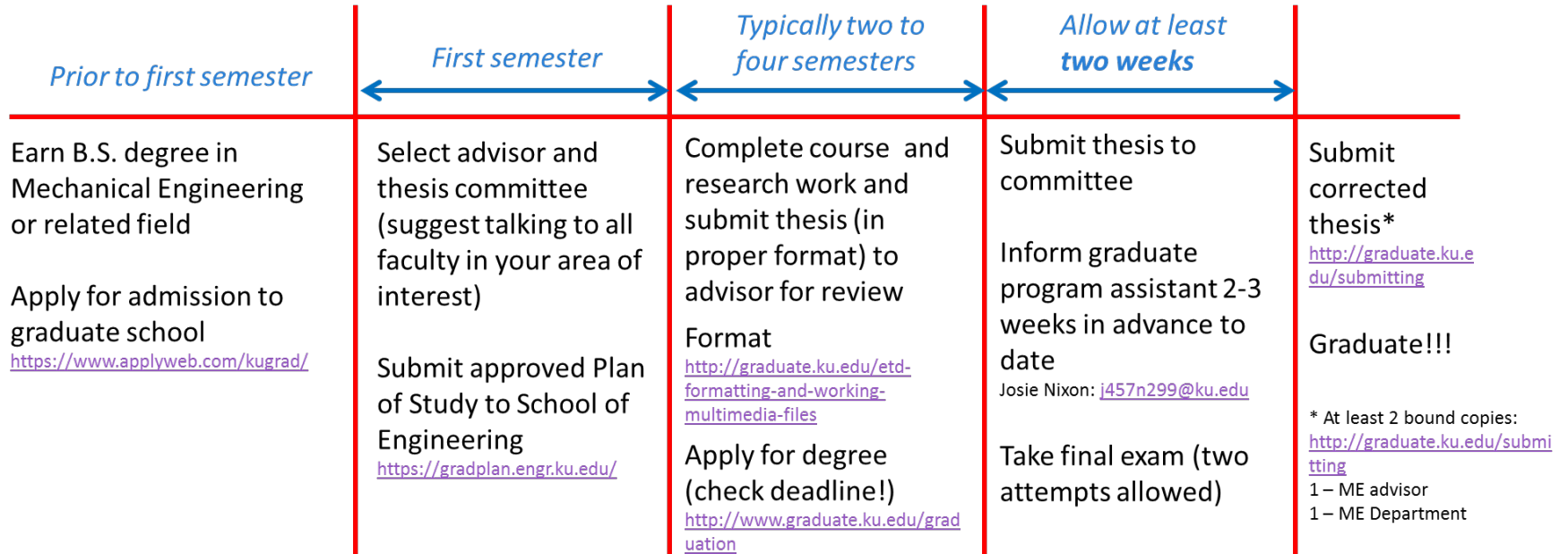
- ME 790 Special Topics (*a faculty member uses this number when they are in the midst of developing a graduate course for Master’s students*)
- ME 860 Advanced Mechanical Engineering Problems (*An analytical or experimental study of problems or subjects of immediate interest to a student and faculty member; to be discussed individually with faculty and is independent of thesis/dissertation work*)
- ME 890 Special Topics (*a faculty member uses this number when they are in the midst of developing a graduate course for Master’s/Doctoral students*)
- ME 899 Independent Investigation (*Master’s thesis or project credit hours*)
- ME 990 Special Topics (*a faculty member uses this number when they are in the midst of developing a graduate course for Doctoral students*)
- ME 999 Independent Investigation (*Ph.D. dissertation credit hours*)

Approved Courses in Mathematics

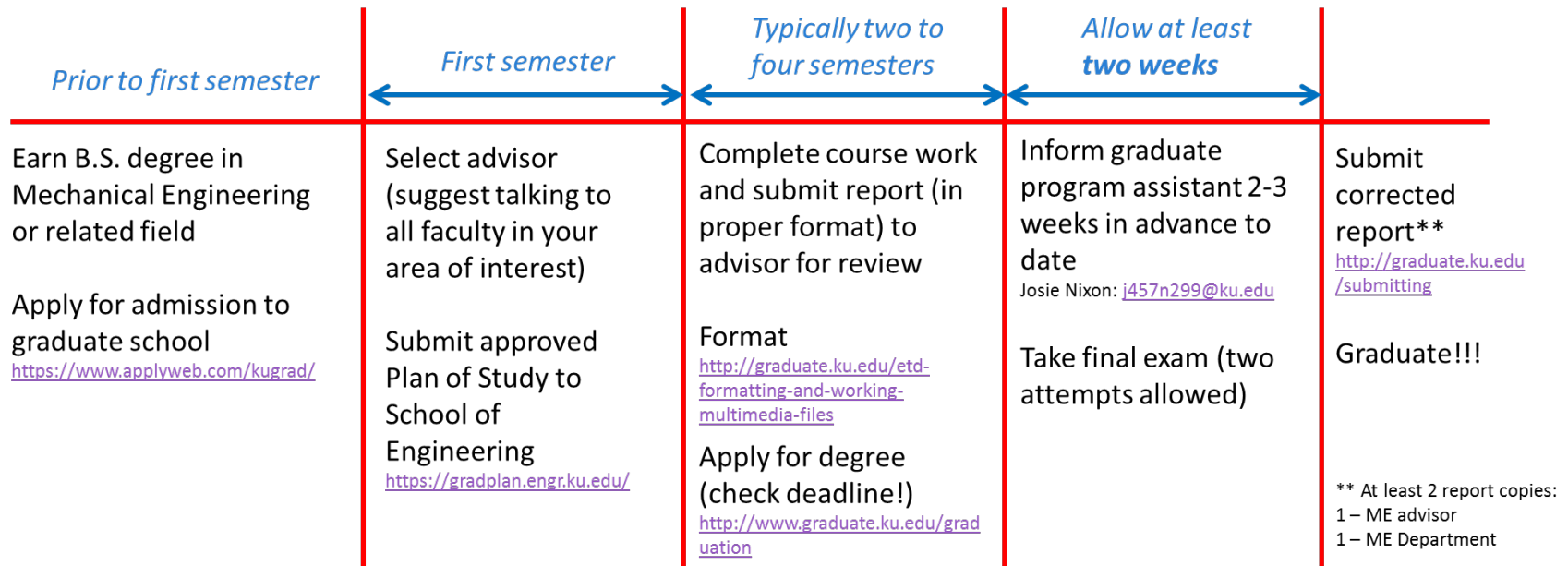
The following courses may be used to satisfy mathematics requirements for a Mechanical Engineering graduate degree. If the student wishes to select a different course for satisfying the mathematics requirement, they must first seek approval by the Graduate Director prior to enrolling.

- ME 702 Mechanical Engineering Analysis
- PHSX 718 Mathematical Physics
- MATH 590 Linear Algebra
- MATH 591 Applied Numerical Linear Algebra
- MATH 611 Fourier Analysis of Time Series
- MATH 624 Discrete Probability
- MATH 627 Probability
- MATH 628 Mathematical Theory of Statistics
- MATH 631 Operations Research
- MATH 646 Complex Variable and Applications
- MATH 647 Applied Partial Differential Equations
- MATH 648 Calculus of Variations and Integral Equations
- MATH 715 Sampling Techniques
- MATH 717 Nonparametric Statistics
- MATH 727 Probability Theory
- MATH 728 Statistical Theory
- MATH 735 Intro To Optimal Control Theory
- MATH 750 Stochastic Adaptive Control
- MATH 765 Intro to Theory of Functions I
- MATH 766 Intro to Theory of Functions II
- MATH 783 Applied Numerical Analysis for Partial Differential Equations
- MATH 790 Linear Algebra II
- MATH 791 Modern Algebra I
- MATH 792 Modern Algebra II
- MATH 865 Intro to Stochastic Processes

M.S. Thesis Degree Succinct Flow Chart



M.S. Non-Thesis Degree Succinct Flow Chart



Ph.D. Degree Succinct Flow Chart (Starting at B.S.)

