Graduate Handbook

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Mechanical Engineering Faculty

The Mechanical Engineering Department currently consists of 19 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.

Theodore Bergman*, Charles E. & Mary Jane Spahr Professor (Ph.D., Purdue University)
Heat Transfer, Energy, Thermal Manufacturing
3144B Learned Hall; (785) 864-3181; tlbergman@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*, Professor (Ph.D., University of Michigan)
Automotive Engineering, Internal Combustion Engines, Alternative Fuels and Energy
3144C Learned Hall; (785) 864-4151; depcik@ku.edu

Huazhen Fang*, Associate 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*, Professor, Department Chair (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) 864-1086; gbkwon@ku.edu

Xianglin Li*, Assistant Professor (Ph.D., University of Connecticut)
Proton Exchange Membrane and Direct Methanol Fuel Cells, Lithium-Air Batteries, Multi-Species and Multi-Phase Heat and Mass Transfer, Thermodynamic and Full Fuel Cycle Analysis
3118 Learned Hall; (785) 864-8165; xianglinli@ku.edu

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
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 (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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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
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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
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Candan Tamerler*, Wesley G. Cramer Professor (Ph.D., Bogazici University)
Molecular Biomimetics, Bio-nanotechnology, Nanotechnology, Bio-enabled Materials Science, Biomaterials
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Peter W. TenPas*, Associate Professor (Ph.D., Iowa State University)
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Sara Wilson*, Associate Professor (Ph.D., Massachusetts Institute of Technology)
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Xinmai Yang*, Associate Professor (Ph.D., Boston University)
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Mechanical Engineering Emeriti Faculty

Louis Burmeister, Professor (Ph.D., Purdue University)
Heat Transfer, Convective Transport, Transient Film Boiling, and Numerical Methods for Solution of Partial Differential Equations

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

Robert Umholtz, Associate Professor (M.S., University of Kansas)
Kinematics, Dynamics of Machinery, Computer-Aided Design

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

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

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 be able to:

1. *Conduct original research in mechanical engineering (for the Master of Science with thesis option), or complete a substantial project related to mechanical engineering (for the Master of Science with project option).*
2. *Demonstrate the ability to learn new concepts and build new skills relevant to the discipline of mechanical engineering.*
3. *Effectively communicate advanced mechanical engineering concepts, both in writing and orally.*
4. *Qualified to work at the most prestigious research institutions and universities in the world.*

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

Graduates holding the Ph.D. degree in Mechanical Engineering will be able to:

1. *Conduct independent, publishable, impactful research on a topic or topics related to mechanical engineering.*
2. *Demonstrate the ability to learn new concepts and build new skills relevant to the discipline of mechanical engineering.*
3. *Demonstrate expertise in at least one area of mechanical engineering.*

4. *Effectively communicate advanced mechanical engineering concepts, both in writing and orally, at a professional level.*

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

Application Deadlines

Fall Priority Deadline: December 15th
Spring Priority Deadline: September 30th

Applications may be accepted after the priority deadlines listed above, but those applicants may not be considered for fellowships and assistantships. All application materials for international students must be submitted by March 31st for fall and September 30th for spring to be considered for admission. For domestic students, these dates are June 1st for fall and November 1st for spring. See the Graduate Studies website (http://graduate.ku.edu/) for the application procedure and fees.

Application Materials

- Application
- GRE scores (institution code = 6871; program code = 1502)
- One-page statement of purpose
- Resume or curriculum vitae (optional)
- Official transcript from each institution of higher education attended
- Three letters of recommendation
- TOEFL scores (international students; institution code = 6871; program code = 68)
- Financial statement (international students only if admitted)

Submit all supporting documents and your graduate application online (http://graduate.ku.edu/ku-graduate-application). Graduate Record Examination (GRE) scores are required for all applicants and are used in the evaluation process.

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).
- Students who have an undergraduate grade point average of at least 3.75/4.0 or 3.5/4.0 with an M.S. degree are eligible for and will be recommended for direct admission into the Ph.D. program ("Fast Track") on a regular admission status.

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 (4/5/2020).

Admission:

KU recognizes several mechanisms by which applicants may demonstrate their English proficiency. The following are acceptable means of demonstrating English proficiency for purposes of graduate admission:

1. Graduation with a baccalaureate degree (or higher) earned in residence from a regionally accredited English-medium U.S. college or university or from a foreign university which conducts all instruction in English and which maintains substantially equivalent bachelor's, master's, or doctoral degree requirements
    - Degrees earned online may not be used to demonstrate English proficiency.
    - Demonstrates Full Proficiency: applicants are not required to complete AEC testing
2. Satisfactory completion of the entire AEC curriculum with a final university designation of "Proficiency Obtained"
    - Demonstrates Full Proficiency: no further English-language testing or coursework is required
3. Employment as an officer in the U.S. military with documentation of selection or promotion to the rank of Major or higher (or the equivalent U.S. Navy or Coast Guard rank)
    - Demonstrates Full Proficiency: applicants are not required to complete AEC testing
4. Official scores from an English proficiency standardized test (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 that Graduate Admissions processes the application.
    - Scores demonstrate Provisional, Admission, or Full Proficiency in accordance with the table below
5. In exceptional cases, a department, with written support from the appropriate school or college, may petition the Vice Provost for Graduate studies to consider alternative documentation of English proficiency. In consultation with the Executive Council of Graduate Faculty and the Director of the AEC, the Vice Provost for Graduate Studies will determine whether the alternative documentation demonstrates English proficiency at the level expected for regular admission to graduate study at KU.
    - Demonstrates Provisional, Admission, or Full Proficiency, depending on the documentation provided

Documentation Type	***Full Proficiency***	***Admission Proficiency***	***Provisional Proficiency***
TOEFL (paper)	*All part scores at least 57, TWE 5.0*	*All part scores at least 53*	*All part scores 51-52*
TOEFL (iBT)	*Reading, Listening, and Writing part scores at least 23*	*Reading, Listening, and Writing part scores at least 20*	*Reading, Listening, and Writing part scores 18-19*
IELTS-Academic	*Minimum overall score 6.5, at least 6.0 in Listening, Reading, and Writing*	*Minimum overall score 6.0 with no part score below 5.5*	*Minimum overall score 5.5 with no part score below 5.0*
PTE	*Minimum overall score 58 with no part score below 53 in Listening, Reading, and Writing*	*Minimum overall score 55 with no part score below 50*	*Minimum overall score 45 with no part score below 40*
AEC Coursework	*Completion of all AEC coursework and designation as "Proficiency Obtained"*	*N/A*	*N/A*
AEC Testing Required?	*No*	*Yes*	*Yes*

Applied English Center Testing:
The Applied English Center (AEC - http://aec.ku.edu/) maintains a testing process for non-native speakers of English. This process serves to confirm each 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 Full Proficiency standard as demonstrated by their performance in AEC coursework and/or testing.

- Students who are admitted in the Full Proficiency band are not required to complete AEC testing.
- All other non-native speakers of English who gain admission to campus-based programs are required to complete AEC testing upon arrival on campus.

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: 11/27/2017).

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, or
- 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)

In addition, all non-native speakers of English *must* be interviewed by three institutional representatives, including at least one student to determine sufficient English proficiency.

More information may be found in the Spoken English Language Competency of Faculty and Graduate Teaching Assistants, Kansas Board of Regents Policy (https://policy.ku.edu/KBOR/spoken-english-competency-BOR-policy: 9/8/2016).

Please consult the Graduate School English Proficiency Score (http://graduate.ku.edu/english-proficiency-requirements) requirements for admission and GTA/GRA eligibility (Figure 1).

TOEFL (iBT)	**IELTS** (Academic)	**SPEAK Test** (AEC)	***Result***
GTA			
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			
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*

Figure 1. University of Kansas - English Proficiency Scores

Visiting Us

The graduate program staff is happy to work with all prospective students in determining the fit between the student and the program. In order to determine this, we feel that visiting our campus in Lawrence is a very important step. In order to facilitate your visit to KU, there are two main options:

- The first, and most preferred, option entails simply applying for admission to the program. All prospective students are welcome to attend our Open House in early November and some highly qualified admitted students may be invited to participate in Campus Visit Days in late February or early March (prior to the fall semester of your intended matriculation). These organized visitation opportunities will allow you time to gather a great deal of first-hand information which we hope will help you in making a final decision about whether to attend KU.
- The second option involves arranging to visit us on your own, 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 if you feel that this is the best 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: http://policy.ku.edu/graduate-studies/fulltime-enrollment (6/25/2020).

	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: http://policy.ku.edu/graduate-studies/doctoral-candidacy (8/14/2018)	• 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: http://policy.ku.edu/graduate-studies/doctoral-candidacy (8/14/2018)
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*: In certain master's degree programs, students who are in the final semester may be able to complete the course and hours requirements for the degree while enrolling in fewer than six hours. Such students may enroll in fewer than six hours and still retain eligibility to hold a position as a Graduate Research Assistant (GRA) provided that the student will not be continuing in a doctoral program at the University of Kansas. The option of enrolling in fewer than six hours during the final semester is available only to master's students with GRA appointments. It is not available to master's students with GTA or GA appointments: http://policy.ku.edu/graduate-studies/GRA-appointment-eligibility (6/5/2020).

**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 post-comprehensive credit hours, the student may enroll in one 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.
http://policy.ku.edu/graduate-studies/GRA-appointment-eligibility (6/25/2020)
https://policy.ku.edu/graduate-studies/GTA-appointment-eligibility (6/25/2020)
https://policy.ku.edu/graduate-studies/GA-appointment-eligibility (6/25/2020)

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: http://policy.ku.edu/graduate-studies/enrollment?num2.3 (3/9/2018).

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 $100 late fee to enroll in the Fall/Spring and $50 in the Summer. Students not enrolled by the 20th of classes will be automatically discontinued in Enroll & Pay.
https://registrar.ku.edu/comprehensive-fee-schedule
https://policy.ku.edu/comptroller/tuition-and-fee-late-fee-assessment (6/27/2019)

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: http://policy.ku.edu/graduate-studies/discontinued-enrollment (3/9/2018)

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, 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:
http://policy.ku.edu/graduate-studies/leave-of-absence?num2.6 (11/27/2017)
https://engr.ku.edu/sites/engr.ku.edu/files/docs/pdfs/LOA%20Request.pdf

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: https://policy.ku.edu/graduate-studies/doctoral-candidacy (8/14/2018).

Student *must* obtain permission from an International Student Services Advisor first 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: http://policy.ku.edu/graduate-studies/seniors-and-grad-study?num2.8 (12/6/2012)

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. http://policy.ku.edu/graduate-studies/grading (11/4/2016)

Incomplete (I): The I grade indicates course work that has been of passing quality but which is partially unfinished for good reason. 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 I 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: http://policy.ku.edu/governance/USRR#ArticleII – 2.2.3.2 (1/30/2020). 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. The student's graduate GPA calculation will include any degree- or certificate-seeking graduate course work completed at KU. Courses graded P, S, SP, LP, NP, U, and I are excluded from the computation of the GPA. The graduate GPA calculation only includes courses 500-level and above: https://policy.ku.edu/graduate-studies/graduate-credit: (4/19/2019).

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. http://policy.ku.edu/graduate-studies/academic-probation (6/25/2020)

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) 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 (10/4/2018):

> 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 (11/3/2015).
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> 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. 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: http://policy.ku.edu/graduate-studies/benefits-for-GRAs-GTAs-GAs (10/4/2018)

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 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. Courses either required or used for the B.S. degree may not be used to fulfill M.S. degree requirements. https://catalog.ku.edu/engineering/mechanical-engineering/ms/#requirementstext

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. 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 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://gradplan.engr.ku.edu/accounts/login/.

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 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 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: 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: http://policy.ku.edu/graduate-studies/ma-program-time-constraints (3/9/2018).

Credit by Transfer

At the discretion of the major 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.

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

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: http://policy.ku.edu/graduate-studies/graduate-credit (4/19/2019).

School of Engineering Graduate Program Timelines
Master's Program, M.S.

These are general timelines for degree completion, based on regular admission (no pre-requisites required), full-time enrollment and satisfactory progress. We expect our students to make every effort to complete their degree within three years (average for most programs, including part-time programs). Enrollment in the summer is not required for master's students, but may reduce your time to degree. The following timeline summarizes the School of Engineering's expectations for student progress. Please note the academic year runs from fall (late August) through summer (end of July).

Year One

- Attend New Graduate Student Orientation and any required trainings (New GTA Training)
- Begin coursework to complete core requirements: 6-9 credit hours of graduate level courses – Note you must complete pre-requisite courses before graduate-level courses to be considered in good academic standing (if required)
- Consult with faculty - select an advisor and a master's committee[1] and submit your initial Plan of Study for approval online at: https://gradplan.engr.ku.edu
- Participate in academic & professional development activities and secure funding for upcoming semesters by mid-spring
- Utilize summer research funding or internship opportunities (optional) – Enrollment in 1-3 research hours over summer (if employed as GRA)
- Research Students: Start reading relevant literature and developing approaches to your thesis research or project.
- Provide Annual Progress Report to your department or program office (Graduate Activity Report)

Year Two

- Complete coursework: 6-12 credit hours of graduate level courses (recommended) – Note some courses are only offered in a given semester or year, so plan accordingly
- Complete research or project enrollment and plan for final Master's Exam, Project Presentation or Thesis Defense[3] & discuss PhD options with advisor (recommended)
- Utilize the Engineering Career Center and network with those around you to start making steps towards your career goals – Actively seek out employment opportunities
- Update Plan of Study and submit for final committee approval - Contact your committee members to discuss your progress and/or problems to see if they have any advice
- Conference attendance & journal publication (encouraged) - Participate in academic & professional development activities. Publications make you more marketable and offer leverage over other job applicants
- Complete Graduation Checklist Requirements[4] and exit interview

Graduate Milestones

1. The master's committee generally consists of at least 3 members. Those members should consist of at least 2 tenured / tenured-track faculty from within the department (including the advisor) and include one additional member who holds any graduate faculty status, including regular, dissertation, or special status. This third member can be, but need not be, a member of the candidate's department/program. 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://policy.ku.edu/graduate-studies/masters-oral-exam-committee-composition & https://documents.ku.edu/policies/Graduate_Studies/gradfacappnts.htm).

2. Graduate Students must make satisfactory progress towards their degree to be considered in good standing and eligible for funding as a GTA or GRA. To ensure students are making progress towards their degree, you may submit an annual Graduate Student Activity Report (GAR) to your department prior to the start of the spring semester to reflect the previous calendar year. A list of master's degree requirements can be found at http://policy.ku.edu/graduate-studies/ma-requirements and within the Academic Catalog.

3. When the master's candidate has passed the final oral examination or thesis defense and the members of the committee have signed the thesis title and acceptance pages, the student must deliver all graduation requirements to the School of Engineering Research & Graduate Programs Office (1415 LEEP2) so that completion of degree requirements may be officially certified. Some programs have exceptions to the committee composition and examination requirements (coursework only professional degrees). More information can be found at http://policy.ku.edu/graduate-studies/masters-final-exams & http://policy.ku.edu/graduate-studies/ma-thesis.

4. The graduation checklist is available online at http://engr.ku.edu/masters-degree-checklist 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).

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/accounts/login/.

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 from the approved list of courses.			
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 *or* 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 ❑ Non-thesis Option ❑	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 *may apply* ME courses in Section 1 above to the ME course requirement. However, do not double count those 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

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

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.

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.

Qualifying Exam Checklist

Committee Members (at least 3 Mechanical Engineering faculty members)

_____

_____

❑ 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 subset of core advanced mechanical engineering knowledge. The student will identify three 3-credit ME technical elective courses that reflect three specific subjects in the focus area of study and one 3-credt mathematics course from the approved list, or the student will be required to pass written exams in each of these four subjects.*			
Subject #1:	Course:	Semester:	Grade:
Subject #2:	Course:	Semester:	Grade:
Subject #3:	Course:	Semester:	Grade:
Advanced Mathematics	Course:	Semester:	Grade:
		Cumulative GPA:	

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 a summary of one to three pertinent and related papers (with no conflict of interest) to the student's Ph.D. topic area.* *Options for Each: P-Pass, CP-Conditional Pass (committee needs to recommend remedy), F-Fail*

❑ The student has provided the committee a one-page summary 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: _____

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/accounts/login/), 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.

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 (4/19/2019)

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: 10/20/2014). 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. 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. *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.

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 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: http://policy.ku.edu/graduate-studies/doctoral-oral-exams (6/5/2020)

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 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 (8/14/2018)

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
Introduction of Problem – The student has effectively defined the problem or issue their research will address. Peer reviewed literature is utilized to illustrate the problem's significance and to describe prior efforts. Comments:
Methodology/Approach – Student specifies a detailed plan that they will take (e.g., experimentation and/or modeling) 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 findings for each pathway. Comments:
Results/Analysis – 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. Comments:
Publications – Student illustrates what publications (e.g., conference & journal papers) will result from the work, what these publications will contain, and where these publications will be submitted. Comments:
Timeline – Student has generated a timeline of the effort that is appropriate and doable. Student has considered the time taken to run experiments and/or computer simulations. Comments:

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 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 (9/6/2013)

Furthermore, a candidate for a doctoral degree must satisfy all Graduate School requirements for the degree: http://policy.ku.edu/graduate-studies/doctoral-degree-requirements (11/13/2017).

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: 7/13/2020):

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: 7/13/2020); 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: 9/6/2013).

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

Dissertation Oral Examination

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 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. The final oral examination may be held no earlier than one (1) month after 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: https://policy.ku.edu/graduate-studies/final-oral-exams (6/25/2020)

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).

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 1 month 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 with a 30-credit Master's 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).*					
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 with a 30-credit Master's degree in ME, 24 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. 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.*					
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 1 month 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 Master's 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 Rubrics

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	• Poorly written • Does not define the problem or approach • Does not show sufficient knowledge	• Adequately written • Does not explain the problem's importance	• Well written • Provides a good problem statement	• Exceptionally well written • Sets up & defines problem clearly
Grounding in the Literature	• Inadequate sources • Does not understand the literature • Does not provide context	• Adequate • Does not put literature in right context • Lacks critical analysis & synthesis	• Shows understanding of the literature • Provides a meaningful summary of the literature	• Provides a thorough, comprehensive and up to date review • Uses literature to advance the field
Methodology/ Approach	• Uses the wrong methodology or tool • Methodology is absent or omitted • Methodology is misunderstood	• Understands & uses theory appropriately • Shows basic level of competence	• Complete & correct • Builds on existing theory • Applies method in correct ways	• Original • Integrates theory & experimental work • Uses cutting-edge methodology
Results/ Analysis	• Analysis is wrong, inappropriate, or incompetent • Data are wrong • Cannot explain results	• Appropriate & correct • Produces quality results	• Appropriate & correct • Produces high-quality results	• Results are meaningful and usable • Provides plausible interpretations • Discusses accuracy, reliability & limitations
Discussion/ Conclusion	• Inadequate • Does not understand the results • Does not discuss the implications of the work • Does not draw conclusions	• Summarizes the dissertation • Does not address the significance or implications of the research	• Provides a good summary • Identifies possible implications & some future directions	• Clear & concise • Discusses strengths, weaknesses & limitations • Puts the study in the larger context • Discusses future directions
Overall				

Another rubric that might be helpful for the candidate is this one from the Stevens Institute of Technology (https://peer.asee.org/a-proposed-doctoral-assessment-procedure-and-rubric-for-science-and-engineering)

CRITERIA	0	1	2	3	4
Originality and novelty	The work completely lacks originality	Repeats work of others with only minor changes	Work has not been done before, but is an obvious extension of previous work	Work incrementally improves on previous approaches	Work is cleverly designed and/or represents a significantly new direction or approach
Advances the State of the Art	No advance is evident	Results are obvious or easily anticipated	Incrementally advanced the knowledge or methodology in the field	Results can be expected to have a modest impact	Produced a significant result that is likely to have a major impact
Literature survey	Lacking	Cursory	Extensive but either not complete or not critical	Complete and concise, but not adequately critical	Comprehensive and critical
Possesses Practical and/or Academic Utility (Potential Impact)	Work is unlikely to be useful to others	Work has a low likelihood to be used by others	Work has some likelihood to be used by others	Work is reasonably likely to be used by others	Work has strong potential for use by others either in applications or in further research
Uses new or advanced techniques	Uses only primitive methods	Uses only simple and long-established methods and techniques	Uses standard methods commonly known in the field	Uses the most advanced established methods	Uses leading-edge methods not applied before in this field
Has elements of theory	Does not involve any theoretical development or predictions	Incorporates standard theory in the field	Incrementally advances theory currently used in the field	Significantly extends existing theory in the field	Involves theory that represents a break with the state-of-the-art
Has elements of experiment	There is no data collection or usage	Few data are collected or relies on data from others	Data collection is a minor part of this work	Data collection is a major part of this work	Employs sophisticated and novel experimental methods

CRITERIA	0	1	2	3	4
Technogenesis Potential for Intellectual Property (IP)	No IP issues recognized or addressed	Some recognition of IP issues	IP issues considered but there is limited IP potential	Significant consideration of IP issues and demonstrated IP potential	Well defined IP context and strong IP potential
Written presentation (Thesis)	Missing significant details or very difficult to read	Disorganized or lacking in some details	All details are present, but requires some effort by reader	All details are present, organization is adequate	Comprehensive, elegantly and clearly written
Oral presentation (Defense)	Poor quality visuals or inarticulate presentation	Some visuals need improvement or presentation is not confident	All visuals adequate and presentation is confident	Significant effort evident in visuals, and presentation is confident	High production quality and articulate presentation
Responsiveness to questioning	"Freezes up" or generally unable to adequately handle questioning	Often isn't able to respond to questions, or requires prompting	Makes satisfactory responses on his/her own to most questions	Clearly understands the issues raised and always makes satisfactory responses	Articulate and thorough, demonstrates complete mastery of the topic

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 (3/9/2018)

School of Engineering Graduate Program Timeline
Doctoral Degree Program, Ph.D.

These are general timelines for degree completion, based on regular admission (no pre-requisites required), full-time enrollment and satisfactory progress. We expect our students to make every effort to complete their degree within six years (average for most programs). Enrollment in the summer is not required for graduate students (except GRA's), but may reduce your time to degree. The following timeline summarizes the School of Engineering's expectations for student progress. Please note the academic year runs from fall (late August) through summer (end of July).

Year 1

- Attend New Graduate Student Orientation and events throughout your first year
- Begin Coursework Requirements and submit a Plan of Study for approval online at: https://gradplan.engr.ku.edu: 6-12 credit hours of graduate level courses each fall and spring semester (summer enrollment is required if enrolled or working on research)
- Consult with faculty - Select a dissertation project in collaboration with your advisor and doctoral committee[1]
- Complete Residency, Research Skills & Responsible Scholarship Requirements[2]
- Complete Doctoral Qualifying Exam[4] – generally completed at the end of the first year or through strong performance in core courses
- Participate in academic & professional development activities to secure funding for upcoming year
- Utilize the summer break to start your research or seek internship opportunities (optional) – Enrollment in 1-3 research hours over summer (if employed – 3 hours recommended)
- Provide Annual Progress Report to your department or program office (Graduate Activity Report[3])

Year 2

- Continue Coursework & Research Requirements: 6-12 credit hours of graduate level courses (recommended)
- Begin research proposal in preparation for comprehensive oral exam[5] in year 3
- Update Plan of Study and PhD milestones – Enrollment in 3 research hours over summer (if employed)
- Participate in academic & professional development activities including conference abstracts and poster competitions
- Provide Annual Progress Report to your department or program office (Graduate Activity Report[3])

Year 3

- Continue Coursework & Research Requirements: 6-12 credit hours of graduate level courses (recommended)
- Complete Comprehensive Oral Exam[5] – fall of Year 3 (before the start of spring courses) – minimum of 1 month must pass between your comprehensive exam and final defense
- Update Plan of Study, PhD milestones and dissertation committee in preparation for final dissertation defense in year 4
- Conference Attendance & Journal Publications (encouraged)
- Participate in academic & professional development activities including presenting your research at competitions and conferences
- Provide Annual Progress Report to your department or program office (Graduate Activity Report[3])

Year 4

- Get actively involved in your field of study by attending conferences & journal publications (strongly encouraged). Publications make you more marketable and offer leverage over other job applicants
- Summer enrollment required until competition of dissertation defense[7] & graduation requirements[8] met
- Finalize your dissertation and communicate progress to your committee regularly up to the date of your dissertation defense
- Participate in academic & professional development activities ensuring you reach your graduation and career goals for the year
- Complete Graduation Checklist, Exit Interview Requirements & meet with Engineering Career Center to prepare for employment

Program Requirements & Milestones

1. 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 http://policy.ku.edu/graduate-studies/oral-exam-committee-composition & https://documents.ku.edu/policies/Graduate_Studies/gradfacappnts.htm).

2. 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 with enrollment of two semesters, which may include one summer session, 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. The student must be enrolled in a minimum of 6 credit hours per semester (see more details at http://policy.ku.edu/graduate-studies/doctoral-program-time-contraints).

3. Graduate Students must make satisfactory progress towards their degree to be considered in good standing and eligible for funding as a GTA or GRA. To ensure students are making progress towards their degree, you must submit an annual PhD Activity Report (PhAR) to your department each spring for the previous calendar year. A list of doctoral degree requirements can be found at http://policy.ku.edu/graduate-studies/doctoral-degree-requirements and within the Academic Catalog.

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

5. Comprehensive Oral Exam (Required by University / Program Specific) – Completed after major portion of coursework, research skills, responsible scholarship, and residency completed, see list of departmental requirements below. Student must be in good academic standing with no incomplete grades and have a complete and approved Plan of Study on file (see more details at http://policy.ku.edu/graduate-studies/doctoral-oral-exams).

6. Doctoral Candidacy – After passing the Comprehensive Oral Exam, the candidate must be continuously enrolled, excluding summer sessions (unless working as a GRA), 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 each fall and spring semester (more details can be found at http://policy.ku.edu/graduate-studies/doctoral-candidacy).

7. Doctoral Defense - When a graduate student passes the final oral examination or dissertation defense, the student must deliver all graduation requirements to the School of Engineering Research & Graduate Programs Office (1415 LEEP2) so that completion of degree requirements may be officially certified. More information can be found at http://policy.ku.edu/graduate-studies/final-oral-exams.

8. The graduation checklist is available online at http://engr.ku.edu/doctoral-degree-checklists 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 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 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 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 770 Conductive 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 833 Radiative 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 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

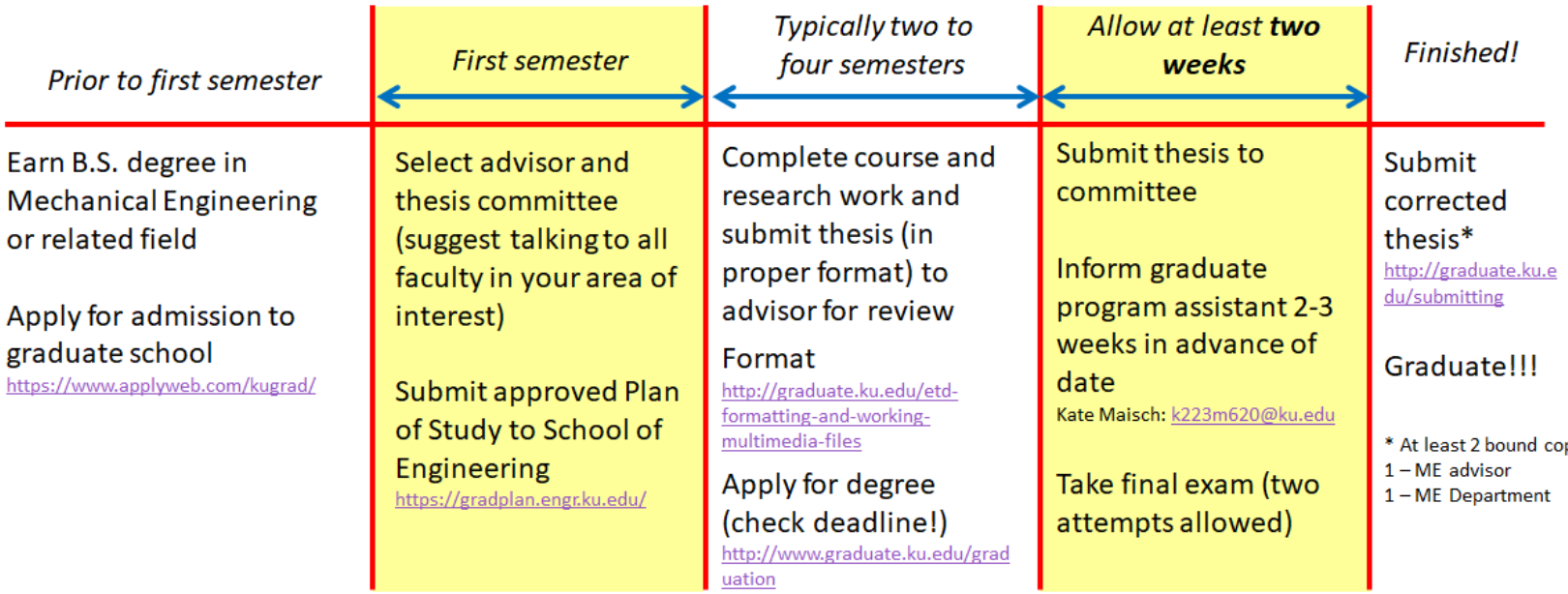
- ME 790 Special Topics (*a faculty member uses this number when they are in the midst of developing a graduate course for Master's students*)
- ME 860 Advanced Mechanical Engineering Problems (*An analytical or experimental study of problems or subjects of immediate interest to a student and faculty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

Approved Courses in Mathematics

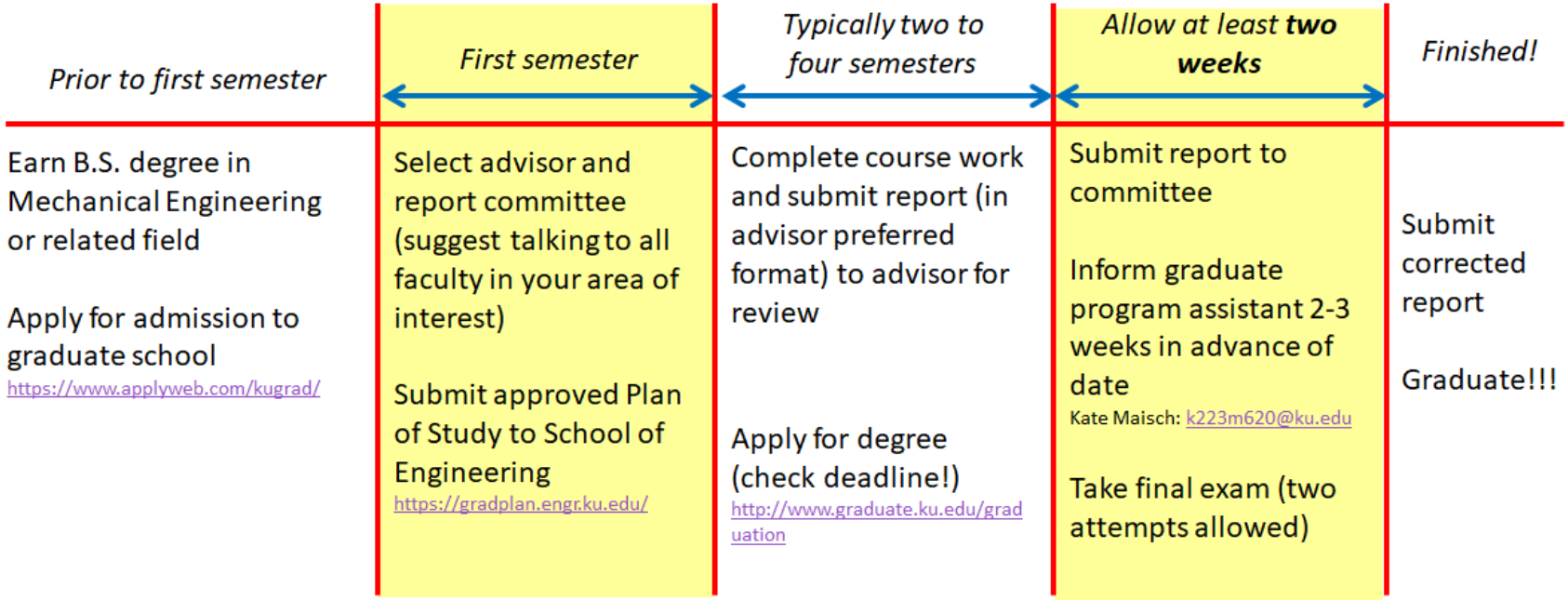
The following courses may be used to satisfy mathematics requirements for a Mechanical Engineering graduate degree. If the student wishes to select a different course for satisfying the mathematics requirement, they must seek approval by the Graduate Director. When seeking approval for a different course, 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. *Currently under review.*

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

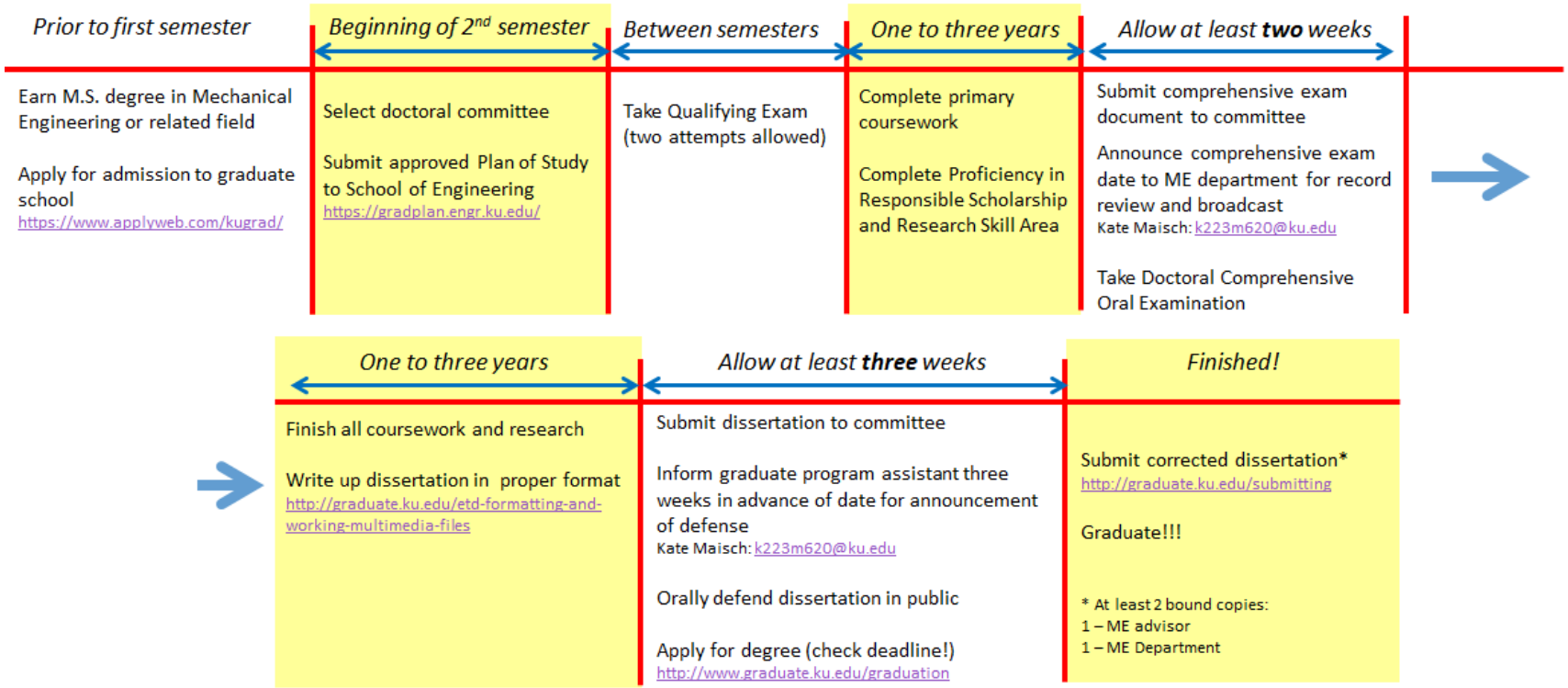
Mechanical Engineering
M.S. Thesis Degree Succinct Flow Chart



Mechanical Engineering
M.S. Non-Thesis Degree Succinct Flow Chart



Mechanical Engineering
Ph.D. Degree Succinct Flow Chart (Starting at M.S.)



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