

# Nuclear Engineering Department Graduate Handbook

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THE UNIVERSITY OF  
**TENNESSEE**  
KNOXVILLE

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DEPARTMENT OF  
NUCLEAR ENGINEERING

Tickle College of Engineering  
University of Tennessee, Knoxville  
August 2019

Nuclear Engineering Building  
1412 Circle Drive  
Knoxville, TN 37996-2525  
E-mail: [utne@utk.edu](mailto:utne@utk.edu)  
Phone: 865-974-2525



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# 1 Message from the Department Head



Welcome to the University of Tennessee's Nuclear Engineering (UTNE) Department.

The information provided in this graduate handbook is intended to be one source to help students navigate the policies, procedures, and practices surrounding graduate school in the Nuclear Engineering Department. It is certainly not all inclusive, but important links will be provided to steer students towards other valuable information sources. We hope you will find this document useful.

The UTNE department's strengths include an outstanding faculty of skilled teachers and productive researchers; close ties with the Oak Ridge National Laboratory, Y-12 Nuclear Security Complex, UCOR, nuclear utilities, and international research collaborations; attractive graduate assistantship and fellowship opportunities; and outstanding research facilities. In addition to traditional nuclear engineering, concentrations in radiological engineering are also offered at all levels incorporating health physics, medical physics, and radiological assessment. The UT Nuclear Engineering program hosts the largest nuclear engineering PhD program in the United States, and our graduate program is consistently ranked among the top ten in the nation by *U.S. News and World Report*. If you desire additional information, please contact us by email at [utne@utk.edu](mailto:utne@utk.edu).

**J. Wesley Hines**  
Postelle Professor, Chancellor Professor, and Head

## 2 Introduction

Established in 1957, the UT Department of Nuclear Engineering is one of the oldest and most prestigious programs in the United States. The Nuclear Engineering Department strives to develop and maintain a nationally and internationally recognized program that promotes a passion for understanding and applying the knowledge of nuclear science and engineering and develops the next generation of technical leaders of the global nuclear enterprise. Our faculty consists of diverse research expertise; many have worked in national labs and the industry, and are considered to be national and global leaders in their respective fields. Students gain expertise as scientists and engineers who advance radiation detection, nuclear security, nuclear fuel cycles, fusion technology, reliability and safety, health physics, and other areas of basic research. Visit the Graduate Admissions website <<https://gradschool.utk.edu/admissions/>> and the Graduate Catalog <[https://catalog.utk.edu/misc/catalog\\_list.php?catoid=2](https://catalog.utk.edu/misc/catalog_list.php?catoid=2)> for more information on applying to the Nuclear Engineering Department's graduate program.

The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees, and several Graduate Certificates. Students may elect a traditional nuclear engineering program focusing on fission energy or a radiological engineering concentration, which prepares students for careers in the radiation safety field (health physics). Beginning in Fall 2019, there is also a medical physics program. All programs are designed for graduates of accredited undergraduate programs in engineering, physics, chemistry, or mathematics.

To serve the mission and vision of the Graduate School and preserve the integrity of graduate programs at the University of Tennessee, Knoxville, information related to the process of graduate education in each department is to be provided for all graduate students.

Based on Best Practices offered by the Council of Graduate Schools, it is important that detailed articulation of the information specific to the graduate degrees offered in each department/program be disseminated.

The Department Graduate Handbook does not deviate from established Graduate School Policies <<http://tiny.utk.edu/grad-policies>> noted in the Graduate Catalog, but rather provides the specific ways in which those policies are carried out.

- The purpose of the Graduate Handbook is to provide Nuclear Engineering Departmental specific information in one document. This information is subject to change, and this document will be updated annually.

- Graduate students are expected to be aware of and satisfy all regulations governing their work and study at the University. Students should be directed to the Graduate Catalog <<http://tiny.utk.edu/grad-catalog>>, to Hilltopics <<http://hilltopics.utk.edu/>>, and to the publications on the Appeals Procedure <<http://gradschool.utk.edu/graduate-student-life/understanding-your-rights-and-obligations/>>.
- The Nuclear Engineering Graduate Program Committee is responsible for activities such as preparing the qualification exam, recruiting top domestic and international students, admissions tracking, financial support recommendations, and annually updating the graduate handbook. The Department Head appoints a Chairperson and at least two other members to the Graduate Program Committee.
- The 2019-2020 Chair of the Graduate Program Committee is Dr. Jason Hayward, and the other members are Dr. Maik Lang, Dr. Nicholas R. Brown, and Dr. Richard Wood.

## 3 Admission Requirements & Application Procedures

Admission to the program requires a bachelor's degree from a college or university accredited by the appropriate regional accrediting agency. A foreign degree must be equivalent to a US bachelor's degree and must be accredited by its regional or national accreditation agency.

The decision for admission is based upon the applicant's GPA, GRE scores, TOEFL scores (for applicants whose native language is not English), letters of recommendation, and research statement. College professors, research advisors, and summer internship mentors who have first-hand knowledge of your academic and scholarly performance and capabilities make good reference providers. We recommend that applicants explore our research focuses and our faculty to investigate research topics that may be of interest and fit with applicants' career goals <<http://ne.utk.edu/research/focus-areas/>>. Prospective students are required to provide a one-page statement of research interests.

US degree holders must have earned a 3.0 out of a possible 4.0 GPA or a minimum of 3.0 during their senior year of undergraduate study. Foreign degree holders must have earned a minimum of 3.0 on a 4.0 scale or other equivalent to a B average. If you have completed previous graduate coursework, you must have a GPA of 3.0 on a 4.0 scale or the equivalent. The average GPA of admitted students in recent years is between 3.6 and 3.7 on a 4.0 scale.

Applicants must also take the GRE examination and submit test scores. GRE quantitative, verbal, and analytical scores are one measure used to evaluate student capacity to successfully complete the MS and PhD programs. We do not publish minimum scores, but admission to the

program is competitive. Recent average GRE quantitative scores have been 162–163 (170 max), and average GRE verbal scores have been 158 (170 max). For students requesting graduate assistantships (GRA and/or GTA), GRE averages are typically higher than the averages for general admission into the program. A GRE analytical score of 4 or higher is recommended. These metrics and scores are intended to provide general guidance, and each application is evaluated by the Graduate Program Committee and other faculty.

Applicants whose native language is not English must submit TOEFL or IELTS test scores. To be fully admitted, applicants must submit a minimum score of 550 on the paper-based TOEFL, 80 on the TOEFL iBT, or 6.5 on the IELTS. Applicants may be eligible for English Proficiency Conditional Admission.

Admission to the program is through the Office of Graduate Admissions and online application procedures can be found at <http://graduateadmissions.utk.edu/>. Meeting minimum standards does not guarantee admission to the program, and the entire package of submitted materials—GPA, GRE scores, letters of recommendation, and research statement—is considered holistically.

All entering students must have, as a minimum, competency in mathematics through ordinary differential equations, competency in atomic and nuclear physics, and competency consistent with an introductory course in nuclear engineering. If such competencies do not exist, the student must take appropriate courses for undergraduate credit. In addition, students without a BS degree in nuclear engineering, or the equivalent, must take 433 (Radiation Protection) and 470 (Nuclear Reactor Theory I), both of which may be taken for graduate credit. Contact the department for more information at [utne@utk.edu](mailto:utne@utk.edu).

The Graduate Catalog contains policy and procedure information related to the graduate program <http://tiny.utk.edu/grad-catalog>.

## 4 Financial Support

The university is committed to providing quality education at a reasonable cost, and a number of programs have been developed to help graduate students finance their studies.

If graduate students have 20hr per week support (a 50% assistantship) such as with a GRA, GTA/GRA, or other assistantship or fellowship that requires 20 hours per week of work, they should not have additional work requirements outside of the University. This means that a student on a full GRA should not have an external job or perform external consulting work. We make this very strong suggestion because history has shown that graduate students who have a 50% assistantship while attending UTNE and also try to maintain an additional external work load, are not successful in our program.

## 4.1 Departmental Graduate Assistantships

The Nuclear Engineering Department has Graduate Teaching Assistant (GTA) and Graduate Research Assistant (GRA) openings with extremely competitive stipends, especially considering the low cost of living in Knoxville. The Nuclear Engineering Department has the largest Nuclear Engineering PhD enrollment in the country and 98% of those students are fully funded through the university and other external entities.

The NE department strives to maintain a common pay scale for all graduate students. In FY2019, the NE annual graduate stipend is \$30,000 for PhD students and \$27,600 for MS students, divided evenly per twelve-month period (\$2500 or \$2300 per month).

A student supported as a GTA, GRA, or split GTA/GRA also receive a tuition waiver and student health insurance. Specifics related to pay scales and policy is provided in the appendix as the GTA- GRA Pay Scale Policy.

This is a very competitive salary compared with other Nuclear Engineering Departments in the country, especially when considering the cost of living in Knoxville, TN. The table below shows a comparison of the current value of a \$30,000 yearly stipend at other Universities with top 10 ranked Nuclear Engineering programs:

### Cost Of Living Comparison with Knoxville, TN

City	University	Salary: 30,000	Percent Difference
Knoxville, TN	University of Tennessee	30,000	0.0%
Ann Arbor, MI	University of Michigan	25,424	18.0%
Boston, MA	MIT	19,032	57.6%
Madison, WI	University of Wisconsin	24,489	22.5%
College Station, TX	TAMU	26,841	11.8%
State College, PA	Penn State University	22,703	32.1%
Raleigh, NC	NC State	28,066	6.9%
Atlanta, GA	Georgia Tech	26,287	14.1%
Oakland, CA	UC Berkeley	18,718	60.3%

Ref: CNN.com and areavibes.com (2017)

## 4.2 Funded Graduate Student Performance Expectations

Students receiving financial support provided by the University of Tennessee, Tickle College of Engineering, or Nuclear Engineering Department are expected to make progress towards their degree and meet the performance expectations of their graduate advisors. If a student works as a GTA, he/she is expected to work on average 10 hours per week and return graded assignments in a timely manner as defined by the course instructor. Failure to achieve set goals will result in a warning and areas of improvement will be identified. If performance does not improve within an agreed upon time, your Graduate Assistantship (tuition waiver and stipend) will be subject to termination. More detailed information on UTK assistantships and related policies can be found at <http://gradschool.utk.edu>.

## 4.3 Other Financial Aid

The Graduate School has several assistantship opportunities.

<http://gradschool.utk.edu/graduate-student-life/costs-funding/graduate-assistantships/>

## 4.4 Fellowship and Scholarship Opportunities

National organizations—such as the Department of Energy, the American Nuclear Society, and the National Academy for Nuclear Training—also offer excellent fellowship and scholarship opportunities for nuclear engineering graduate students. The department can provide information and assistance in applying for these fellowships.

US Department of Energy Student Programs and Internships, <http://energy.gov/student-programs-and-internships>, US Department of Energy Internship Programs and Other Opportunities

US Department of Energy Nuclear Energy University Program, <https://neup.inl.gov/SitePages/Fellowship%20Information.aspx>, The US Department of Energy, Office of Nuclear Energy Fellowship Program supports nuclear engineering students conducting their graduate work engineering and science programs related to nuclear energy.

NASA Space Technology Research Fellowship (NSTRF), <https://www.nasa.gov/strg/nstrf>, For U.S. citizen and permanent resident graduate students who show significant potential to contribute to NASA's goal of creating innovative new space technologies for our Nation's science, exploration and economic future; involves a generous stipend and an annual 6-10 week visiting technologist experience at NASA Centers and/or at nonprofit U.S. R&D laboratories.

National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP), <https://www.nsfgrfp.org>, The NSF Graduate Research Fellowship Program recognizes and

supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based Master's and doctoral degrees at accredited United States institutions.

DOE NNSA Stewardship Science Graduate Fellowship, <<https://www.krellinst.org/ssgf/how-apply>>, The Department of Energy National Nuclear Security Administration Stewardship Science Graduate Fellowship (DOE NNSA SSGF) program provides outstanding benefits and opportunities to students pursuing a Ph.D. in areas of interest to stewardship science, such as properties of materials under extreme conditions and hydrodynamics, nuclear science, or high energy density physics. The fellowship builds a community of talented and committed doctoral students that solve complex science and engineering problems critical to stewardship science (national defense); fellows are provided opportunities to work with some of the nation's most sophisticated and powerful experimental and computational facilities at DOE NNSA national laboratories.

American Nuclear Society Scholarships, <<http://www.ans.org/honors/scholarships/>>, The American Nuclear Society believes in rewarding its members for their academic, services and leadership excellence. To do so, scholarships are granted to qualified student members of ANS who have demonstrated a high commitment to the standards set by the Society.

Society of Women Engineers (SWE) Scholarships, <<http://societyofwomenengineers.swe.org/scholarships>>, SWE Scholarships support women pursuing ABET-accredited bachelor or graduate student programs in preparation for careers in engineering, engineering technology and computer science in the United States. I

Roy G. Post Foundation Scholarship, <<http://www.roygpost.org/roygpost/Scholarship>>, the Roy G. Post Foundation is a non-profit organization formed by his students, peers and protégés to provide scholarships to students to develop careers in the safe management of nuclear materials and to participate in the WM Conference.

Rickover Fellowship Program in Nuclear Engineering, <<https://www.scuref.org/program/rfp-01/>>, The program will assist in preparing students for roles in naval nuclear propulsion and will support the broader objective of advancing fission energy development through the research efforts of the fellows.

Nuclear Nonproliferation International Safeguards Graduate Fellowship Program, <<https://www.scuref.org/nnis/>> This fellowship provides financial support for exceptional students pursuing technical doctoral research relevant to the field of international safeguards. Participating universities foster partnerships between science/engineering programs and programs focused on nuclear nonproliferation and safeguards policy. Armed with both deep technical expertise and policy understanding, NNIS Fellows are primed to take on the exciting and challenging work of international nuclear safeguards.

SMART Scholarship administered by the National Defense Education Program, <<https://smartscholarshipprod.service-now.com/>>, The Science, Mathematics And Research for Transformation (SMART) Scholarship-for-Service Program is an opportunity for students pursuing an undergraduate or graduate degree in Science, Technology, Engineering, and Mathematics (STEM) disciplines to receive a full scholarship and be gainfully employed by the Department of Defense (DoD) upon degree completion.

## 4.5 Travel Support

The Nuclear Engineering Department funds approximately \$500,000 a year in faculty, staff and student travel. Departmental travel assistance should be provided by the student's Major Professor. Other travel support, such as the Graduate Student Travel Fund <<http://gss.utk.edu/travel-awards/>>, could also be utilized to attend national and international workshop and conferences.

# 5 Registration and Advising

Academic advising is provided by the student's Major Professor; however, if a Major Professor has not been chosen, the Department Head or designee (e.g. the Associate Department Head or Director of Graduate Studies) will provide academic advising. The goal of first year course selection is to set the student up to be successful in passing the qualification exam offered in May. Students without a NE undergraduate degree are usually advised to take NE 433 and NE 470 their first semester. A full course load is usually three graduate courses per semester.

400-level courses, listed in the *Graduate Catalog*, in nuclear engineering may be used for graduate credit. However, for a MS degree, at least two-thirds of the minimum required credit hours in the MS must be taken in courses numbered 500 or above.

Registration deadlines are provided in the Timetable/Financial Deadline Calendar on the registrar website: [http://registrar.utk.edu/academic\\_calendar/index.shtml](http://registrar.utk.edu/academic_calendar/index.shtml)

This section should include information about how to register for classes and get advising, including:

## 5.1 Required Course Loads

Required course loads can be found in the Graduate Catalog; this information is repeated below for convenience:

*The maximum load for a graduate student is 15 credit hours, and 9 to 12 credit hours are considered a full load. For the summer term, graduate students may register for a maximum of 12 credit hours in an entire summer term or for a maximum of 6 credit hours in a five-week summer session. Students may enroll in only one course during a mini-term session.*

*Students holding a one-half time assistantship normally should enroll for 6-11 credit hours. A one-fourth time graduate assistant normally should take 9-13 credit hours. A student on a one-half time assistantship who takes 6 credit hours will be considered full time for academic purposes. See heading "Financial Assistance" regarding financial aid eligibility for students with Assistantships. Refer to the Policy for the Administration of Graduate Assistantships for additional information.*

*Students receiving financial aid should consult with the department/program head concerning appropriate course loads. Courses audited do not count toward minimum graduate credit hours required for financial assistance.*

*Registration for more than 15 credit hours during any semester, or for more than 12 credit hours in the summer term, is not permissible without prior approval. The academic advisor may allow registration of up to 18 credit hours during a semester if the student has achieved a cumulative grade point average of 3.6 or better in at least 9 credit hours of graduate work with no outstanding incompletes. No more than 12 credit hours are permissible in the summer term without prior approval.*

In summary, a student on payroll having a 25% assistantship (10 hrs/wk) is required to take 9 hours during the academic year (i.e., during Fall or Spring semesters). A student on payroll having a 50% assistantship (20 hrs/wk) is required to take 6 hours during the academic year. Students who are required to work 20 hours per week don't have to take as many courses.

If a student is not on payroll but instead receives an external source of financial aid (e.g., through fellowships such as NSF, NEUP, etc.), these students are required to take 9 hours during the academic year. If a student has no support, they have to take 9 hours to be full time.

There are also some separate requirements for reduced full time course loads for international students. It is the responsibility of the international student to work with the Center for International Education (CIE), <<https://cie.utk.edu>>, to maintain their student visa status and comply with United States law.

### 5.1.1 Summer Registration Requirements:

Summer registration requirements differ depending on the student's situation:

- If a student is on campus at all, they need to register for at least 3 hours of something: a course, NE 500, 502, 598, or 600.
- If a student is off campus, but working on research with some advising from a faculty, they need to register for some research hours: NE 500, 598, or 600.
- If a student has started doing PhD research and has taken NE 600, they need to continue to take 3 hours until graduation including summers, unless they have an approved Leave of Absence (LOA).
- If a student is graduating at the end of the summer with a thesis, they need to register for 3 hours of NE 500.
- International students may have different requirements; please contact CIE.
- Some students may have different requirements due to external fellowships.

### 5.1.2 Graduate Student Seminar Registration Requirement

The Nuclear Engineering Department's Graduate Seminar (an actual class will be offered in 2019: NE 501) is offered on Wednesdays from 1:30 to 2:30 followed by light refreshments with the speaker. These seminars are an important component of the graduate educational experience and registration is therefore required for first and second year graduate students. Registration is not required for non-thesis MS students and non-resident. First and second year graduate students are required to attend at least 75% of the seminars each semester. Nominally, 12 seminars are given each semester so attendance is required for 9 of them. The seminars are normally webcast; however, attendance must be in person. If a student is on official travel as evidenced by an approved travel form, or if they have a conflict that is confirmed by their advisor, they will receive credit for the missed seminar after watching the seminar video and providing a short summary (about 1 page) and turn it in prior to the next seminar. Students who are performing research for an extended period at a remote location will be required to make arrangements with their advisor and with the program to meet seminar requirements.

Starting in 2019, seminar hours can be used toward graduation. For MS students, a maximum of 3 hours may be applied to the major. For PhD students with an MS, a maximum of 3 hours may be applied to the major. For PhD students directly from BS, a maximum of 6 hours may be applied to the major.

If you are **not** a new student in Fall or Summer of 2019, it is possible to waive your 3 hour NE 501 requirement so that you can graduate; however, you should consult with your major professor to see if they require you to take NE 501 seminar for credit and to use those credits towards your graduation. Even if you are not required to take NE 501 by your major professor,

you can choose to take NE 501 and apply the credit towards your graduation. Your major professor and committee sign off on your course plan, so they also have a say in approving your curriculum.

There will be attendance requirements for the new NE 501 seminar course and for students with research at ORNL, your advisor can develop a plan for you to meet these attendance requirements through in person attendance or through watching the seminars online and then writing a summary turned into the advisor. If you have any questions, please discuss with your advisor. If you do not have an advisor and have questions, please feel free to contact the graduate chair.

The first or second seminar each Fall is on the topic of safety. Our first objective in our departmental strategic plan is “to develop and maintain a robust safety culture”; and therefore, attendance for this seminar is mandatory. Anyone missing this seminar 1) must watch the entire recorded seminar and write a one page summary to be turned in to Lydia Sharp within one week of the seminar or 2) if they are trained by ORNL for laboratory safety, provide documentation of up to date training as shown by the Learning Resource Network site.

### 5.1.3 PhD NE 600: Research

A student must pass the qualifier before taking NE 600: Research. Once a student begins to take NE 600, he/she must continue to take at least 3 hours of NE 600 each semester, including summer. The one exception is if a student takes a leave of absence (LOA). A LOA form is available at the Graduate School website(<http://gradschool.utk.edu/forms-central>). If personal emergencies or other extenuating circumstances arise causing a student to have to interrupt his/her studies, the student may file a Request for Leave of Absence (LOA) for a maximum of two years. A Leave of Absence (LOA) is a temporary cessation of study; therefore, students should not be working on their dissertation during a LOA.

The LOA may be granted by the Graduate School upon approval of the home department or program. Students who have been granted a leave of absence are eligible for reinstatement to active status and do not have to apply for readmission. There is a form on the graduate school website for requesting a LOA (<http://gradschool.utk.edu/forms-central/graduate-student-leave-of-absence/>).

PhD Students who do not maintain continuous enrollment will lose their active status and may not continue in their program until readmitted. Upon readmission, students will be responsible for payment for retroactive enrollment for the missed terms during which no LOA was sought or granted.

## 5.2 PhD Qualification Exam

The first part of the comprehensive examination, commonly termed the qualification exam, qualifier, or prelims, is prepared by the nuclear engineering faculty and consists of 6 hours of a written examination that is administered over a two-day period. All past written examinations are filed in a library maintained by Lydia Sharp (lsharp@utk.edu), and students are encouraged to review them. Students are invited to take the written examination after they have taken enough graduate coursework to prepare them for the exams. Graduate students often take the exam at the end of their first year of graduate student. A student who fails the written examination must take and pass the examination the next time it is offered to remain in the PhD program. Graded exams will not be returned to the students.

Registration for NE 600 research credit is not permitted until the written examination is passed. (However, students may take NE 6XX coursework before passing this exam.) The second part of the comprehensive examination is completed with the successful oral defense of a written dissertation proposal. This exam is also called a proposal defense. The written proposal should be submitted to a student's committee two weeks before the oral defense. If the proposal is not submitted a week in advance, the student must obtain permission from each committee member to proceed with the planned defense.

The proposal should contain the following sections: introduction and background, relevant prior work by others, list of original contributions, description of research work to date, description and schedule of remaining work.

The qualification exam is offered once per year in May. A memo is provided to graduate students in the February timeframe. A student can sign up to take the qualification exam and choose the specialty test. A student's Major Professor must agree to this selection and sign the form.

A student should aim to complete his/her proposal defense as soon as possible, but certainly more than a year before completing his/her dissertation work such that the guidance of the committee may impact the trajectory of the student's research. We recommend a PhD proposal sometime between 2-3 years for a student without a MS or between 1-2 years for a student with a MS degree.

The format for the written portion of the PhD qualifying examination is as follows:

**First Day:** Undergraduate Nuclear Engineering Examination (two 1.5-hour exams)

Students must answer a selection of questions pertaining to nuclear engineering undergraduate fundamentals, including those fundamentals learned during required 400-level courses

Radiological Engineering (NE 433) (1.5 hours)

Nuclear Reactor Theory (NE 470) (1.5 hours)

Statistics and mathematics introduced in these courses will be emphasized in addition to the fundamental nuclear engineering concepts.

**Second Day:** Graduate Specialty Examination (1 three-hour exam)

Students must select one three-hour examination from the following list. Please place a check mark by the exam that you intend to take.

- Transport Processes in Nuclear Engineering (similar to content of NE 511)
- Nuclear Systems Dynamics and Control (similar to content of NE 521, 522)
- Radiological Engineering (similar to content of NE 551, 552)
- Reactor Theory and Design (similar to content of NE 571, 572)
- Shielding and Radiation Transport (similar to content of NE 582, 583)
- Nuclear Fuels and Materials (similar to content of NE 440, NE 540)
- Nuclear Security (similar to content of NE 530, NE 550, NE 542)
- Nuclear Instrumentation (similar to content of NE 550, NE 551)

## 6 Degree Requirements

The nuclear engineering department offers the following graduate degrees and certificates. Specific requirement can be found in the graduate catalog. Graduate students graduate under the most recent graduate catalog.

- Dual MS-MBA Program – Nuclear Engineering
- Nuclear Criticality Safety Graduate Certificate
- Nuclear Engineering Major, MS
- Nuclear Engineering Major, PhD
- Nuclear Security Science and Analysis Graduate Certificate
- Reliability and Maintainability Engineering Graduate Certificate – Nuclear Engineering Concentration
- Reliability and Maintainability Engineering, MS – Nuclear Engineering Concentration
- Medical Physics, MS

- Medical Physics Graduate Certificate

## 6.1 Nuclear Engineering Major, PhD

The graduate curriculum has changed as of 2019. Both the current description and the old description are included here. **However, only the current requirements may be met unless the Department has granted a specific exception for a student.** Graduate students graduate under the most recent graduate catalog, so please see your faculty advisor if you want to seek an exception.

### 6.1.1 PhD Requirements (2019)

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy degree must have a Bachelor of Science or Master of Science from a recognized university with a major in engineering, physics, chemistry, or mathematics. It is required that all applicants to the degree programs submit scores from the General Graduate Record Examination (GRE).

Specific requirements for the PhD with a major in nuclear engineering include the following.

- A minimum of 72 credit hours beyond the bachelor's degree, exclusive of credit for the MS thesis. Of this number, a minimum of 24 credit hours in NE 600 and a minimum of 39 hours of graduate coursework will be required.
- The graduate course work requirement includes a minimum of 27 credit hours of graduate courses in nuclear engineering at or above the 500-level, exclusive of thesis, practice project, or dissertation credit.
- Three credits (1+1+1) of NE 501 Graduate Seminar are required as part of the 27 hours of graduate coursework in nuclear engineering.
- A minimum of 12 additional course work credit hours is required, subject to approval by the student's faculty committee.
- At least 6 credit hours of the above coursework must be at the 600-level, with at least 3 of these credit hours in nuclear engineering.
- At the discretion of the student's dissertation committee and depending on the student's background, more than 39 credit hours of courses may be required.
- A maximum of 24 credit hours from a master's degree may be used to satisfy the course requirements for the PhD.

### 6.1.2 Old PhD Requirements (Pre-2019)

These requirements are no longer applicable. They are provided here for information purposes only.

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy degree must have a Bachelor of Science or Master of Science from a recognized university with a major in engineering, physics, chemistry, or mathematics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, chemistry, physics, and nuclear engineering.

Specific requirements for the PhD with a major in nuclear engineering include the following:

- A minimum of 48 credit hours of graduate coursework and 24 credit hours of doctoral research (NE 600) credit beyond the bachelor's degree. If the student has or earns a master's degree, then a minimum of 24 credit hours of graduate coursework beyond all masters is required.
- A minimum of 30 credit hours in nuclear engineering courses numbered 500 and above (or the equivalent). These are exclusive of thesis, practice project, or dissertation credits.
- A minimum of 18 graduate credit hours of coursework in addition to the requirement of 30 credit hours of graduate nuclear engineering course credit hours. The 18 graduate hours are to be related to the student's research, as approved by the student's committee. No more than twelve 400-level graduate credit hours may be used to satisfy this requirement.
- A minimum of 6 credit hours of 600-level courses. No more than 3 credit hours of the 600-level course hour requirement may come from a department other than Nuclear Engineering.

Note that research credits such as NE 600, NE 500, and NE 598 are not counted as coursework. Deadlines and other requirements for graduation are posted at the Graduate School website, <<https://gradschool.utk.edu/graduation/>>.

### 6.1.3 Energy Science and Engineering Concentration

This concentration is offered in collaboration with the Bredesen Center for Interdisciplinary Research and Graduate Education. The Bredesen Center unites extensive and complementary resources at UT and Oak Ridge National Laboratory (ORNL) to advance science, technology, engineering, and mathematics research related to energy.

Students who wish to pursue this concentration will normally have completed 6 Core Credit hours, 3 credit hours of Knowledge Breadth, and 6 credit hours of Knowledge Specialization coursework (minimum 15 hours) specified under the Energy Science and Engineering (ESE) major, (PhD) program in the Graduate Catalog.

Students in this program take a different qualification exam, as described on the Bredesen Center website <<https://bredesencenter.utk.edu/the-energy-science-and-engineering-phd/>>. The director of the Energy Science and Engineering Concentration is Dr. Suresh Babu.

#### 6.1.4 Radiation instrumentation Interdisciplinary Graduate Education

The Radiation Instrumentation Interdisciplinary Graduate Education (**RIDGE**) program began in the 2015-2016 academic year in order to establish a closer connection between engineering departments that contribute to radiation instrumentation systems research and development. The program is geared toward education of PhD-seeking students through coursework and research. Though this program a student may earn either a MS degree in Nuclear Engineering, Computer Engineering, Computer Science, Electrical Engineering, or Materials Science Engineering along the way to the Nuclear Engineering PhD. It is also possible to earn another certificate along the way, such as one in Nuclear Security Science and Analysis. A sample curriculum along with other suggested milestones for a student seeking a PhD in Nuclear Engineering can be found at: <<https://radideas.utk.edu/the-ridge/>>. For more information about this program please contact Dr. Jason Hayward.

## 6.2 Nuclear Engineering Major, MS

The graduate curriculum has changed as of 2019. Both the current description and the old description are included here. However, only the current requirements may be met unless the Department has granted a specific exception for a student. Please see your faculty advisor if you want to seek an exception.

### 6.2.1 MS Requirements (2019)

The Department of Nuclear Engineering offers a Master of Science degree in which students may elect a program focusing on traditional fission energy, nuclear security, nuclear materials, or a student can choose a radiological engineering concentration.

The program requires the completion of 12 graduate credit hours of nuclear engineering courses and 12 graduate credit hours of graduate courses. The program requires a research option selected by the student in coordination with the student's graduate committee and is based on the student's personal interests, academic background, and work experience, as well as the nature of projects currently available in the department. A thesis project requires the student to conduct independent, in-depth research. An engineering practice project is similar to a thesis project but smaller in scope and can be research, design, product development, special operations, or a critical review of published literature in a specific technical area. The final report for an engineering practice project is normally prepared in thesis format; however, another formal report format may be used if approved by the student's graduate committee.

The minimum requirements for the MS in nuclear engineering are

A major consisting of 15 credit hours of graduate courses in nuclear engineering which must include at least two of the following courses:

- NE 511 - Transport Processes in Nuclear Engineering
- NE 521 - Nuclear Plant Instrumentation and Control Systems
- NE 522 - Nuclear Reactor Dynamics and Controls
- NE 540 - Fundamentals of Irradiation Effects in Nuclear Materials
- NE 542 - Management of Radioactive Materials
- NE 551 - Radiation Protection
- NE 563 - Plasma Physics and Plasma Materials Interactions
- NE 571 - Reactor Theory and Design

Two credit hours (1+1) of NE 501 are required, and a maximum of 3 credit hours of NE 501 can be used towards the 15 credit hours of NE graduate courses.

An additional 9 credit hours of graduate courses related to the student's research, as approved by the student's committee typically selected from Nuclear Engineering, Physics, Mathematics, Computer Science, Mechanical Engineering, or Material Science

Option 1 – a thesis project (6 credit hours of NE 500).

Option 2 – two engineering practice projects (6 credit hours of NE 598).

Option 3 – one engineering practice project (3 credit hours of NE 598) plus 3 credit hours of additional nuclear engineering course work.

Only 9 credit hours of 400 level graduate coursework can be applied towards the 24 credit hour course requirement.

Students without a BS in nuclear engineering, or the equivalent, must take NE 433 and NE 470, both of which may be taken for graduate credit.

The student must pass an oral examination on all work presented for the degree (all course work and thesis).

### 6.2.2 Requirements (Pre-2019)

These requirements are no longer applicable. They are provided here for information purposes only.

A graduate program leading to the Master of Science degree is available to graduates of recognized undergraduate curricula as described above. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The minimum requirements for the MS in nuclear engineering are

A major consisting of 12 credit hours of graduate courses in nuclear engineering which must include at least two of the following courses:

- NE 511 - Transport Processes in Nuclear Engineering
- NE 521 - Nuclear Plant Instrumentation and Control Systems
- NE 522 - Nuclear Reactor Dynamics and Controls
- NE 540 - Fundamentals of Irradiation Effects in Nuclear Materials
- NE 542 - Management of Radioactive Materials
- NE 551 - Radiation Protection
- NE 563 - Plasma Physics and Plasma Materials Interactions
- NE 571 - Reactor Theory and Design

An additional 12 credit hours of graduate courses related to the student's research, as approved by the student's committee.

Option 1 – a thesis project (6 credit hours of NE 500).

Option 2 – two engineering practice projects (6 credit hours of NE 598).

Option 3 – one engineering practice project (3 credit hours of NE 598) plus 3 credit hours of additional nuclear engineering course work.

The determination of which option a student may undertake is made by the student's graduate committee and is based on the student's personal interests, academic background, and work experience, as well as the nature of projects currently available in the department. A thesis project requires the student to conduct independent, in-depth research. An engineering practice project is similar to a thesis project but smaller in scope and can be research, design, product development, special operations, or a critical review of published literature in a specific technical area. The final report for an engineering practice project is normally prepared in thesis format (i.e., according to the Graduate School, Guide to the Preparation of Theses and Dissertations); however, another formal report format may be used if approved by the student's graduate committee. The student must also register for the appropriate number of credit hours of either NE 500 or NE 598, as specified by the student's major professor, during each semester that

work is performed on a thesis or engineering practice project. Finally, the student must pass an oral examination on all work presented for the degree (all course work and all projects).

PhD students seeking concurrent MS degrees should note that the option selected above could affect the number of courses that the student is required to take beyond the MS degree (24 hours beyond all MS degrees is required for a PhD).

### 6.2.3 Concurrent Master's Degree Program

Currently enrolled UT doctoral students who plan to complete the master's degree while maintaining enrollment in the doctoral program must submit a Request for Concurrent Master's Degree form to the Graduate School graduation office two weeks prior to the deadline for submission of the graduation application for the Master's Degree. No fee will be assessed for submission of this form.

For students receiving financial support from the Department, we advise that since your main interest is in receiving the terminal degree for our graduate program, a PhD degree, we advise that you enroll as PhD students and, if interested in a MS degree along the way, request a concurrent Master's Degree. Obtaining a MS degree along the way is a good idea in case either you or the Department decides that a PhD degree at UTK isn't in your best interest. You should plan to meet the requirements to obtain a MS degree within 18 to 24 months. If a student is enrolled in the BS-MS program, it may be possible to obtain the MS degree within 12 months.

### 6.2.4 MS Defense Combined PhD Proposal Option

In particular, if a PhD seeking student in NE utilized the concurrent option to get an MS in NE as the student progressed towards the PhD, they may combine the MS practice project defense with their PhD proposal. Specifically, if a student

1. desires to obtain a concurrent MS degree in Nuclear Engineering,
2. elects one of the practice-project-based options to obtain this MS degree,
3. is conducting MS and PhD research in the same topical area,
4. includes three members of the NE department of his or her PhD committee, and
5. has the consent of his/her Major Professor,

then the student may elect to incorporate his/her MS defense into his/her PhD proposal defense.

In particular, the "Contributions to date" section (see below) of the PhD proposal defense will double as the MS defense.

The PhD-seeking student must still follow the guidelines of a standard PhD proposal defense in the NE department, incorporating the following sections into both the written proposals and oral defenses:

1. Review of prior relevant work
2. Statement of original scientific contributions
3. Contributions to date
4. Remaining tasks and expected schedule for completion

Separate decisions will be made by the committee as to the outcome of this defense for MS degree conferral and PhD Candidacy. Naturally, the out-of-department member only weighs in on the PhD Candidacy.

### 6.2.5 Five-Year BS-MS Program, Nuclear Engineering Major

The Department offers a 5-year BS-MS program with a BS (major in nuclear engineering) and an MS (major in nuclear engineering) for qualified students. The primary component of the program is that a qualified student may take up to 6 credit hours of approved graduate courses for their senior undergraduate electives and have them count toward both the Bachelor's and Master's degrees at the University of Tennessee. This program is designed for students attending the University of Tennessee for their Master of Science degree, because other universities may not accept these courses for graduate credit since they were used to satisfy requirements for the Bachelor of Science degree. Significant components of the program are:

- Students must have an overall GPA of 3.4 in required coursework. Conditional admission to the 5-year program may be granted after completion of 63 credit hours of required coursework, while full admission may be granted after the completion of 93 credit hours of required coursework with a minimum GPA of 3.4.
- Admission must be approved by the Department and the Graduate School.
- Students must at least be conditionally admitted to the program prior to taking courses that receive credit for both the BS and MS degrees.
- All courses taken for graduate credit must be approved by the Director of Graduate Studies. Students admitted to the program must request permission from the Graduate School to take approved courses for graduate credit. Students admitted to the program must also follow the normal procedure for admission to the Graduate School.
- Students will not be eligible for graduate assistantships until they are enrolled as graduate-level students in the Graduate School. (Graduate assistantships are reserved for PhD-seeking students first.)

### 6.2.5.1 Radiological Engineering Concentration

Students electing the Radiological Engineering concentration must fulfill the MS requirements and take NE 401 (Radiological Engineering Laboratory), NE 551 (Radiation Protection), NE 552 (Radiological Assessment and Dosimetry), and NE 490 (Radiation Biology) in their course of study.

Note: This concentration is in the process of being changed to a MS in Medical Physics. We expect to obtain accreditation from CAMPEP for this program. **The MS in Medical Physics was approved by the Tennessee Higher Education Commission (THEC) on July 2.** For more information on the Radiological Engineering concentration, students are encouraged to contact Dr. Lawrence Heilbronn.

## 6.3 MS in Medical Physics

The MS in Medical Physics program is designed for graduates of accredited undergraduate programs in engineering, physics or a closely related field who would like to become certified Medical Physicists and/or conduct research in Medical Physics. Students that desire a more in-depth research experience may want to pursue the MS in Medical Physics on their way towards a PhD in Nuclear Engineering.

A major consisting of 15 credit hours of graduate courses in engineering which must include each of the following core courses BME 574, NE 490, NE 551, NE 567, NE 568.

An additional 3 graduate courses, 2 of which are from the following list of electives: NE 406, NE 542, NE 550, NE 552, NE 582, NE 583, NE 588. Two foundational courses: BCMB 230 (5 credit hours) and EEB 240 (4 credit hours) (see the current undergraduate catalog for course descriptions). NOTE: These courses can not be taken for graduate credit.

### Option Requirements

- Thesis Option: NE 500 Thesis, 6 credit hours
- Project Options (NOTE: Research topic must be related to Medical Physics): Two engineering practice projects, NE 598 for 6 credit hours, One engineering practice project, NE 598 for 3 credit hours, plus 3 credit hours of additional nuclear engineering (NE) coursework as approved by the graduate committee.

### Non-course Requirements:

The Medical Physics Program Director must be a member of all MS graduate committees.

The determination of which option a student may undertake is made by the student's graduate committee and is based on the student's personal interests, academic background, and work experience, as well as the nature of projects currently available in the department.

A thesis project requires the student to conduct independent, in-depth research on a Medical Physics related topic.

An engineering practice project is similar to a thesis project but smaller in scope and can be research, design, product development, special operations, or a critical review of published literature in a specific technical area related to Medical Physics.

The final report for an engineering practice project is normally prepared in thesis format (i.e., according to the Graduate School, Guide to the Preparation of Theses and Dissertations); however, another formal report format may be used if approved by the student's graduate committee.

The student must also register for the appropriate number of credit hours of either NE 500 or NE 598, as specified by the student's major professor, during each semester that work is performed on a thesis or engineering practice project.

Finally, the student must pass an oral examination on all work presented for the degree regardless of thesis or project (all course work and all projects).

## 6.4 Dual MS-MBA Program – Nuclear Engineering

The Nuclear Engineering Department offers a Dual MS-MBA Program. The program requirements are provided in the Graduate Catalog:

<[https://catalog.utk.edu/preview\\_program.php?catoid=23&poid=9795&returnto=2835](https://catalog.utk.edu/preview_program.php?catoid=23&poid=9795&returnto=2835)>.

## 6.5 Reliability and Maintainability Engineering, MS – Nuclear Engineering Concentration

A Master of Science degree with a Major in Reliability and Maintainability Engineering is offered through an interdepartmental program. Both thesis and non-thesis options are available. See the Catalog listings for the appropriate department in the Tickle College of Engineering and the Department of Business Analytics and Statistics for more information about the courses offered. The program can be completed on campus or through distance delivery. The Reliability and Maintainability Engineering Program Director, Dr. Mingzhou Jin, is the contact for all students interested in the concentration. < <https://tickle.utk.edu/rme/>>. The requirements are found in the Graduate Catalog:

<[https://catalog.utk.edu/preview\\_program.php?catoid=23&poid=9929&returnto=2835](https://catalog.utk.edu/preview_program.php?catoid=23&poid=9929&returnto=2835)>.

## 6.6 Graduate Certificates

Several graduate certificates are offered by the Nuclear Engineering Department to provide specific education in specialized areas. Most certificates require 4 courses (12 credit hours). Students must maintain a minimum of a 3.0 grade point average once in the program and complete the requirements of the certificate program as stated in the Graduate Catalog to be awarded the graduate certificate. In addition to the ones listed below, we also expect to add a Medical Physics Graduate Certificate as soon as the Fall 2019 semester and seek CAMPEP accreditation for this program.

For all graduate certificates, students should apply for an add-on certificate prior to the completion of six-semester hours towards the certificate requirements. More information is available at:

<[http://catalog.utk.edu/content.php?catoid=23&navoid=2827#Graduate\\_Certificate\\_Programs](http://catalog.utk.edu/content.php?catoid=23&navoid=2827#Graduate_Certificate_Programs)>

### 6.6.1 Medical Physics Graduate Certificate

The Department of Nuclear Engineering offers a graduate certificate in Medical Physics (MP). The Graduate Certificate in Medical Physics is designed for students who have earned a PhD in a related field and who would like to become certified Medical Physicists and/or conduct research in Medical Physics.

Students can potentially transfer in a very limited number of courses if they are found to cover equivalent topics of the required courses. More information can be obtained by contacting the Medical Physics Program Director.

All entering students shall have a strong foundation in basic physics demonstrated either by an undergraduate or graduate degree in physics, or by a degree in an engineering discipline or another of the physical sciences and with coursework that is the equivalent of a minor in physics (i.e., one that includes at least three upper-level undergraduate physics courses that would be required for a physics major).

The UT Medical Physics programs will be applying for accreditation from CAMPEP. Please check the CAMPEP website to determine whether the program has been accredited yet: <http://www.campep.org/campeplstgrad.asp>.

The 15-graduate credit hour certificate is earned by completing the five required courses listed below and the two undergraduate courses

<b>Required Courses</b>		<b>Credit Hours</b>
BME 574	Medical Imaging	3
NE 490	Radiation Biology	3
NE 551	Radiation Protection	3
NE 567	Medical Physics I	3
NE 568	Medical Physics II	3
BCMB 230	Human Physiology	5 (UG)
EEB 240	Human Anatomy	4 (UG)

The Medical Physics Program Director must be a member of all PhD graduate committees for students that intend to receive a Graduate Certificate in Medical Physics as an Add-on Option. If applying for the Stand-Alone option, the Medical Physics Program Director will help to make the acceptance decision.

### 6.6.2 Nuclear Criticality Safety Graduate Certificate

The Department of Nuclear Engineering offers a graduate certificate in nuclear criticality safety. The program is designed primarily for part-time students. All of the courses are available through distance education.

The 12-credit hour certificate is earned by completing NE 421, NE 543, and NE 582 plus one of the following two courses: NE 470 or NE 571. The selection of one of the latter two courses is determined through an advising conference with each individual student and is based on the student's personal interests, academic background, and work experience.

Students interested in the certificate are encouraged to contact Dr. Ronald Pevey with any questions.

### 6.6.3 Nuclear Security Science and Analysis Graduate Certificate

The Department of Nuclear Engineering offers a graduate certificate in Nuclear Security Science and Analysis (NSSA). The program is designed primarily for students seeking specialization in nuclear security science with emphasis on current or aspiring members of the

nuclear security community, including those areas with an emphasis on arms control, treaty verification, non-proliferation, international nuclear security issues in both civilian and military contexts, nuclear threat detection, and principles of nuclear intelligence assessment.

Additionally, this program will prepare graduate students to engage in the research and development of new tools and processes related to nuclear security science and analysis.

The 12-credit hour certificate is earned by completing four courses from the following lists, including one required course, one qualifying Nuclear Engineering elective course, and two NSSA electives.

- The required course is NE 530 - Nuclear Security Science and Analysis.
- Qualifying Nuclear Engineering elective courses include (please note that the 400-level courses must be taken for graduate credit to qualify for the certificate):
  - NE 404 - Nuclear Fuel Cycle,
  - NE 433 - Principles of Health Physics,
  - NE 470 - Nuclear Reactor Theory,
  - NE 542 - Management of Radioactive Materials,
  - NE 551 - Radiation Protection,
  - NE 571 - Reactor Theory and Design.
- NSSA electives include:
  - NE 532 - Detection, Localization, and Nondestructive Assay of Nuclear and Radiological Materials,
  - NE 533 - Physical Security for High-Consequence Facilities,
  - NE 534 - Physical Security Vulnerability Assessment,
  - NE 537 - Human Reliability in Nuclear Systems
  - NE 550 - Radiation Measurements Laboratory,
  - NE 635 - Nuclear Forensics,
  - POLS 686 - Arms Control, Deterrence and Nuclear Nonproliferation.

The selection of courses, which must be approved by the Department, is determined through a student advising conference that considers the student's personal interests, academic background, and work experience. Criteria for acceptance to the certificate program are the same as for acceptance into the M.S. program in nuclear engineering. Students interested in the concentration are encouraged to contact Dr. Jason Hayward with any questions.

#### **6.6.4 Reliability and Maintainability Engineering Graduate Certificate – Nuclear Engineering Concentration**

The Tickle College of Engineering offers a graduate certificate in Reliability and Maintainability Engineering. The program is designed primarily for part-time students in that all of the courses are available through distance education.

The 12-credit hour certificate is earned by completing CBE 483, IE 483, ME 483, or NE 483 and CBE 484, IE 484, MSE 484, ME 484, or NE 484, plus two elective courses selected from a list of courses provided by the participating departments – Chemical and Biomolecular Engineering; Electrical Engineering and Computer Science; Industrial and Systems Engineering; Mechanical, Aerospace, and Biomedical Engineering; and Nuclear Engineering.

Currently, the available elective courses are CBE 585 / NE 585, ECE 504, IE 516, IE 517, IE 522, ME 534, MSE 421, NE 441, NE 575, NE 579, NE 585, and STAT 567.

The selection of elective courses is determined through an advising conference with each individual student, and is based on the student's personal interests, academic background, and work experience.

## 6.7 Committee Requirements

### 6.7.1 Master's Committee

A committee composed of the Major Professor and at least two other faculty members, all at the rank of Assistant Professor or above, should be formed as early as possible in a student's program, and must be formed by the time a student applies for admission to candidacy (refer to Advisor/Major Professor). The responsibility of this committee is to assist the student in planning a program of study and carrying out research, and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

### 6.7.2 Doctoral Committee

The Major Professor directs the student's dissertation research and chairs the dissertation committee. The student and the major professor identify a doctoral committee composed of at least four members. At least 2 committee members must be UT tenured or tenure-track faculty members. At least one committee member must be from outside of the student's department/interdisciplinary program. This external member can be from outside UT. UT tenured or tenure-track faculty without a doctoral degree and other experts in the field may serve on PhD committees with department head approval. Students are encouraged where appropriate to seek a fifth member in the field of specialization from outside the University to serve on their dissertation committee. To officially establish the committee, the student will submit the Doctoral Committee Appointment Form with original signatures. This committee is nominated by the department head or college dean and approved by the Dean of the Graduate School.

A doctoral student should begin to form the committee during the first year of study. Subject to Graduate Council policies and individual program requirements, the committee must approve all

coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, assist the student in conducting research, and recommend the dissertation for approval and acceptance by the Graduate School.

The doctoral committee is convened for the comprehensive exam or proposal defense and then again for the dissertation defense. A student should submit his/her dissertation at least two weeks ahead of the defense. If a student has not submitted his dissertation within one week of his/her defense, the student needs the permission of all committee members to proceed. The submitted dissertation should be a near final form, having already been reviewed by the Major Professor at this point.

This also means that the student should check with the Graduate School to make sure it meets their formatting requirements. If any copyrighted materials are included in the dissertation (e.g., from journals), permission for publication should be obtained. If the dissertation needs to be approved for release by a sponsor, a national laboratory, or perhaps due to any nondisclosure agreements in place with a private company, this should also have been done.

If a student passes his/her oral dissertation defense, changes or editing of the dissertation may still be required by the committee. These changes must be completed before the deadline given by the Graduate School (see the Graduate School website for deadline information) in order for the PhD degree to be conferred on time.

Another possible outcome of the oral defense is for the student to fail it. In this case, a student may reschedule a defense as soon as the following semester. Failure to pass the examination or to gain acceptance of a dissertation on the second try will result in dismissal from the Nuclear Engineering PhD program.

There is an option within the Department of Nuclear Engineering (NE) for selected PhD proposal defenses.

In particular, if a PhD seeking student in NE

- 1) desires to obtain a concurrent MS degree in Nuclear Engineering,
- 2) elects one of the practice-project-based options to obtain this MS degree,
- 3) is conducting MS and PhD research in the same topical area,
- 4) includes three members of the NE department of his or her PhD committee, and
- 5) has the consent of his/her Major Professor,

then the student may elect to incorporate his/her MS defense into his/her PhD proposal defense.

In particular, the “Contributions to date” section (see below) of the PhD proposal defense will double as the MS defense.

The PhD-seeking student must still follow the guidelines of a standard PhD proposal defense in the NE department, incorporating the following sections into both the written proposals and oral defenses:

- 1) Review of prior relevant work
- 2) Statement of original scientific contributions
- 3) Contributions to date
- 4) Remaining tasks and expected schedule for completion

Separate decisions will be made by the committee as to the outcome of this defense for MS degree conferral and PhD Candidacy. The out-of-department member only provides input on the PhD Candidacy.

## 6.8 Time Limits for Completion of Degree

MS Candidates have six calendar years to complete the degree, starting at the beginning of the semester of the first course counted toward the degree. Students who change degree programs during this six-year period may be granted an extension after review and approval by the Dean of the Graduate School. In any event, courses used toward a master's degree must have been taken within six calendar years of graduation. The term(s) and/or year(s) of an approved Leave of Absence (LOA) will not be counted toward time to degree, and milestone deadlines such as Admission to Candidacy will be adjusted accordingly.

For PhD students, the comprehensive examinations must be taken within five years, and all requirements must be completed within eight years, from the time of a student's first enrollment in a doctoral degree program. The term(s) and/or year(s) of an approved Leave of Absence (LOA) will not be counted toward time to degree, and milestone deadlines such as Admission to Candidacy will be adjusted accordingly.

## 6.9 PhD Residence Requirement

Residence is defined as full-time registration for a given semester on the campus where the program is located. The summer term is included in this period. During residence, it is expected that the student will be engaged in full-time, on-campus study toward a graduate degree.

For the doctoral degree, a minimum of two consecutive semesters of residence is required, except in programs where alternative or additional residence requirements have been approved.

A statement as to how and during what period of time the residence requirement has been met will be presented with the Application for Admission to Candidacy along with signatures of approval from the Major Professor and the department head/program director.

# 7 Academic Standards and Academic Standing

Graduate education requires continuous evaluation of the student. This includes not only periodic objective evaluation, such as the cumulative grade point average, performance on comprehensive examinations, and acceptance of the thesis or dissertation, but also judgments by the faculty of the student's progress and potential. Continuation in a program is determined by consideration of all these elements by the faculty and the head of the academic unit.

The academic records of all graduate students are reviewed at the end of each semester, including the summer term, to determine academic standing. For good standing, graduate students must maintain a cumulative grade point average (GPA) of at least 3.0 on all graduate courses taken for a letter grade of A-F. Grades of S/NC, P/NP, and I, which have no numerical equivalent, are excluded from this computation.

There are three types of academic standing set at the end of every term of enrollment: good standing, academic probation, and academic dismissal.

## 7.1 Academic Probation

Upon completion of 9 credit hours of graduate coursework, a graduate student will be placed on academic probation when his/her cumulative GPA falls below 3.0. A student will be allowed to continue graduate study in subsequent semesters if each semester's grade point average is 3.0 or greater. Upon achieving a cumulative GPA of 3.0, the student will be removed from probationary status.

## 7.2 Academic Dismissal

If a student is on academic probation, the degree or non-degree status will be terminated by the Dean of the Graduate School if the student's semester GPA falls below 3.0 in a subsequent semester. When the particular circumstances are deemed to justify continuation, and upon recommendation of the appropriate academic unit and approval of the Dean of the Graduate School, a student on probation whose semester GPA is below 3.0 may be allowed to continue on a semester-by-semester basis.

Dismissal of a graduate student by a department or program is accomplished by written notice to the student, with a copy to the Graduate School. In those cases, where the department's requirements for continuation are more stringent than university requirements for graduate programs, the Dean of the Graduate School will evaluate the student's record to determine whether the student is eligible to apply for a change of status and register in another area of study. Registration for courses in a department from which a student has been dismissed will not be permitted, except by written authorization from that department.

## 7.3 Academic Dishonesty

Dishonesty and other integrity issues are taken extremely seriously in the nuclear engineering department as they are in the nuclear engineering industry. One falsified document could result in an accident or event that could change the course of nuclear power for the world. Our department will institute the harshest penalty allowed by the University when dishonesty, cheating, plagiarism, or other integrity issues occur. It is the practice of the Nuclear Engineering Department Head to not give second chances. Integrity is the foundation of our industry, and those without it will not have a place in our Department.

## 7.4 Grade of Incomplete

Under extraordinary circumstances and at the discretion of the instructor, the grade of I (Incomplete) may be awarded to students who have satisfactorily completed a substantial portion of the course requirement but cannot complete the course for reasons beyond their control.

- The I (Incomplete) grade is not issued in lieu of the grade of F.
- The terms for the removal of the I, including the time limit for removal of the I, is decided by the instructor.
- It is the responsibility of the student receiving an I (Incomplete) to arrange with the instructor whatever action is needed to remove the grade at the earliest possible date, and in any event, within one calendar year of the assignment of incomplete.

- Students do not remove an I grade by re-enrolling in the course.
- The I grade does not carry quality points and is not computed as a grade of F in the grade point average.
- If the I grade is not removed within one calendar year or upon graduation, it shall be changed to an F and count as a failure in the computation of the grade point average.
- A student need not be enrolled at the university to remove a grade of incomplete.

## 7.5 Appeal Procedure

The Graduate Council Appeal Procedure can be obtained at the Graduate School or at <http://gradschool.utk.edu/GraduateCouncil/AppelComm/AppealProcedureApproved2009>. Normally, grievances should be handled first at the department level through the student's academic advisor, the director of graduate studies, or the department or program head. Further appeal may be made to the dean of the respective college, the Graduate Council Appeals Committee through the Assistant Dean of the Graduate School, and ultimately to the Dean of the Graduate School.

Appeals may involve the interpretation of and adherence to university, college, and department policies and procedures as they apply to graduate education and the issuance of grades based on specific allowable reasons stipulated in the *Graduate Council Appeal Procedure*.

Appeal procedures in regard to allegations of misconduct or academic dishonesty are presented in *Hilltopics* under "Disciplinary Regulations and Procedures." Students with grievances related to race, sex, color, religion, national origin, age, disability or veteran status should file a formal complaint with the Office of Equity and Diversity, 1840 Melrose Avenue.

## 7.6 Academic Policies for the Administration of Graduate

### Assistantships

The academic policies related to graduate teaching and research assistantships are found here: < [https://catalog.utk.edu/content.php?catoid=23&navoid=2827#poli\\_admi\\_grad\\_assi](https://catalog.utk.edu/content.php?catoid=23&navoid=2827#poli_admi_grad_assi) >

Work assignments for each type of assistantship should be as specific as possible and should be developed to reflect both the needs of the department and each graduate assistant's obligation to make satisfactory progress in his/her program. Therefore, to the extent possible an assignment should appropriately reflect teaching hours, office hours, hours to be spent performing research or other specified tasks. Such specifications should be provided in writing at the time the offer is made.

Departments employing graduate assistants will conduct an annual evaluation of each assistant. The results of the evaluation are made available to the assistant and placed in the student's academic file. Appropriate follow-up also should occur. The evaluation, review with the assistant, and follow-up should focus not only on assistant-related work being done but should be preparatory for future employment, thus providing professional growth. In most cases, a graduate assistant's supervisor shares results of the evaluation with the assistant and takes appropriate follow-up action.

In cases where corrective measures must be taken to remediate deficiencies, the graduate assistant should be notified in writing of recommended action to solve the problem(s). Situations leading to dismissal for cause must be described in writing to the assistant being dismissed. This letter should be written by the supervisor with a copy to the department head. In cases where the assistant feels that university-related factors (facilities, working conditions, improper supervision, etc.) have had negative effects on specific aspects of job performance, a letter to the supervisor would be appropriate.

Graduate assistants who are performing satisfactorily are normally reappointed up to the maximum time limit as stated below. In situations where the demands of the department do not call for a job to be continued, reappointment may not be made. In cases where a department has a rotational plan for assistantships, graduate assistants likewise may not be reappointed.

When an assistantship is not to be renewed, the graduate student should be notified in advance. In most cases, this notice must be given no later than one month prior to the end of the appointment. Specific reasons for not renewing the contract should be given (e.g., discontinuation of the program or grant, significant neglect of duty, unsatisfactory academic performance or progress toward a degree, non-compliance with university policies, etc.).

## 8 Links to Important Resources

- International students
  - Center for International Education ([international.utk.edu](http://international.utk.edu))
  - International House ([ihouse.utk.edu](http://ihouse.utk.edu))
  - ITA Testing Program ([tiny.utk.edu/ita-testing](http://tiny.utk.edu/ita-testing))
- Funding
  - Costs and funding opportunities ([tiny.utk.edu/grad-funding](http://tiny.utk.edu/grad-funding))
  - Graduate Student Senate Travel Awards ([gss.utk.edu/travel-awards](http://gss.utk.edu/travel-awards))
  - Financial Aid and Scholarships ([onestop.utk.edu/financial-aid](http://onestop.utk.edu/financial-aid))

- Professional development & training
  - Office of Graduate Training and Mentoring ([gradschool.utk.edu/training-and-mentorship](https://gradschool.utk.edu/training-and-mentorship))
  - Best Practices in Teaching Program ([tiny.utk.edu/bpit](https://tiny.utk.edu/bpit))
  - UT Libraries Information for Graduate Students ([libguides.utk.edu/graduate](https://libguides.utk.edu/graduate))
  - Center for Career Development ([career.utk.edu](https://career.utk.edu))
  - Tennessee Teaching and Learning Center ([tenntlc.utk.edu](https://tenntlc.utk.edu))
    - UT CIRTL: Center for Integration of Research and Teaching ([tlc.utk.edu/cirtl-program-center-for-integration-of-research-and-teaching/](https://tlc.utk.edu/cirtl-program-center-for-integration-of-research-and-teaching/))
  - Experience Learning ([experiencelearning.utk.edu](https://experiencelearning.utk.edu))
- Student resources
  - Counseling Center ([counselingcenter.utk.edu](https://counselingcenter.utk.edu))
  - Department and college websites
  - Graduate School ([gradschool.utk.edu](https://gradschool.utk.edu))
  - Graduation Deadlines ([tiny.utk.edu/grad-deadlines](https://tiny.utk.edu/grad-deadlines))
  - Graduate School Forms ([gradschool.utk.edu/forms-central](https://gradschool.utk.edu/forms-central))
  - Graduate Catalog ([tiny.utk.edu/grad-catalog](https://tiny.utk.edu/grad-catalog))
  - Student obligations and appeals process ([tiny.utk.edu/rights-obligations](https://tiny.utk.edu/rights-obligations))
  - Graduate Student Senate ([gss.utk.edu](https://gss.utk.edu))
  - Office of Graduate Admissions ([gradschool.utk.edu/admissions](https://gradschool.utk.edu/admissions))
  - Student Conduct and Community Standards ([studentconduct.utk.edu](https://studentconduct.utk.edu))
  - Office of Equity and Diversity ([oed.utk.edu](https://oed.utk.edu))
  - Sexual Misconduct, Relationship Violence, and Stalking ([sexualassault.utk.edu](https://sexualassault.utk.edu))
  - Office of Multicultural Student Life ([multicultural.utk.edu](https://multicultural.utk.edu))
  - Office of Research Integrity ([research.utk.edu/compliance](https://research.utk.edu/compliance))
  - Thesis/Dissertation Consultant ([gradschool.utk.edu/thesesdissertations](https://gradschool.utk.edu/thesesdissertations))
  - Office of Information Technology ([oit.utk.edu](https://oit.utk.edu))

# 9 APPENDICES

## PURPOSE

To establish a policy and pay scale for Graduate Teaching Assistants and Graduate Research Assistants within the department.

## POLICY

1. Applies to Graduate Teaching Assistants (GTA) and Graduate Research Assistants (GRA) that are paid by a Nuclear Engineering Department account.
2. A 25% Full Time Equivalent (FTE) position requires that you work an average of 10 hours per week. A 50% FTE position requires that you work an average of 20 hours per week. Appointments exceeding 50% must have prior approval of the Dean of the Graduate School, excluding summer term.
3. Maintenance fees and tuition waivers apply to appointments at a 25% FTE basis or higher. This does not include the program and services fee, the technology fee, the facilities fee, or the transportation fee.
4. Students holding a 25% assistantship or receiving any type of external financial aid normally must enroll for at least 9 hours in order to be considered full time. Students holding a 50% assistantship must enroll for at least 6 hours to be considered full time. Students conducting thesis research at the master's or doctoral level must take a minimum of 3 hours of research during the summer semester. Refer to the Policy for the Administration of Graduate Assistantships for Additional information.
5. Graduate students are required to maintain an active status through continuous enrollment from the time of first enrollment until graduation. The minimum enrollment for international students may be different, and international students always need to check with the Center for International Education (CIE) in order to determine what minimum enrollment they need to maintain in order to satisfy all enrollment requirements attached to their specific visa.
6. The maximum number of years that a graduate student can be appointed to a 25% FTE or more assistantship is three years as a master's student, five years as a doctoral student, or eight years in doctoral programs in which students enter with a baccalaureate degree only.
7. A GTA position is a 9 month academic position paid over 12 months. A GRA position is nominally a 12 month academic position paid over 12 months. GTA/GRA dual appointment positions typically are offered the opportunity to be paid at 50% FTE for their GRA position during May-July.

8. The chain of command for a student is their immediate supervisor (Major Professor), then the Department Head, followed by the Dean of the College of Engineering, and, finally, the Dean of the Graduate School.
9. The pay scale policy will be reviewed by the faculty and Department Head a minimum of every three years.
10. The pay scale can be changed with a majority vote by tenure and tenure-track faculty.

PAY SCALE (Updated 2019):

<b>PhD Students Starting FY20</b>	<b>Monthly</b>	<b>May-July Monthly (GTA/GRA Dual Appt Only)</b>	<b>Annual</b>
GTA 25%	\$775.00	N/A	\$9,300.00
GRA 25%	\$1,250.00	N/A	\$15,000.00
GTA 25% & GRA 25% (50% GRA May-July)	\$2,241.67	\$3,275.00	\$30,000.00
GRA 50%	\$2,500.00	N/A	\$30,000.00

<b>MS Students Starting FY20</b>	<b>Monthly</b>	<b>May-July Monthly (GTA/GRA Dual Appt Only)</b>	<b>Annual</b>
GTA 25%	\$775.00	N/A	\$9,300.00
GRA 25%	\$1,150.00	N/A	\$13,800.00
GTA 25% & GRA 25% (50% GRA May-July)	\$2,041.67	\$3,075.00	\$27,600.00
GRA 50%	\$2,300.00	N/A	\$27,600.00

Principal Investigators supporting students are to pay difference between GTA base pay of and GTA dual appointment base pay (dependent upon applicable tier).

Information about student health insurance plans may be found at the following link:  
<https://studenthealth.utk.edu/health-insurance-records-requests/graduate-assistants-associates-including-gagragta/>