College of Engineering & Computer Science
Ph.D. in Engineering Program:
Policies & Procedures

Approved by Dissertation Qualified Faculty:

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WRIGHT STATE UNIVERSITY

Table of Contents

1. Introduction 3
   1.1. Purpose 3
   1.2. Mission 3
   1.3. Administration 3
   1.4. Research Focus Areas 3
   1.5. Faculty Membership 4
      1.5.1. Program Faculty 5
      1.5.2. Dissertation-Qualified Faculty (DQF) 5
      1.5.3. Application Process 5
      1.5.4. Faculty Membership Lists 6
2. Admission 6
   2.1. Admission Requirements 6
   2.2. Admission Application Evaluation Process 7
3. Program Requirements 7
   3.1. First-Semester Registration 7
   3.2. Dissertation Advisor 7
   3.3. Dissertation Committee 8
      3.3.1. Dissertation Advisor 8
      3.3.2. Committee Members 8
   3.4. Program of Study 9
   3.5. Grade Standards 9
   3.6. Credit for Previous Graduate Work 9
4. Degree Requirements 10
   4.1. Overview 10
   4.2. Candidacy Examination 11
      4.2.1. Purpose 11
      4.2.2. Eligibility 11
      4.2.3. Required Action 11
      4.2.4. Examination Format 11
      4.2.5. Examination Outcome 12
      4.2.6. Repeat of Candidacy Examination 12

4.2.7. Specific Focus Area Guidelines 12
4.3. Research Proposal Defense 16
4.3.1. Purpose 16
4.3.2. Eligibility 16
4.3.3. Required Actions 17
4.3.4. Examination Format 17
4.4. Journal Publication Submission 17
4.5. Dissertation Defense 18
4.5.1. Purpose 18
4.5.2. Eligibility 18
4.5.3. Required Actions 18
4.5.4. Examination Format 18
4.6. Dissertation Submission and Binding 19
4.7. Dissertation Defense Assessment and Exit Interviews 19

1. Introduction

1.1. Purpose

This document, *Policies & Procedures*, describes the policies and procedures of the Ph.D. in Engineering Program. It is designed to serve as a reference manual for students, faculty (Program and Dissertation Qualified), and staff, providing a useful overview of the operation and requirements of the Program.

The Ph.D. in Engineering Program will update this manual whenever policy changes are made. The Program office will automatically update non-policy-related content and inform the program and dissertation-qualified faculty of the updated material.

1.2. Mission

The Ph.D. in Engineering Program is committed to providing a high-quality, advanced doctoral level engineering education to students through tailored course work and independent and collaborative research. The educational experience each student receives serves as a strong foundation for exciting and rewarding research and development careers in industry, government, and academia.

1.3. Administration

Administered by the College of Engineering and Computer Science, the Ph.D. in Engineering Program is led by a Program Committee, who elects a chair to serve as Program Director on an annual basis. The purpose, composition, activities, and authority of the Program Committee and Program Director are described in *Structures & Responsibilities*, a separate document.

1.4. Research Focus Areas

The Ph.D. in Engineering Program includes the following focus areas:

- Mechanical and Aerospace Engineering
- Materials Science and Engineering
- Biomedical Engineering
- Industrial and Human Factors Engineering

Descriptions of each focus area are provided in the following subsections.

Mechanical and Aerospace Engineering: The study of mechanical and aerospace engineering (MAE) covers a wide range of topics: thermal fluids sciences. solid mechanics, design and optimization, computational modeling, control sensors and control and renewable energy.

Materials Science and Engineering: Engineering applications call for materials with specific sets of properties, which are determined by material structure, composition, and processing history. At the doctorate level, relevant length scales can range from nanometers for advanced materials, to microscopic for critical microstructural concerns, up to the macroscopic for traditional engineering. Faculty in the Materials focus area perform research in the areas of design and development of metallic, ceramic, and polymeric materials and their composites, nanoscale characterization and processing, energy-related materials and devices, theoretical modeling and simulation, the study of chemical and mechanical effects at interfaces, enhanced natural and bio-geo inspired solids, and bio-medical materials.

Biomedical Engineering: This focus area prepares students for the increasing demand for cutting-edge medical equipment, devices, and therapeutic approaches, by applying the principles of engineering and applied science to problems in biology and medicine, to understand the dynamics of living systems, and to develop biomedical systems, devices, and alternative therapies for chronic conditions such as organ failure, severe tissue damage. The focus area in biomedical engineering emphasizes biomedical imaging, biomechanics, tissue engineering, nanomedicine, human-computer interaction, neuroscience, and neuroengineering. This joining of the diverse scientific fields is complemented by strong academic and research collaboration with other Wright State departments and collaborating institutions.

Industrial and Human Factors Engineering: This focus area is interdisciplinary in nature and contributes to societal needs by applying principles, methods, and tools from wide area of applications such as industrial & systems engineering, human factors engineering, human-computer interaction, neuroengineering, cognitive sciences & psychology, systems physiology, engineering education, healthcare, and computation.

1.5. Faculty Membership

The Ph.D. in Engineering Program has two levels of faculty membership: Program Faculty and Dissertation-Qualified Faculty (DQF). Program Faculty is the base level of membership and is open to tenure-track and emeritus CECS faculty who hold full graduate faculty status with the Graduate School and meet the criteria listed in Section 1.5.1. Dissertation-Qualified Faculty is the higher level of membership and is open to Program Faculty who wish to serve as primary dissertation advisors and who meet additional criteria as described in Section 1.5.2.

Membership in the Ph.D. in Engineering Program at either level is intended for CECS faculty who have an ongoing interest in participating in the program. At the Program Faculty level, members assist with advising, participate in candidacy exams administered by focus areas, and serve on dissertation committees as program representatives. As described in Section 3.3, each dissertation committee must include at least three program faculty members (at either level). At the DQF level, members can

also serve as primary dissertation advisors and serve on Program oversight committees. In addition, the DQF serve as the oversight body for the Program.

Note: While faculty Membership in the Ph.D. in Engineering Program is intended only for CECS faculty who seek to participate in the program on a regular, ongoing basis, other faculty whose sole interest is in serving on the dissertation committees of individual students are invited to apply for Dissertation Committee Membership. Once approved, a faculty member may serve on Ph.D. committees for up to five years in one of the committee positions reserved for outside participants. Details on the composition of Dissertation Committees are found in Section 3.3.

1.5.1. Program Faculty

Membership in the Program Faculty is open to tenure-track and emeritus CECS faculty who: 1) hold graduate faculty status with The Graduate School, and 2) intend to contribute to the supervision of students in the Program (new applicants) or demonstrate a history of supervising students in the Program (renewals).

1.5.2. Dissertation-Qualified Faculty (DQF)

Faculty who serve as DQF advise Program students toward earning the Ph.D. in Engineering degree, but may also serve as the supervising, or primary advisor of a Ph.D. dissertation committee. Hence, the number and scope of requirements for serving as DQF are greater than those required for Program faculty.

Membership in the DQF is open to Program Faculty (see 1.5.1) who have active research programs, as demonstrated by several of the following:

- Supervision of M.S. theses or Ph.D. dissertations as the primary advisor
- Participation in M.S. thesis or Ph.D. dissertation committees to completion
- Publication of archival journal articles
- Service as an editor or associate editor for journals
- Service as a reviewer for journals
- Service as chair or organizer of technical conferences and/or conference sessions
- Recognition through professional honors or awards
- External funding through research grants and contracts

1.5.3. Application Process

To apply for Program Faculty or DQF membership, faculty must complete an Application for Faculty Membership and submit a 2-page CV, focusing on the items listed in Section 1.5.2. Applications are evaluated by the Program Committee. The

Program Committee will reevaluate faculty members at the Program Faculty level every three years, and those at the DQF level every five years. At renewal, members will be asked to complete a Faculty Member Renewal form and submit a CV.

1.5.4. Faculty Membership Lists

The Program Director will maintain a current list of the Program Faculty and the DQF.

2. Admission

2.1. Admission Requirements

To be considered for admission into the Ph.D. in Engineering Program, a student must first satisfy the admission requirements of the Graduate School. The student is also expected to meet the requirements for admission into the Program as described below:

- B.S. degree in Engineering from an ABET-accredited program or equivalent, with a minimum 3.0 grade-point average; or an M.S. degree from an engineering program, with a minimum 3.5 grade-point average.
- Minimum GRE (Graduate Record Examinations) requirements: Verbal ≥ 145 and Quantitative ≥ 156 and Analytical Writing ≥ 3.0; or Combined Verbal + Quantitative ≥ 301 and Analytical Writing ≥ 3.0
- Statement of Objectives including the research focus area of interest, the research that was performed during undergraduate or graduate studies, and the name of the potential WSU DQF with whom the student will conduct his dissertation (but only if this has been mutually agreed upon)
- Three letters of recommendation
- For International students only: proof of English proficiency minimum requirements: TOEFL (Test of English as a Foreign Language) ≥ 79; or IELTS (International English Language Testing System) ≥ 6.0; or Pearson PTE (Pearson Test of English) ≥ 57; or satisfactory completion of LEAP (Learning English for Academic and Professional Purposes) level 4 TOEFL waiver track
- Letter of support from the potential dissertation advisor: Applicants are required to provide a letter of support signed by the WSU DQF with whom the student would like to do research. The letter should include a statement of support describing the commitment of the faculty member to advise the student, and all funding sources that will be used to support the student throughout his doctoral training.

Notes:

- *GRE requirements are waived for applicants who received their engineering degree from WSU unless the test scores have expired*

- *Applicants who do not meet GPA and GRE criteria but are strongly supported by an advisor will be reviewed by the Program Committee.*

2.2. Admission Application Evaluation Process

The applications for admission are submitted to either the Graduate School (U.S. Citizens) or the University Center for International Education (International Students).

All applications for doctoral study in engineering are received by the Ph.D. in Engineering Program office and reviewed for meeting the expected requirements as established by the Program.

- If all requirements are met: the application is forwarded to the respective research focus area chair for evaluation, and an initial recommendation on acceptance is provided to the Program office. The application is then forwarded to the Program Director for final review.
- If test scores are below requirements: the application is first forwarded to the Program Committee for review. If the Program Committee recommends admission, the application is forwarded to the respective research focus area chair for evaluation, and an initial recommendation on acceptance is provided to the Program office. The application is then forwarded to the Program Director for final review.

2.3. Financial Support Opportunities

There is a variety of financial support opportunities available to students in the Program in the form of research and teaching assistantships, internal and external fellowships, and scholarships. Any university or college funds made available for graduate student support will be utilized in a means determined by the Program Director and Program Committee.

3. Program Requirements

3.1. First-Semester Registration

Students new to the Program are required to meet with their assigned advisor prior to beginning their first semester to plan their course registration. First-semester registration should consist of necessary prerequisite courses along with courses leading to advanced study in the chosen focus area.

3.2. Dissertation Advisor

Students are required to identify a dissertation advisor, with mutual consent, in order to be admitted to the program. To facilitate the selection of an advisor, the student should discuss his/her educational objectives with several focus area DQF members at least one semester prior to submitting his/her application.

The dissertation advisor will serve as chair of the student's Dissertation Committee and will direct the research study.

3.3. Dissertation Committee

The Dissertation Committee is responsible for administering the Candidacy Examination (in some Focus Areas), Research Proposal Defense, and Dissertation Defense.

3.3.1. Dissertation Advisor

- The dissertation advisor must be a dissertation-qualified faculty member of the Ph.D. in Engineering Program. The dissertation advisor is responsible for the overall direction of the research, the regular advising of the student, and the continuing progress of the student in completing his or her Program of Study in a timely manner.
- It is permissible to have two committee members co-advise a dissertation if at least one member has dissertation-qualified faculty status.

3.3.2. Committee Members

A minimum of three members in addition to the dissertation advisor as follows:

- At least one faculty members shall have Ph.D. in Engineering dissertation-qualified status. At the time of Dissertation Committee approval, a WSU faculty member must possess full graduate faculty status or expect to obtain full graduate status by the student's Dissertation Defense.
- All members must have either full graduate status or adjunct full graduate status. For additional information on graduate status, refer to the Graduate School's Graduate Policies and Procedures Manual.
- One of the committee members can serve as a co-advisor.
- Exceptions to the committee composition as specified above can be made on a case- by-case basis through a petition by the dissertation advisor to the Program Committee.

Once the members have been selected, the student must submit a *Dissertation Committee Form* for approval by the Engineering Ph.D. Program Director, the Dean of the College of Engineering and Computer Science, and the Dean of the Graduate School. In the event a member can no longer serve on the Dissertation Committee due to unforeseen circumstances, a suitable replacement must be found, and the student must submit a new Dissertation Committee Form for approval. The final committee shall follow the above-stated committee structure.

3.4. Program of Study

Every graduate student is required to file a Program of Study with the Graduate School. Students in the Program must complete the *Program of Study Form* under the supervision of their dissertation advisor and in coordination with their Dissertation Committee. After being signed by the student, dissertation advisor, and focus area chair, the form must be submitted to the Ph.D. in Engineering Program Office for the Director's signature and submission to the Graduate School.

The purpose of the Program of Study is to design an appropriate program to meet the specific needs of a given student in his or her chosen focus area as determined by the Dissertation Committee.

Ideally, a tentative plan should be formulated no later than the end of the second semester of study. Failure to comply with this requirement may jeopardize further registration in the Ph.D. Program.

Minor changes in the Program of Study can be made easily in case of course offering deletions or schedule conflicts. These changes must also be approved by the Program Director and filed one week prior to the start of the final semester of graduate study. The course work must be selected to form a unified Program of Study. Course work from a previous master's degree is listed in the formal Program of Study in appropriate categories. Total research hours (thesis and dissertation) for both M.S. and Ph.D. are within 30-40 credit hours.

3.5. Grade Standards

Grade standards in the Ph.D. in Engineering Program are identical to those of the Graduate School. Students in the Program must maintain at least a 3.0 grade point average in all graduate courses in which a letter grade is assigned. Students who do not meet these requirements are subject to probation or dismissal.

3.6. Credit for Previous Graduate Work

Refer to the Graduate School's Graduate Policies and Procedures Manual for complete details. Some of the information relevant to the Engineering Ph.D. Program is stated below. Graduate credit may be given in the student's doctoral Program of Study for a relevant master's program or for graduate courses taken at another university as stated below:

For students entering the Program with a relevant master's degree: The hours counted towards the master's degree will not exceed thirty hours. Additionally, the sixty-hour residency requirement must be met.

Upon the recommendation of the student's dissertation advisor and the approval of the Program Director and the Graduate School, graduate courses completed at another

regionally accredited academic institution may be counted towards the student's Ph.D. Program requirements at Wright State University.

For students entering the Program with graduate credit beyond the master's degree: The credit to be transferred has not been applied toward an awarded degree. While credits that were applied toward an awarded master's degree are not eligible for transfer credit, they may be used, with Program approval, to waive certain course requirements. The sixty-hour residency requirement must be met.

The student's dissertation advisor and focus area chair must review the transfer of credit request and recommend the course(s) to be accepted for transfer credit.

The student was admitted and enrolled as a graduate student at the institution where the graduate credit was completed. The other institution must be regionally accredited. Additionally, the student must be or have been in good standing at that institution.

The amount of credit to be transferred does not exceed eight semester hours.

For students entering the Program without the master's degree: The student may have up to 30 semester hours of applicable graduate transfer credit posted on his or her Wright State academic record.

4. Degree Requirements

4.1. Overview

To obtain the Ph.D. in Engineering degree, the student must complete an approved Program of Study that contains at least 90 semester graduate credit hours beyond the bachelor's degree in engineering or an equivalent degree, or 60 semester credit hours beyond a master's degree in engineering. At least 30 of these credit hours must be for graduate course work beyond a master's degree. Utilization of transfer credit from other institutions is governed by Graduate School policy.

To meet the 90 semester graduate credit hours required for the Ph.D.in Engineering degree, a student with a B.S. degree must:

- Complete at least 45 semester hours of graduate courses (6000-level and above), distinct from dissertation research hours.
- Completed graduate courses must include at least 18 semester credit hours of major courses (7000-level and above) from within the College of Engineering and Computer Science.
- Completed graduate courses must include at least 6 semester credit hours of graduate (6000-level and above) courses in mathematics (MTH) or statistics (STT).
- May take no more than 3 semester credit hours of independent study.
- Complete between 30-45 semester credit hours of dissertation research.

- Give a 50-minute research presentation in an announced college seminar, or present a paper at a peer-reviewed conference hosted by a recognized professional society. For a conference paper presentation, the student must be both the primary author and the presenter of the research, and the student's paper must be included in the conference proceedings
- Submit at least one manuscript to a peer-reviewed journal.
- Complete the Candidacy Examination satisfactorily.
- Complete the Research Proposal Defense satisfactorily.
- Complete the Dissertation Defense satisfactorily.
- Complete the final dissertation satisfactorily, as judged by the student's Dissertation Committee and the Graduate School.
- Complete the exit interview with the Program Director.

Note: Students having non-engineering backgrounds are required to successfully complete the equivalent of the relevant math and science sequences required for an undergraduate engineering degree appropriate for their focus area. These courses cannot be used to satisfy degree requirements.

4.2. Candidacy Examination

4.2.1. Purpose

The purpose of the Candidacy Examination is to evaluate the student's capability to synthesize and integrate material as applied to the research focus area. It is expected that the student demonstrates a certain breadth of knowledge and is able to apply this knowledge to a problem.

4.2.2. Eligibility

The student must have

- filed a formal Program of Study and
- completed the courses recommended by the focus area

before registering for the exam. Usually, the student will register for the Candidacy Examination before the end of the second year of study.

4.2.3. Required Action

The candidate must complete and submit a *Request for Candidacy Examination Form* to the Program Director no later than 30 days before the scheduled examination. The dissertation advisor and Program Director must sign this form.

4.2.4. Examination Format

The exam contains a written part followed by an oral part, usually taken within a three-week period of each other. Each focus area has its own specific format on how to

administer the two parts of the Candidacy Examination and who is responsible for these parts. The details for each focus area are outlined in section 4.2.7.

4.2.5. Examination Outcome

The following outcomes are possible:

- pass
- repeat exam or part thereof after strengthening specific areas of weakness
- fail

The deliberations and vote concerning the outcome of the exam take place immediately following the oral exam. The examination outcome requires a 2/3rd majority of all members of the examination committee for pass and fail. Any other vote results in a repeat of the exam or part thereof.

When the Candidacy Examination is completed, a *Record of Candidacy Examination Form* is signed by all members of the examination committee and forwarded to the Program Coordinator.

4.2.6. Repeat of Candidacy Examination

If the outcome of the first Candidacy Examination was "repeat exam or part thereof after strengthening specific areas of weakness," the student may submit another request for a Candidacy Examination. This request is to be submitted no earlier than three months and usually no later than six months after completion of the first attempt. Only one repeat of the Candidacy Examination is permitted.

4.2.7. Specific Focus Area Guidelines

4.2.7.1. Mechanical and Aerospace Engineering

The Candidacy Exam will cover three out of a possible six separate topic areas. The candidacy exam will be administered over the course of approximately one business week, with a separate day devoted to each topic area.

4.2.7.1.1. Examination Committee

Each topic area of the Candidacy Examination will be administered by a three-member examination team composed of Ph.D. Program Faculty members with the appropriate expertise.

4.2.7.1.2. Examination Deadlines

The Candidacy Exam will be offered annually in December, with a potential repeat the following June. A student must take the Candidacy Exam no later than the first December following his or her completion of 30 semester hours (or equivalent) in the Ph.D. Program. However, students continuing from a master's degree in a related field are strongly encouraged to take the candidacy exam during their first December as a Ph.D. student

4.2.7.1.3. Examination Content

The Candidacy Exam will cover a total of three topic areas taken from the list below. Topic area I (Engineering Mathematics) is required for all students, while the remaining two topic areas are selected by the student.

i. Engineering Mathematics (Required) - Suggested prior course work: MTH 6050 Advanced Engineering Mathematics I and II, or equivalent

ii. Solid Mechanics - Suggested prior coursework: ME 6120 Finite Element Analysis and ME 7100 Advanced Mechanics of Solids, or equivalent

iii. Dynamics - Suggested prior coursework: ME 6210 Mechanical Vibrations, ME 7100 Advanced Mechanics of Solids, and ME 7120 Finite Element Method Applications, or equivalent

iv. Design Optimization - Suggested prior coursework: ME 6080 Design Optimization and ME 7080 Multidisciplinary Structural Optimization, or equivalent

v. Fluid Dynamics - Suggested prior coursework: ME 7300 Advanced Fluid Dynamics and ME 7340 Computational Fluid Dynamics, or equivalent

vi. Thermal Sciences - Suggested prior coursework: ME 7330 Convective Heat & Mass Transfer and ME 7500 Advanced Thermodynamics, or equivalent

The three topic areas constitute the entire Candidacy Exam for the student, and must be taken during the same Candidacy Exam period (i.e., a student may not divide the topic areas over sub- sequent offerings of the Candidacy Exam).Each topic area will be tested through a combination of written and oral components, with the exception of topic area 1 (written component only).The outcome of the exam in each topic area (pass, repeat or fail) will be determined by the examination team's simultaneous consideration of the written and oral components. Students required to repeat the exam in one or more topic areas will be required to do so the following July. A grade of Pass in all three topic areas is required for advancement in the Ph.D. Program.

4.2.7.1.4. Written Exam

A written component in each topic area will be prepared and approved by the three-member examination team. The written component will be open book and open notes, with a period of 4 hours for completion.

4.2.7.1.5. Oral Exam

The oral component in each topic area will commence approximately one hour following the written component, which will provide the three-member examination team with an opportunity to review the student's written responses. The duration of the oral component will be approximately one hour.

4.2.7.2. *Materials Science and Engineering*

The Candidacy Examination will be administered as a common written examination over two sessions of 3 hours each, followed by a one hour oral examination.

4.2.7.2.1. Examination Committee

The Candidacy Examination will be administered by a four-member committee composed of Materials Focus Area Ph.D. Program Faculty members.

4.2.7.2.2. Examination Deadlines

The Candidacy Examination will be offered twice a year in early June and early December. A student must take the Candidacy Examination no later than the first offering following completion of 30 semester hours (or equivalent) in the Ph.D. Program. Students entering with a master's degree in MSE or a related field are strongly encouraged to take the exam at the first offering after admission to the PhD Program.

4.2.7.2.3. Examination Content

The candidacy examination covers basic knowledge expected of BS graduates in Materials Science and Engineering as well as graduate level core courses of the Focus Area. The content will include the following areas (WSU course numbers in parenthesis): basic materials science and engineering (ME 2700), materials thermodynamics (ME 5750), diffusion and kinetics (ME 5760), polymers (ME 6720), ceramics (ME 6730), mechanical behavior of metals (ME 6770), in addition to graduate-level knowledge of thermodynamics (ME 7500), polymers (ME 7720) , physical properties (ME 7730), engineering materials (ME 7750), phase transformations (ME 7760), and ceramics (ME 7780).

4.2.7.2.4. Written Exam

The common written examination will be conducted for all Focus area candidates over two sessions of three hours each. The students will be required to answer questions on the topic areas listed above.

4.2.7.2.5. Oral Exam

The oral exam will be conducted on the following day after the examination committee has been able to evaluate the written exam. The duration of the oral examination will be approximately one hour for each candidate.

4.2.7.2.6. Repetition of the examination

A student is allowed to repeat the examination once, at the next offering. If the student is not successful after the second attempt, he or she will be dismissed from the Engineering PhD program (Materials and Nanotechnology Focus area).

4.2.7.3. *Biomedical Engineering*

The Candidacy Examination evaluates the student's capability to synthesize and integrate material as applied to a research area. As such, it is expected that the student will have completed the majority of his or her coursework. The examination consists of both written and oral components.

4.2.7.3.1. Examination Committee

The Candidacy Examining Committee is comprised of members of the student's Dissertation Committee.

4.2.7.3.2. Examination Deadlines

The student submits a request for the Candidacy Examination to the Focus Area Chair and the student's advisor for submittal to the Program Coordinator. This should be done at least six weeks prior to the expected oral examination date. Along with the request, the student will submit a five-page, double-spaced description of a proposed area of research.

Within one week after the request, the student's description of the proposed area of research will be distributed to the examining committee by the student's advisor.

4.2.7.3.3. Examination Content

The content of the examination is drawn from the student's course work with consideration of the planned area of specialization.

4.2.7.3.4. Written Exam

The Committee decides which questions are to be answered in a sitting exam and which are to be answered in a take-home exam, what supporting materials are allowed for a sitting exam, and how much time is allowed to create the answers to the questions. The full set of questions will then be provided to the student's advisor, with a copy to the Focus Area Chair, within two weeks after receiving the research topic description. The student's advisor will select questions to provide to the student. The student receives the questions and prepares written responses to each question provided by the student's advisor. The advisor will collect all written answers. The responses for all questions are distributed to the Candidacy Examination Committee the day following their receipt. Evaluation of these answers represents the written component of the Candidacy Examination.

4.2.7.3.5. Oral Exam

The oral exam takes place approximately one week after the written exam. The duration of the oral exam is determined by the examination committee.

Based on a composite evaluation of the student's written and oral components of the examination, the Candidacy Examination Committee determines the student's capability to continue his or her doctoral studies. At the conclusion of the oral component, the committee will decide on one of three outcomes: pass, repeat exam or part thereof after strengthening specific areas of weakness, or fail.

4.2.7.4. Industrial and Human Factors Engineering

The Candidacy Examination evaluates the student's capability to synthesize and integrate material as applied to a research area. As such, it is expected that the student will have completed the majority of his or her coursework before taking the candidacy exam. The examination consists of both written and oral components.

4.2.7.4.1. Examination Committee

The Candidacy Examining Committee is comprised of members of the student's Dissertation Committee.

4.2.7.4.2. Examination Deadlines

The student submits a request for the Candidacy Examination to the Focus Area Chair and the student's advisor for submittal to the Program Coordinator. This should be done at least four weeks prior to the expected oral examination date. Along with the request, the student will submit a five-page, double-spaced description of a proposed research topic. Within one week after the request, the research topic description prepared by the student will be distributed to the examining committee by the student's advisor.

4.2.7.4.3. Examination Content

Each committee member constructs questions that evaluate the student's capability to integrate course material, synthesize related research, and critically analyze different aspects of the candidate's research topic. These questions will be submitted to the advisor, with a copy to the Focus Area Chair, within two weeks after receiving the research topic description. The full set of questions will then be provided to the student's advisor. The student's advisor will select questions to provide to the student.

4.2.7.4.4. Written Exam

The student receives the questions and prepares written responses to each question provided by the student’s advisor. The student must submit their written answer to the advisor, with a copy to the Focus Area Chair. These responses must be received no later than seven days after the date of exam receipt by the student. Each answer shall not exceed ten double-spaced pages. The responses for all questions are distributed to the Candidacy Examination Committee the day following their receipt. Evaluation of these answers represents the written component of the Candidacy Examination.

4.2.7.4.5. Oral Exam

Not less than fourteen days following receipt of the student's answers, the oral component of the examination will occur.

4.3. Research Proposal Defense

The Research Proposal Defense is an oral examination administered by the candidate's Dissertation Committee.

4.3.1. Purpose

The purpose of the Research Proposal Defense is to test the validity of the dissertation proposal and the candidate's fitness to carry out the research work proposed.

4.3.2. Eligibility

The examination may be taken no earlier than the semester in which the candidate completes the eight credits of course work, as required by the focus area. The candidate must have finished the Candidacy Examination requirement.

4.3.3. Required Actions

The candidate must complete and submit a *Request for Research Proposal Examination Form* to the Program Coordinator no later than 30 days before the scheduled defense. The dissertation advisor and Program Director must sign this form.

The format of the proposal must conform to the regulations outlined by the Graduate School in the Graduate Policies and Procedures Manual. The substance of this proposal forms a major part of the oral portion of the exam. As such, it must be a complete document with a thoughtful, in-depth treatment of the dissertation topic. It should be substantial enough to form the basis of a meaningful oral examination and establish a worthy research problem and the development of an effective research plan. It should only be written after the student has done enough work on the problem to speak meaningfully about it, including discussion of the preliminary investigations.

Above all, it should be a technically sound and scholarly document.

At least two weeks prior to the scheduled defense, the Research Proposal must be submitted to the candidate's Dissertation Committee.

4.3.4. Examination Format

On the day of the defense, the examination begins with a short presentation by the candidate outlining the problem chosen, the procedures and methods to be used, the work already completed, and the additional work proposed to be completed for the Ph.D. degree. The Dissertation Committee then questions the candidate. The committee may also ask questions of a more general nature in order to the test the adequacy of the candidate's preparation for the proposed research. At the conclusion of the examination, the dissertation advisor announces one of four decisions:

- The candidate passed the Research Proposal Defense and may proceed to independent study and research for the doctoral degree.
- The examination is temporarily adjourned. The candidate must revise the Research Proposal and be examined again within the next six months.
- The candidate failed, but may submit a new Research Proposal and submit to another Research Proposal Defense after completing additional course work, independent study, or research.
- The candidate failed and will not be readmitted to another examination.

Members of the Dissertation Committee must sign a *Record of Research Proposal Defense Form*. A copy of the signed form will be given to the student and dissertation advisor.

4.4. Journal Publication Submission

The results of the student's dissertation must be sufficiently significant to warrant submission of at least one article to a peer-reviewed journal. A copy of the manuscript and transmittal letter must be submitted to the Program Director.

4.5. Dissertation Defense

The dissertation must meet all of the requirements of the Graduate School. The research must be a significant, unique contribution to the field of engineering, and should provide an important creative experience for the student.

The Dissertation Defense is the final examination for the Ph.D. degree. It is a public, oral examination that is administered by the candidate's Dissertation Committee.

The dissertation advisor and the focus area's home department are responsible for preparing and distributing the Dissertation Defense announcement. Announcements, including the abstract, must be posted in engineering departments and e-mailed to College faculty and students at least one week prior to the defense. Announcements may be produced in the form of a flyer. The defense should also be announced on Russ Center TV.

4.5.1. Purpose

The purpose of the Dissertation Defense is to examine the candidate's depth of engineering knowledge, mastery of research techniques, and the application of both in conducting the research.

4.5.2. Eligibility

After successfully finishing the Research Proposal, the candidate must devote at least six months to research before being eligible for the final examination; the Dissertation Defense cannot take place until six months after the Research Proposal.

4.5.3. Required Actions

The candidate must complete and submit a *Request for Dissertation Defense Form* to the Program Coordinator no later than 30 days before the scheduled defense. The dissertation advisor and Program Director must sign this form.

At least two weeks prior to the scheduled defense date, the candidate must submit the dissertation to all members of the Dissertation Committee.

4.5.4. Examination Format

On the day of the defense, the examination begins with a public presentation by the candidate, followed by a question period by the Dissertation Committee. At the conclusion of the examination, the dissertation advisor announces one of four decisions:

- The candidate passed the final examination and the dissertation is accepted as submitted. All members of the committee sign the Dissertation Certificate of Approval.
- The candidate passed the final examination, but the dissertation will not be accepted and signed by the committee unless various specified corrections and revisions have been made.

- The examination is temporarily adjourned. The candidate must revise the dissertation, complete any additional independent study or research required by the Dissertation Committee, and be examined again. The second examination must take place within six months of the first.
- The candidate failed and will not be readmitted to another examination.
- At the conclusion of the defense, members of the Dissertation Committee must sign a *Record of Dissertation Defense Form*.

4.6. Dissertation Submission and Binding

Students are responsible for the formatting and submission of their final dissertations to the Graduate School. Refer to the Graduate School's Graduate Thesis/Dissertation Handbook for complete information.

The focus area's home department is responsible for ordering the advisor's copy of the dissertation.

4.7. Dissertation Defense Assessment and Exit Interviews

The University requires a yearly assessment of the Ph.D. in Engineering Program, focusing primarily on coursework, dissertation research, and student learning. After a Dissertation Defense, the committee members are requested to complete a *Doctoral Dissertation Assessment Form* to assess the quality of the research that was performed by the student.

In addition, prior to when the student is ready to submit his or her dissertation to the Graduate School, the Program Director will conduct an exit interview with the student to gain information about the student's learning outcomes and complete an *Exit Interview Form*.