NORTHERN ARIZONA UNIVERSITY

College of Engineering, Informatics, and Applied Sciences

Graduate Student Handbook

Mechanical Engineering Ph.D. Program
Northern Arizona University

Revised January 2021

Contents

Mechanical Engineering Ph.D. Program

Introduction

The Doctor of Philosophy in Mechanical Engineering (ME) provides advanced training in research using an integrative and comprehensive disciplinary approach. Students develop expertise in engineering modeling, experimentation, and analysis at a level appropriate for positions in industrial research and development, national laboratories, or academia. The knowledge gained during this program prepares students to provide solutions to complex engineering problems. The program supports faculty, interdisciplinary collaborators, and students performing cutting-edge research in topics such as energy systems and wind energy, adaptive structures and intelligent systems, nano-heat transfer, computational fluid mechanics, advanced composites, robotics, and tools/devices for scientific discovery. The PhD program facilitates research collaborations with other advanced programs at NAU, including but not limited to Civil Engineering, Electrical Engineering, Computer Science, the Center for Materials Interfaces in Research and Applications, the School of Earth Sciences and Environmental Sustainability, the Department of Geography, Planning, and Recreation, Biology, and Business. Within this degree plan, students complete advanced engineering and elective courses in preparation for an original research project culminating in a dissertation and oral defense.

This handbook describes the steps for successful completion of the PhD degree in ME and specifies the procedures, policies, and timelines for progression through the program. This document is designed to augment information about requirements that apply to all NAU graduate programs that are posted on the Graduate College webpages. Students are responsible for understanding the policies and procedures of the Graduate College and the requirements for the ME PhD degree.

Additional information:

- Refer to the ME PhD program website at: https://nau.edu/mechanical-engineering/mechanical-engineering-phd/
- Review additional resources for NAU graduate students are at: https://nau.edu/graduate-college/forms/
    - See Checklist for doctoral students which describes the steps that the Graduate College requires to complete a doctoral program at NAU.
    - See Graduate Assistantship, Traineeship & Fellowship Policy Handbook
- Review NAU Policy Requirements for Doctoral Degree https://www5.nau.edu/policies/Client/Details/618?whoIsLooking=Students&pertainsTo=All&sortDirection=Ascending&page=1

Admission

Requirements

The application for admission along with transcripts for all completed collegiate work should be on file with the Dean of the Graduate School by program application deadline https://nau.edu/graduate-college/deadlines/.

In addition, all applicants (with possible exception of student's whose previous degree is from NAU) must submit scores from the Graduate Records Examination. Three letters of recommendation and the applicant's statement of purpose should support the application. An individual who is applying for a Graduate Teaching Assistantship is advised to complete the admission process well in advance of the deadline dates given in the Application for Graduate Degree Program form. Evaluation of applicants for teaching assistantships for the fall semester begins on February 1st. Faculty from the student's area of interest evaluates the application and transcripts. The program director or a designated staff member transmits the decision regarding admission to the Graduate School. Applicants are evaluated on the individual merits of their academic achievements and individual scholarly potential to complete graduate level coursework and research requirements. Although all relevant materials are taken into account, priority is given to grade point average and GRE scores. To be considered for the Graduate program, the applicant must hold a Bachelor degree from a recognized undergraduate program. Degrees that are recognized are based on programs of study that meet or exceed the general educational requirements for comparable majors and degrees at Northern Arizona University.

For more details see: https://nau.edu/graduate-college/admissions/

Additional Requirements for International Students

It is recognized that educational systems in other countries differ from that of the United States. Generally, a four-year, first university degree can be considered as comparable to the U.S. bachelor's degree, provided that it was earned at an institution that has official recognition by the Ministry of Education as a university level academic institution in that country. In addition to the academic requirements for all applicants, international students from non-English speaking countries must satisfy English proficiency, financial guarantee, and health insurance requirements.

To demonstrate proficiency in English students must earn a minimum score of:

- TOEFL – 80
- DuoLingo – 105
- IELTS – 6.5

For more details see: https://nau.edu/graduate-college/international-graduate-admission/

Notification of Admission Decision

Each applicant will be notified by email of admission decision as quickly as possible. Applicants who do not enroll for the term to which they have been admitted must contact the graduate program coordinator if they wish to defer enrollment to another term.

Admission Classification

- Regular admission – Applicants who meet all admission criteria.
- Conditional admission – Applicants not qualified for regular admission may be granted admission conditional admission. This may include students who need to take background courses or students who do not meet admissions standards but show potential. Applicants who fail to meet conditional admission requirements will be denied regular admission.

- Non-degree admission – Granted to individuals seeking personal enrichment or those who are not ready to apply to degree program.

For more details see: https://nau.edu/graduate-college/admissions/

Application Materials

Application materials must be submitted on forms furnished by the Graduate College. Application packets are available online http://nau.edu/graduateapply. For more details see: https://nau.edu/graduate-college/admissions/

For assistance or questions regarding application, contact the graduate program coordinator. See Contact Information for more details.

Program Overview

Required Coursework

See Program of Study on pages 8-9 for additional information.

Credits	Requirement Area	Description
30	NA	Maximum transferrable from MS degree
3	EGR Comp	Engineering computations, one three-unit course
3	Applied Math	Math or stats, one three-unit course
18	Foundations	Advanced topics in ME, six three-unit courses
15	Electives	In consultation with faculty advisor
6	Seminar	ME Graduate Seminar
15	ME 799	Dissertation

TOTAL: 60

Recommended Timeline

The following timeline is recommended for traditional, full-time students entering the PhD program following a Master's degree in a similar field of study. For non-traditional students or students entering the program without a Master's degree, an alternative timeline should be developed in close consultation with their faculty advisor and dissertation committee.

Semester 1 - Work with faculty advisor to develop a provisional plan of study and identify possible dissertation committee members.

Semester 2 - Formalize dissertation committee and hold first committee meeting. Under the supervision and approval of faculty advisor and dissertation committee, develop a plan of study and timeline for completing qualifying exam.

Semester 3 – Prepare the written part of the qualifying exam and start studying for the oral part. Remember that the written part of the qualifying exam is due 3 month before the oral exam.

Semester 4 – Take oral part of the qualifying exam. Once the qualifying exam is complete, begin to prepare dissertation prospectus which includes an extensive literature review and detailed research plan.

Semester 5 - Finalize the dissertation prospectus and defend it. Submit advancement proposal and complete the written and oral advanced to candidacy exams. When these items have been successfully completed and

approved by the student's dissertation committee and the Graduate College, the student becomes an official PhD candidate.

Semester 6 through completion – Perform research, write dissertation, and defend dissertation. In order to complete a Ph.D. in ME at NAU, students must have at least one paper in which they are the lead author accepted for publication in a reviewer-blind peer-reviewed journal with an impact factor of at least 0.5. Ideally, students will have a second paper at least submitted by the time their degree is completed, but that will not be required. It is recommended that the publication be submitted by the end of semester 6.

Program Governance

ME Graduate Committee and the Associate Chair for Graduate Programs

The ME Graduate Committee works closely with the Associate Chair for Graduate Programs to administer the ME PhD program. The committee is composed of faculty from ME and most members will be advisors to active PhD students. The Associate Chair for Graduate Programs and the committee determine policies and procedures of the program, recommends best practices for program requirements and helps make admissions and funding decisions.

Graduate Program Coordinator

A staff member hosted in CEIAS will work closely with the ME Associate Chair for Graduate Programs and the Graduate College to answer inquiries from prospective students, manage applications and admissions to the program, and monitor PhD candidates' advancement through the program.

Faculty Advisor

All students enter the PhD program with a designated faculty advisor who is a faculty member in ME. The relationship between students and advisor is established by mutual agreement based on shared interests and available resources. The advisor is ordinarily permanent; however, students may change advisors if deemed appropriate after consultation with the current advisor, the potential new advisor, and the ME Associate Chair for Graduate Programs. Students must meet/talk with their Advisors prior to the first semester to select courses and set goals for the first semester. Students should work with their advisor to identify a dissertation committee and should meet regularly to discuss the dissertation project and to develop each student's individualized plan of study.

Dissertation Committee

The role of the dissertation committee is to advise and mentor the PhD student during their advancement through the PhD program as well as critique and assess the quality of the qualifying and advance to candidacy exams and dissertation of the student. The committee must have at least 4 members all of whom hold PhD degrees. The main advisor(s) of the student must be part of this committee and serves as the committee chair. At least one member of the dissertation committee must be from outside the student's primary academic unit, and off-campus members are encouraged. The role of the outside member is to bring additional breadth of expertise represented by the committee and to encourage development of the interdisciplinary aspects of the project. Committee members may include tenure-track and research professors, adjuncts, or other professionals with appropriate experience to advise and evaluate a PhD dissertation. At least two committee members (including the advisor(s)) must be faculty in the NAU Department of Mechanical Engineering. The assessment and formal decisions on the student's exams and materials (pass, fail, or revise) and a written justification will be forwarded to the Graduate College. NAU Policy 100806, *"Requirements for Theses and Dissertations"*

outlines the requirements for dissertation committees. The specific composition of the dissertation committee for this program is explained in the following section of this handbook.

Download the *Dissertation Committee Recommendation Form* at: https://nau.edu/graduate-college/forms/

The faculty advisor completes this form and submits it to the Graduate College. This form lists the proposed dissertation committee and a brief summary of the proposed dissertation topic. A current CV must be included for committee members from outside of NAU. The membership of the proposed dissertation committee will be reviewed by the Graduate Dean, who will formally appoint the committee. The dissertation committee is formalized upon the Graduate Dean's approval. The Graduate Dean will *not* approve substitute committee members within two months of the dissertation defense.

Program of Study

The student works with their advisor and dissertation committee to develop an appropriate set of courses based upon on the student's dissertation topic and career objectives. The PhD degree at NAU requires a minimum of 60 credit hours beyond the bachelor's degree. Of the 60 hours, 15 hours must be ME 799 (Dissertation Research) taken following formal application for candidacy. Additional hours of ME 799 do not count toward the minimum credit hour total of 60. The remaining 45 credit hours must be approved by the dissertation committee. Of these, at least 39 credit hours must be at the 500 or 600 level, and no more than 6 credits may be at the 400 level. Any 400-level courses counted towards the Program of Study must be taken at NAU and cannot have been used to fulfill requirements of a bachelor's degree. As approved by the dissertation committee, up to 30 credit hours completed for a Master's degree (at NAU or elsewhere) may be applied toward the Doctoral degree. All courses that count towards degree requirements must be completed within a 6-year time limit, and courses transferred must be less than 6-years old.

Students must maintain a GPA of 3.0 or better. Only 6 hours of grade C are allowed in the PhD degree program. Any C grade places the student on academic probation and requires a plan, presented to Graduate College, for improvement in future courses. In the case of poor academic performance, only one course may be repeated for the second grade to count toward graduation, but both grades are used in computing the grade point average.

Required Coursework

ME Foundations – 18 units from:

Course #	**Name**
ME 520	Advanced Fluid Dynamics *(3 units)*
ME 523	Flight Dynamics *(3 units)*
ME 525	Applied Computational Fluid Dynamics *(3 units)*
ME 530	Advanced Thermal Analysis *(3 units)*
ME 535	Wind Energy Engineering *(3 units)*
ME 554	Finite Element Analysis *(3 units)*
ME 556	Engineering Modeling of Nonlinear System *(3 units)*
ME 560	Advanced Solid Mechanics *(3 units)*
ME 561	Engineering Plasticity *(3 units)*
ME 563	Biomechanical Engineering *(3 units)*
ME 573	Biomaterials *(3 units)*
ME 575	Adaptive Materials and Systems *(3 units)*
ME 580	Mechanics of Composite Materials *(3 units)*
ME 599	Contemporary Topics* *(3 units)*

*Topics include Grid Integration of Renewable Energy, Elasticity, Advanced Engineering Analysis, Continuum Mechanics, Convective Transport, Advanced Thermodynamics, Advanced Dynamics, Viscous Flows, Multivariable Controls, Statistical Thermodynamics and Kinetic Theory.
Note that this list is subject to change as our graduate course offerings change.

Electives – 15 units
Other coursework as guided by research needs and advisor input.

Applied Mathematics – 3 units from:

Course #	**Name**
MAT 661	Applied Mathematics *(3 units)*
MAT 667	Dynamical Systems *(3 unit)*
MAT 690	Advanced Topics in Mathematics *(3 units)*
STA 570	Statistical Methods I *(3 units)*

Engineering Computation – 3 units from:

Course #	**Name**
MAT 563	Numerical Analysis *(3 units)*
ME 554	Finite Element Analysis *(3 units)***
ME 525	Applied Computational Fluid Dynamics *(3 units)***
ME 599	Advanced CFD and FEM *(3 units)***

**If not taken as part of foundational requirements.

Graduate Seminar and Dissertation– 21 units:

Course #	**Name**
ME 698	Mechanical Engineering Graduate Seminar *(1 unit x 6)*
ME 799	Dissertation *(15 units)*

Qualifying Exam

This qualifying examination has written and oral components that are designed to test students' comprehensive knowledge of their field of study, both in breadth across the general topic, and depth within their area of specialization. The examination serves as the primary checkpoint for the dissertation committee to rigorously assess the student's preparedness to advance to candidacy for a doctoral degree. Students who advance to candidacy have demonstrated the motivation and ability to comprehend the limits of knowledge within their field and are able to design and conduct original and rigorous investigations to advance knowledge beyond its current limits.

The written part of the qualifying exam must be approved by the student's entire committee at least three months before the oral exam. The oral exam is typically scheduled for 3 hours in a room with plenty of white boards (such as a classroom or a conference room).

The qualifying exam is to be taken once a student has completed (or is currently enrolled in courses that will lead to the completion of) at least 30 units of coursework, including all mechanical engineering, mathematics, and computation courses. The exam will be administered by the student's dissertation committee and the outcome of is either Pass or Fail. In order to receive a Pass, at least 4/5 of the qualifying committee must vote that the student successfully demonstrated an understanding of both the fundamentals and the state of the art related to his/her dissertation topic. Students who fail this exam on their first attempt will be allowed to retake

the exam once and the retake must be completed within one semester. If a student fails this exam on their second attempt, then they will no longer be allowed to continue in the program (but will have earned enough credits to have earned a master's degree in mechanical engineering). A student's faculty advisor may require a student to take a specific course(s) or independent studies based on the outcome of this exam.

If the comprehensive exam (both written and oral parts) is unlikely to be completed by the end of the fifth semester following admission to the program, students must submit a clear plan for completing the exam at a time that the student and their dissertation committee have determined is reasonable, given the individual circumstances and particular pace and duration of the student's anticipated progress to the PhD degree. *Flexibility in the completion of the comprehensive exam is intended to provide for the diverse situations presented by non-traditional students, not as an avenue to prolonging advancement to candidacy.*

Advance to Candidacy Exam

This exam must be completed within one semester of a student passing the qualifying exam. For a typical full-time student, this exam will be taken in the first semester of a student's third year in the program. This exam has both a written and oral component and will be administered by a student's dissertation committee. The written component is a dissertation proposal, which must be submitted to the committee at least two weeks before the oral part of this exam. During the oral part of this exam, the student will present on their research and defend their research proposal. The outcome of this exam may be Pass or Fail. In order to receive a Pass, at least 4/5 of the dissertation committee must agree that the student's research plan is sound and the student is prepared to conduct the proposed research. Students who fail this exam on their first attempt will be allowed to retake the exam once and the retake must be completed within one semester. If a student fails this exam on their second attempt, then they will no longer be allowed to continue in the program, but they will have enough credits to have earned a master's degree in mechanical engineering.

Advancement to Candidacy

Candidacy means that the student becomes an official candidate for the PhD degree, implying that they have completed their required coursework and comprehensive examinations and are prepared to complete their dissertation.

Download the *Application for Candidacy Form* at: https://nau.edu/graduate-college/forms/

Complete the top portion of the form and forward to the CEIAS Graduate Program Coordinator. The Graduate Coordinator will verify candidacy requirements have been met, obtain signatures, and submit to the Graduate College (student cc'd) on your behalf. This form confirms:

1. Completion of the written and oral qualifying and advanced to candidacy exams.
2. Approved Program of Study that is updated to include any changes that have occurred since the form was initially prepared.
3. Dissertation Prospectus with the title page signed by all committee members.
4. Completion of all required course work with the exception of Graduate Seminars, Professional Development and ME 799 credits*.
5. Confirmation that the residency requirement has been met. Residency requirement is summarized in this Handbook (p19) and the full policy is available on the Grad College's website.

Dissertation

Although two types of dissertation format are acceptable for the Graduate College (https://nau.edu/graduate-college/thesis-and-dissertation/), the journal-article format is recommended for the ME PhD degree, unless

otherwise approved by the dissertation committee. This format is a series of papers either submitted, or drafted for submission, to peer-reviewed professional journals, with additional introductory and concluding chapters as described on the Graduate College website. The dissertation must be of sufficient quality for publication in international peer-reviewed journals. In order to complete a PhD in ME at NAU, students must have at least one paper in which they are the lead author accepted for publication in a reviewer-blind peer-reviewed journal with an impact factor of at least 0.5. Ideally, students will have a second paper at least submitted by the time their degree is completed, but that will not be required.

The dissertation must be reviewed by the advisor and revised by the student prior to distribution to the committee. The nearly final version of the dissertation must be submitted to the dissertation committee at least eight weeks prior to the anticipated defense date to allow for further revisions based upon committee members' recommendations. Committee members must provide feedback on the dissertation within two weeks after receiving it, if they expect the suggested changes to be incorporated into the final draft of the dissertation. At least two weeks before the date of the dissertation defense examination, the dissertation, in its nearly final form, including all figures, tables, and references, must be distributed to all committee members, and the Graduate College.

Dissertation Defense

There are two components to the Dissertation Defense required of all PhD students: The Dissertation Seminar and the Oral Dissertation Defense Examination. The examination is generally scheduled to immediately follow the dissertation seminar in the same location. All total, the seminar and defense examination should last approximately 2-3 hours.

Dissertation Defense Seminar

The PhD degree requires that each student present a formal dissertation defense seminar, which is open to the public. The seminar will last about 40 minutes with 10-15 additional minutes for questions and discussion. This seminar is typically given immediately before the dissertation defense examination. The seminar must demonstrate that the student has mastered their field and contributed new knowledge to their area of specialization thorough their independent scholarly work.

Oral Dissertation Defense Examination

The goal of the Oral Dissertation Defense Exam is to discuss the adequacy of the dissertation and test the student's competence in research. The examination is given by all members of the student's dissertation committee. *The examination is scheduled by the student through the Graduate College at least two weeks in advance.* At the beginning the semester in which a student expects to defend their dissertation, they should schedule their dissertation seminar and dissertation defense examination with the Graduate College. The date for the examination must be arranged by the student so that all members of the dissertation committee can attend. While it is desirable for all members of the committee to be present at the same location for a dissertation defense, teleconferencing of up to two members is permissible. If possible, the date should fall within the Fall or Spring semesters and the defense should not be held during the last two weeks of any term. All committee members must have a confirmed date, time and place, in writing from the student. The examination must be scheduled at least four weeks before the date of expected graduation in order to allow time for any changes to the dissertation recommended by the committee. The dissertation defense may not be held prior to 90 days after the student has been admitted to candidacy. No more than four years can elapse between advance to candidacy and the dissertation defense examination. If the time between examinations is longer than four years, the advance to candidacy and possibly the qualifying exam may need to be repeated.

Each member of the dissertation committee keeps notes on performance during the examination and records a general summary of the student's performance. A pass or fail vote is recorded by secret ballot by each committee member to the graduate college representative present at the examination before any discussion. To pass, a student must obtain at least three-fourths of the votes in favor. If the examination is failed, it may be retaken once. If it is failed again, the student may be recommended for dismissal from the program. If any committee member is absent, the examination must be rescheduled. The Graduate Dean appoints an observer from the University Graduate Committee to attend the dissertation seminar and final oral defense. The observer reports to the Graduate Dean on the conduct of the examination. The observer may ask questions but does not vote to pass or fail the student.

Download the *Dissertation Defense Policy and Procedures* for complete and current information at: https://www5.nau.edu/policies/client/Details/27?whoIsLooking=All&pertainsTo=All

Download the *Dissertation Defense Scheduling* form AND the *Oral Defense* forms at: https://nau.edu/graduate-college/forms/

In preparation for this examination, the student must consider the following points (consult the Dissertation Defense Scheduling Form from the Graduate College):

- A copy of the dissertation, in final form, must be distributed to all committee members, and to the Graduate College, at least two weeks before the date of the examination.
- The date for the examination must be arranged by the student so that all members of the committee can attend. Such a date must fall within the Fall or Spring semesters, excluding Final Examination Week, and faculty must have a confirmed date, time, and place, in writing, from the student. Notification of the scheduled examination must be given to the Graduate Dean by the faculty advisor at least two weeks in advance (See sign-off of the scheduling form.)
- The examination should be scheduled at least 4 weeks before the date of expected graduation in order to allow for any changes to the dissertation recommended by the committee.
- This examination will be devoted to questions relating to the Dissertation.
- Any faculty member may attend the dissertation defense examination. Graduate students may attend by invitation of the faculty advisor. Questions will be asked by members of the student's dissertation committee. At the discretion of the chair, questions may be received from visitors. Each member of the dissertation committee keeps notes on performance during the examination and records a general summary of the student's understanding of the research project and defense of the thesis. These notes will become part of the student's permanent School file.

A pass or fail vote is recorded by secret ballot before any discussion. To pass, a student must obtain at least three-fourths of the votes in favor of passing. If one committee member is absent because of an emergency, permission to continue with the examination must be obtained from the Dean of the Graduate College. If permission is granted to continue with one missing member, no dissenting votes may be registered if the student is to pass. If more than one committee member is absent, the examination must be rescheduled.

The Graduate College also appoints a University Graduate Committee representative to attend the final oral defense. The observer reports to the Dean of the Graduate College on the conduct of the examination. This report is also shared with the school director. If invited by the chair of the dissertation committee, the observer may ask questions, but the observer does not vote to pass or fail the student.

If the Dissertation Defense Examination is failed, it may be retaken only once.

Evaluation of Progress

Degree Progression and Grade Requirements

The student's dissertation committee will meet to evaluate the student once each year. In addition, the Graduate College monitors student transcripts on a continuing basis and evaluates all students for Satisfactory Academic Progress. A student is expected to maintain a grade point average of 3.0 or higher throughout the course work for the Ph.D. degree, and to make significant progress in research each semester.

Students with, or applying for, financial support must maintain a grade point average of 3.0 or higher. Students are expected to complete courses listed on their approved program plan before taking other courses. A Financial Request Form will be filed with the Graduate Program Coordinator once per year by the advisor after the annual meeting with the dissertation committee. This form must be on file before evaluation concerning continued funding can take place (December 31). A copy will be placed in the student's permanent file.

No more than 6 credit hours of course work with a grade of C may be used toward the Ph.D. course requirements. Accumulation of more than 6 credit hours of graduate course work with a "C" grade, or earning any grade below a "C" in a graduate class, will result in Academic Probation for the student. Please see the Graduate College policy on Academic Probation and Dismissal:
https://policy.nau.edu/policy/policy.aspx?num=100319

A student placed on academic probation may not be permitted to register for classes (an enrollment hold will be placed on their account) and may lose their financial aid eligibility. Students on academic probation must meet with their advisor to discuss the steps necessary to remediate problems that led to probation. This meeting should result in a written action plan describing the remediation steps to be taken. The plan must be signed by the student, the advisor, and the ME Program Director, who will then send it to the Graduate College for final approval. If the plan is approved by the Graduate College Associate Dean, the registration hold will be lifted and the financial aid hold may be modified. Successful completion of the plan in subsequent semesters will remove probation and return student to Good Academic Standing.

If a student does not meet the terms of their approved action plan in the following semesters, or fails a second time to maintain Good Academic Standing, one or both of the following actions will be taken:

- The ME PhD advisory council may initiate academic dismissal by notifying the student and the Graduate College in writing of the program's intent to recommend dismissal;
- The student will be blocked from future enrollment.

A terminated student may appeal this decision based on their individual circumstances. It is the student's responsibility to articulate their case and explain why an exception is warranted. See NAU Policy 100319 for information on this process.

Time Limits

If you enter the PhD program after earning an MS degree, you must complete all requirements for the Ph.D. degree within an 8-year period, including time as a non-degree seeking graduate student. If you take courses from other institutions, you may transfer them to your program at NAU, upon approval from the advisor, ME Program Director, and the Graduate College. Faculty within a graduate program/department make the decision as to whether transfer courses will be applied to a program plan and assume the responsibility to ensure transfer courses demonstrate the core learning competencies, expectations, and criteria for the requested transfer. If you enter the PhD Program directly from your Bachelor's degree, without first earning an MS degree, you must complete all requirements for the PhD degree within a 10-year period, including time as a non-degree seeking graduate student. Please see: https://policy.nau.edu/policy/policy.aspx?num=100805 for more details.

One extension of the time to complete degree requirements (of up to one year) may be granted if there are compelling extenuating circumstances. Extensions may be granted for a variety of reasons which may include, but are not limited to, job relocation, military duty, pregnancy, illness, a serious accident, divorce, or other personal tragedies within the immediate household.

If you wish to petition for an extension of the time limit, you must request an extension on the appropriate form (available here: https://nau.edu/graduate-college/forms/). Your advisor and the ME Program Director must support your petition by signing the form, and it must be approved by the Graduate College.

Credit Load

To be considered a full-time graduate student, you must carry 9 graduate credits per semester (Fall & Spring). Students on graduate assistantships or fellowships (20 hours per week employment) are required to carry 9 (and no more than 12) credit hours to qualify for their GA employment. A student must be enrolled in at least one (1) credit of ME 799 (Dissertation) during the semester in which she or he defends, and must adhere to the policy governing continuous enrollment for graduate students: https://policy.nau.edu/policy/policy.aspx?num=100326.

Residency Requirement

NAU's residency requirement can be met through two pathways.

- Option 1: Full-Time Enrollment
  Two consecutive semesters of full-time enrollment following admission to the doctoral program. The Graduate College defines full-time enrollment as carrying at least 9 hours during the fall or spring semesters or 5 hours during a summer session; or

- Option 2: ME Program-specific Alternative Residency Plan
  Completion of 18 face-to-face credit hours before advancement to candidacy, including the following:
  - One ME foundation course during the first fall semester of their doctoral program; and
  - One ME foundation during the first spring semester of their doctoral program; and
  - One applied mathematics course within the first two years of their doctoral program.
  - One engineering computations course within the first two years of their doctoral program.

Please refer to the policy on residency for Ph.D. students: https://policy.nau.edu/policy/policy.aspx?num=100805

Application for Graduation

At the start of each academic year, the Graduate College announces its deadlines for filing the Application for Graduation (https://nau.edu/graduate-college/deadlines/). You must apply for graduation at least one semester before graduation is expected. The online graduation instructions are available at the Graduate College website: https://nau.edu/graduate-college/wp-content/uploads/sites/14/Step_by_Step_Graduation.pdf

Checklist for PhD Students

The following checklist will aid your timely completion of program requirements: https://nau.edu/graduate-college/wp-content/uploads/sites/14/ChecklistDoctoralStudents-1.pdf

Continuous Enrollment Leave of Absence Policy

Please see Policy here: (https://policy.nau.edu/policy/policy.aspx?num=100326)

Graduate students in degree programs that require continuous registration may be granted a Leave of Absence for up to one academic year by the Graduate College, upon the recommendation of the student's advisor and department graduate coordinator. A leave will be granted under conditions requiring the suspension of activities associated with the thesis/dissertation or coursework. A leave will be granted for extraordinary reasons only, such as health or medical problems or military duty. Normally, time-to-degree requirements are not suspended during a Leave of Absence. The right to use University facilities and/or faculty time is suspended during a Leave of Absence. No form of graduate assistant support will be provided during the Leave of Absence. If an extension of time to complete the degree is needed, it should be requested in a petition for extension of time through the Graduate College.

International students (attending NAU on an F-1 or J-1 visa) are generally not eligible for a leave of absence due to INS regulations. Contact the International Student Adviser for any exceptional circumstances.

Leave of Absence requests must be filed no later than the last day for adding classes during the semester in which the leave is to start and cannot be granted retroactively. Students on an approved Leave of Absence may not be required to apply for readmission.

Students who are absent beyond the end of an approved Leave of Absence will be required to apply for readmission as a graduate student and to the appropriate academic department. A Leave of Absence may be extended beyond one year only under exceptional circumstances. Such an extension must be requested on the Leave of Absence form.

A Leave of Absence form (https://nau.edu/graduate-college/forms/) is available on the Graduate College site and requests:

- Student name, student ID number, local address and phone
- Statement of request for leave and justification by student.
- Semester leave begins and semester of student's return to program.
- Approval by advisor, department graduate coordinator and Graduate College.

Financial Aid

Although it is the goal of the ME PhD Program to provide financial support for all students admitted into the graduate program, we recognize that certain students may have their own means of support, and that many worthwhile research projects do not have large resource requirements. When the above conditions can be demonstrated (as determined by the faculty advisor and approved by the ME PhD advisory council), the student will be considered for admission into our graduate program on an equal basis with those who would receive institutional support. Admission to the ME PhD program without support does not imply that financial support will necessarily be provided in the future. Such students would be considered on an equal basis along with all new applicants.

Graduate Teaching Assistantships

Graduate Teaching Assistantships may be available to graduate students in the ME PhD Program. GTAs include an out-of-state Tuition Scholarship, 100% payment of resident tuition (but not associated fees), health insurance, and a stipend. A minimum semester and cumulative grade point average of 3.0, Good Academic Standing, plus satisfactory progress toward your degree program are required for continued support.

Graduate Teaching Assistants are expected to devote 20 hours per week to their appointment, including teaching, office hours, preparations, testing and grading, and set-up and take-down of laboratories. They must have an excellent command of spoken English and of the relevant subject matter. Teaching assistants must carry a course load of 9-12 hours per semester to qualify as full-time students. All teaching assistants must attend the University Graduate Assistant Orientation each Fall prior to the start of classes.

Guidelines are provided to Graduate Teaching Assistants every fall concerning the policies and expectations as determined by the Department and the Graduate College. See the "Graduate Assistantship, Traineeship, and Fellowship Handbook", available at: https://nau.edu/graduate-college/wp-content/uploads/sites/14/GA_Handbook-1.pdf

Graduate Teaching Assistants play a substantial role in the training of undergraduates, and this responsibility is not to be viewed lightly by the Teaching Assistant. For this reason:

- Graduate Teaching Assistants are expected to be in residence and available for assignment throughout the dates specified in their contract, beginning with the first and continuing through the last day of their contract. The contract period normally begins with the full week prior to the start of Fall classes and includes several mandatory orientation and training activities.
- Graduate Teaching Assistants must submit a Request for Approved Leave form if they will miss any time on contract and may be asked to complete additional tasks to offset an absence(s). Failure to do this could result in the loss of the GTA position. The Request for Approved Leave form is not required for absences due to unexpected circumstances or illness; however, the supervisor should be notified and arrangements for a substitute must be made.
- GTAs must read, initial, and submit the CEIAS Graduate Teaching Assistant Expectations form within the first three days of the beginning of the contract period.
- The Graduate College provides a mandatory orientation each fall for the purpose of familiarizing new Graduate Teaching Assistants with the goals of the University and the Assistant's role in achieving these goals.
- Faculty instructors or course coordinators will hold regular meetings with their GAs. These meetings deal with organizational details, various aspects of good teaching techniques and course content, including the preparation and grading of assignments and examinations. Attendance at these meetings is mandatory.
- Faculty instructors or course coordinators will evaluate all Graduate Teaching Assistants based on the expectations outlined in writing and signed by GTAs and supervisors. A standardized evaluation form, CEIAS Graduate Teaching Assistant Evaluation, is used to report the results of these evaluations. Each semester an evaluation will be placed on file, and a copy given to the Graduate Teaching Assistant.
- All forms referred to in this section are available at **TBD**

Expectations and Responsibilities of Graduate Teaching Assistants: Teachers in general have long adhered to a sound and honorable set of ethical standards and these traditional standards continue to apply in today's world. In an effort to circumvent any misconceptions or misunderstandings about what is expected, it is appropriate to state formally these basic principles that have been informally incorporated in the academic way of life for so long.

As professionals, we have a special obligation to encourage the free pursuit of learning in students, to preserve intellectual freedom, to practice intellectual honesty, to respect the rights, the dignity and cultural backgrounds of others, to acknowledge the right of all to express differing opinions in a responsible manner, to promote conditions that foster the free exchange of ideas, and to maintain the orderly processes that make freedom of inquiry and instruction possible.

As teachers, we represent the University, the College and the profession. As such we must hold before students, as best we can, the scholarly standards of our discipline. We must make every reasonable effort to foster honest academic conduct and to assure that our evaluation of students reflects the students' true merit. We must recognize that students are individuals and are entitled to an atmosphere conducive to learning and to fair treatment in all respects of the teacher-student relationship. It is important to present a professional image in the classroom and in other interactions with students and colleagues. This includes proper attire, personal cleanliness, and basic common courtesies. In all contact with students we should use socially acceptable behavior and language. Under no circumstance should teachers participate in activities that might be construed as a conflict of interest such as dating or engaging in amorous relationships with a student enrolled in their lecture or laboratory course, or who is under their supervision. By adhering to the above standards of professional conduct we will be in a sound position to carry out our responsibilities for the health and well-being of the College.

Graduate Research Assistantships

A variable number of Graduate Research Assistantships are available from research funds granted to the university and under the direction of individual faculty members. Recommendations for these appointments are made by the faculty members who administer these funds. Inquiries about availability should be made to the faculty doing research in the area in which the student is interested. GRA benefits include an out-of-state Tuition Scholarship and an in-state tuition waiver, plus health insurance. These appointments have a commitment of 20 hours per week during the academic year. The distribution of effort within these 20 hours is determined by the faculty member awarded the grant. In some cases, a GRA appointment may be made at a level less than 20 hours per week, in which case the benefits may scale with the expected hours worked. A course load of 9-12 credit hours per semester is required for full-time status in order to be eligible for a GRA position. A minimum semester and cumulative grade point average of 3.0, plus satisfactory progress in your degree program are required for continued support.

Additionally, all Graduate Research Assistants must read, initial, and submit the CEIAS Graduate Research Assistant Expectations form within the first three days of the beginning of the GRA contract period. GRA supervisors will evaluate all GRAs based on the expectations outlined in writing and signed by GRAs and supervisors. A standardized evaluation form, CEIAS Graduate Research Assistant Evaluation, is used to report the results of these evaluations. Each semester an evaluation will be placed on file, and a copy given to the Graduate Research Assistant. All forms referred to in this section are available at **TBD**.

Graduate Research Assistants must submit a Request for Approved Leave form if they will miss any time on contract and may be asked to complete additional tasks to offset an absence(s). Failure to do this could result in the loss of the GRA position. The Request for Approved Leave form is not required for absences due to unexpected circumstances or illness; however, the supervisor should be notified and arrangements for a substitute must be made.

Evaluation of GTAs and GRAs

Graduate Teaching Assistants are evaluated each semester by course coordinators or faculty involved in the course. A standardized form for evaluation, CEIAS Graduate Teaching Assistant Evaluation Form, is used. Completed evaluation forms are submitted to the student, the Graduate Program Coordinator, and the student's advisor, and are placed on file.

Graduate Research Assistants are evaluated by their research supervisor, typically their faculty advisor. A summary of the student's progress and the advisor's assessment of such progress is documented on the CEIAS

Research Assistant Evaluation Form. Completed evaluation forms are submitted to the student, the Graduate Program Coordinator, the student's advisor and are placed on file.

Fellowships

The availability of Fellowships varies from year to year. As the department is notified of these, they will be announced via e-mail. The ME Program Director, the Office of the Vice President for Research, and the Graduate Dean are also starting points for general information on Fellowships. Please also see: the "Graduate Assistantship, Traineeship, and Fellowship Handbook," available at: https://nau.edu/graduate-college/wp-content/uploads/sites/14/GA_Handbook-1.pdf

Tuition Waivers

A few in-state and out-of-state Tuition Scholarships are provided to the department each year by the Graduate College. These waivers are awarded to students by the ME Associate Chair for Graduate Programs in consultation with the Graduate Program Coordinator. Decisions are based upon the relative financial need and academic performance of the students. Students who wish to apply for this type of support should inform their advisor who can indicate this on the annual Financial Request Form.

Duration of Support

Regardless of where the student is in her/his program, only students who perform their duties well and make good progress in their program will be considered for continued support after their first year in a program. Relevant policies of the Graduate College are provided in the "Graduate Assistantship, Traineeship, and Fellowship Handbook" (https://nau.edu/graduate-college/wp-content/uploads/sites/14/GA_Handbook-1.pdf)

Student Role

Graduate students acquire training for their professional career through interactions with faculty in formal courses, seminars (e.g. the ME 698 cours), completion of dissertation research, publishing in the best possible scientific journals, service on faculty committees, attendance at Departmental/College seminars, attendance and presentation of papers at scientific meetings, and interactions with visiting scientists. Evaluation concerning a student's leadership qualities and professional capabilities will often rely on the student's participation in these diverse activities. Such qualities may be reflected in letters of recommendation composed for students.

Graduate students carry significant responsibilities in teaching, research, service, and mentoring undergraduates and are representatives of NAU at other institutions, and at professional meetings. Therefore, graduate students are expected to exhibit high professional standards and in general to conduct themselves in a professional manner. Implicit in admission to the PhD Program is the expectation that graduate students will develop and demonstrate a strong sense of professionalism and academic integrity. The faculty-graduate student relationship is unique in the academic environment and it must not be compromised by unprofessional conduct.

The competition for jobs is extreme and is based largely on the quality of independent research and the dedication perceived by those professors most closely associated with a graduate student. A graduate student's research sponsor also has responsibilities to the University and often to a funding agency. University time and grant funds are expected to lead to the steady accumulation of relevant and reproducible data. Graduate student research is often, therefore, both an essential part of the student's education as well as part of the research sponsor's and the University's obligation to the larger community.

Grievance Procedures

Students with significant complaints about any aspect of their PhD training should address such complaints directly to the person causing the grievance in order to reach a settlement. If such an approach fails to achieve the desired results, the student's faculty advisor should be consulted and should attempt to broker an agreeable settlement. If the grievance is not resolved at this point the student should involve the department chair. When none of the above attempts are successful, an *ad hoc* Grievance Committee will be appointed by the department chair. If the grievance is not against the student's advisor, the advisor will chair the committee. Two additional members will be selected by the student, and two members will be selected by the committee chair. The department chair will replace the student's advisor if the advisor is the apparent cause of the grievance. After deliberating on the grievance, the committee will notify the student orally and in writing of its decision to either accept the grievance, and to correct the matter, or to find the grievance unfounded.

Should the student remain unsatisfied with a decision of the grievance committee, following appeals are to be directed to the Associate Dean of the Graduate College. Please see the following policy for more details: https://policy.nau.edu/policy/policy.aspx?num=100103

Grade appeals are handled by policies and procedures found here: https://policy.nau.edu/policy/policy.aspx?num=100105

Academic Integrity violations are handled through the "Academic Integrity Policy" located here: https://policy.nau.edu/policy/policy.aspx?num=100601

Policy and Funding Changes

Changes relating to student support or policies beyond the control of the College and University can occur. Under these circumstances the College cannot be held legally responsible for any difficulties a student incurs.

Northern Arizona University does not discriminate on the basis of age, sex, race, religion, color, national origin, disability or veteran status in admissions, employment, and educational programs or activities which it operates as required by Title IX of the Education Amendments of 1972, Title VI and Title VII of the Civil Rights Act of 1964 as amended; Section 504 of the Rehabilitation Act of 1973 as amended; the Civil Rights Act of 1991; the Americans with Disabilities Act of 1990; and the Age Discrimination in Employment Act of 1967. NAU's policy on nondiscrimination is further augmented by the voluntary affirmative action policies of Executive Order 11246, Section 503 of the Rehabilitation Act of 1973, and the Vietnam Era Veteran's Readjustment Assistance Act of 1973 as amended. You may inquire about the application of these regulations or the NAU Safe Working and Learning Environment Policy by visiting the Office of Equity and Access website: https://nau.edu/equity-and-access.

Contact Information

Program

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- Constantin "Cornel" Ciocanel, ME Department Chair, (928) 523-2439 Constantin.Ciocanel@nau.edu

ME PhD Advisory Council

- TBD, PhD Advisory Council Chair, Associate Professor ME,
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- Others - **TBD**

Graduate College

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- Dr. Karina Collentine, Associate Dean (928) 523-6728 Karina.Collentine@nau.edu
- Graduate Assistantships, Tuition Waivers (928) 523-4349 gatw@nau.edu
- Residency and International Student Resources (928) 523-5316 gradinternational@nau.edu; gradresidency@nau.edu
- Debbie Mariage, Dissertation and defenses (928) 523-8254 etd@nau.edu