

Wright State University
Ph.D. in Engineering Program
Policies & Procedures

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1. Introduction

1.1 Purpose

This document, *Ph.D. in Engineering 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, and staff alike, providing a useful overview of the operation and requirements of the Program.

This document is organized into four sections. In addition to the manual's purpose, Section 1 provides a detailed introduction of the Program, including its mission statement, administrative structure, research focus areas, faculty, Dayton Area Graduate Studies Institute (DAGSI) partnership, and financial support opportunities. Section 2 deals with admission into the Program. Section 3 presents requirements specific to the Program which are, in some cases, beyond those of the School of Graduate Studies. Perhaps of the greatest interest to most is Section 4, which provides clear details about the requirements for obtaining the Ph.D. in Engineering degree. At the end of this manual are two appendices: Appendix A contains sample timelines for obtaining the Ph.D. degree and Appendix B presents all of the forms currently used in 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 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 that uniquely transcends the boundaries of traditional engineering disciplines and provides outstanding opportunities for collaborative research. As a result, the educational experience that students receive 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 Director and assisted by a Program Coordinator. Providing advisory support to the Director are various elected committees. The standing committees of the Program

are: the Program Affairs Committee, the Student Affairs Committee, and the Publicity and Marketing Committee. The purpose, composition, activities, and authority of the standing committees are described in *Structures & Responsibilities*, a separate document.

Program Affairs Committee:

The Program Affairs Committee is comprised of seven members, one representative from each of the Program's six focus areas and the Program Director, who is an ex-officio non-voting member. For a current list of Program Affairs Committee members, please consult the Ph.D. in Engineering website at: www.engineering.wright.edu/phd/.

Ph.D. Student Affairs Committee:

The Student Affairs Committee consists of one DQF member from each focus area. For a current list of Ph.D. Student Affairs Committee members, please consult the Ph.D. in Engineering website at: www.engineering.wright.edu/phd/.

Ph.D. Publicity and Marketing Committee:

The Publicity and Marketing Committee consists of three DQF members who shall serve staggered two-year terms. For a current list of Ph.D. Publicity and Marketing Committee members, please consult the Ph.D. in Engineering website at: www.engineering.wright.edu/phd/.

1.4 Research Focus Areas

The Ph.D. in Engineering Program supports research efforts in six focus areas:

- 1. Computational Design and Optimization**
- 2. Controls and Robotics**
- 3. Electronics, Microwave, VLSI, and Nanotechnology**
- 4. Industrial and Humans Systems**
- 5. Materials and Nanotechnology**
- 6. Medical and Biological systems**
- 7. Sensor Signal and Image Processing**

Descriptions of each focus area are provided in the following subsections. For more information, please consult the Ph.D. in Engineering website at: www.engineering.wright.edu/phd/. Information on the website includes

- Contact Information for each focus area
- The name of the current Focus Area Chair
- A list of dissertation-qualified faculty by focus area
- Updates on current research projects

1.4.1 Computational Design and Optimization

Using cutting-edge research in the application of computational methods for solving real-world problems, the Computational Design and Optimization focus area concentrates on the continuous design improvement of aircraft and automotive components for strength, performance, and reliability. It also investigates and applies multidisciplinary design methodologies to solve problems and utilizes automated computer modeling and “what-if” design scenarios for cost analysis of complex new systems with ambitious performance requirements. Recent developments in this focus area include improved computer interfaces and manufacturing methods, as well as automated tool design.

1.4.2 Controls and Robotics

Current research efforts in the controls and robotics focus area include discrete observer-controller design, efficient implementation of digital controllers using microprocessors for robotics and manufacturing, adaptive digital controllers for uncertain systems, and intelligent controllers with learning capability. Research is also being done to develop reliable and efficient computational schemes that interface with computer-aided control systems design packages. In the area of robust control, efforts are underway to facilitate control system design, which accounts for uncertainties between the real system and the system mathematical models. Fuzzy control is being

applied to a number of applications in robotics, manufacturing, and medicine, and other research is being conducted on advanced prosthesis design using actively controlled, electromechanical control of single and multi-jointed prosthetics.

1.4.3 Electronics, Microwave, VLSI, and Nanotechnology

Research in power electronics includes high-frequency power conversion, dc-dc and resonant converters, electronic ballasts, radio transmitters, and semiconductor power devices. Research in the microwave area includes computational electromagnetics, MMICs, electronic packages, planar antennas for wireless, RF/mixed signal, and evanescent microwave microscopy. Research in VLSI is based on research demand targeted to a variety of nanotechnologies (CMOS, BiCMOS, SiGe, GaAs), digital and mixed-signal IC and SoC, VLSI testing, fault tolerance, FPGAs based systems, and analog IC for signal processing (high performance A/D and D/A converters, PLLs, RF circuits). Research in nanotechnology includes ferromagnetic materials for RF tunable devices, Si/SiGe for high speed transistor, and Porous silicon fuel cells for portable electronics.

1.4.4 Industrial and Human Systems

The Industrial and Human Systems research focus area contributes to societal needs by modeling large-scale industrial systems, developing methodologies for improving industrial systems, and investigating the fundamental nature of human interactions with complex systems. This knowledge is then applied to systems design, evaluation and implementation. Within this context, the focus is on development and validation of system models with theoretical contributions and practical applications. Principles, methods, and tools from systems engineering, neurosciences, cognitive sciences, biomechanics, psychology, systems physiology, computation, statistics, and mathematics are used and developed toward this effort. Research results are applied to human-machine interfaces, decision support systems, virtual environments, ergonomics, transportation, manufacturing, military, and medical systems.

1.4.5 Materials and Nanotechnology

Performance requirements for engineering applications call for materials with specific sets of properties. The properties of a material depend upon its structure, composition, and processing history. Research in the focus area of Materials and Nanotechnology covers length scales from the nanometer range to microscopic and macroscopic ranges for aerospace, automotive, and other traditional applications, as well as emerging areas, such as nanotechnology, alternative energy and biomaterials. Examples include (i) Design and development of metallic, ceramic, and polymeric materials and their composites, (ii) Nanoscale Characterization and Processing, (iii) Energy-related materials and devices, (iv) Theoretical modeling and simulation, (v) Interfacial phenomena including chemistry and mechanics, (vi) Natural and Bio-Geo inspired solids, and (vii) Bio-medical materials.

1.4.6 Medical and Biological Systems

The Medical and Biological Systems focus area applies the engineering sciences (mechanics, thermodynamics, materials science, electrical and computational sciences, control and information theory) to the medical and biological sciences (anatomy, physiology, biophysics, biostatistics).

tics, biomathematics, and neurosciences) in order to contribute jointly to fundamental biomedical engineering knowledge and to innovative engineering design applications. The interactions of these three sciences results in a wide range of biomedical engineering studies with applications in orthopaedic biomechanics, prosthetic and orthotic engineering, clinical/engineering orthopaedics, rehabilitation engineering, biomedical implants, new product design and realization, medical imaging (including diagnostic ultrasound and computed tomography), biological visualization, biomathematical modeling, neuromuscular control systems and biomaterials.

1.4.7 Sensor Signal and Image Processing

Research in the Sensor Signal and Image Processing focus area concentrates on holistic approaches to modeling, processing, extracting, and exploiting signals and inputs produced by a variety of sensors in widely diverse applications. Aggressive research programs span sensor phenomenology, signal models, processing and fusion techniques, and performance analysis as well as image degradation characterization with associated correction techniques. Recent projects have developed technologies in computer-aided non-invasive medical diagnosis and monitoring; commercial applications of speech and image recognition; military and law enforcement techniques for the tracking and identification of targets. Students working in this focus area embrace issues ranging from sensor physics to information utility and emerge with a unique appreciation for and capabilities in sensor system design and development.

1.5 Program Faculty

There are two levels of faculty membership in the Program: Program Faculty and Dissertation-Qualified Faculty.

1.5.1 Program Faculty

Membership as Program Faculty is open to faculty members of Wright State University who

- possess full graduate faculty status in the School of Graduate Studies
- intend to contribute to the supervision of students in the Program (new applicants) and have a track record of supervising students in the Program (renewals).

1.5.2 Dissertation-Qualified Faculty (DQF)

Dissertation-qualified faculty (DQF) members must fulfill the requirements for Program Faculty (1.5.1), be members of one of the WSU engineering programs, and run an active research program 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

Graduate faculty members interested in obtaining Program Faculty or DQF status are required to complete an *Application for Faculty Membership* form (see Appendix B, p. B-1). Applications are evaluated by the Program Affairs Committee, and recommendations are forwarded by the Program Director to the deans of the College of Engineering and Computer Science and the School of Graduate Studies. The Program Affairs Committee will reevaluate faculty members having Program Faculty status every three years and those having DQF status every five years. Such members will be asked to complete a *Faculty Member Review* form (see Appendix B, p. B-2).

A list of the Program Faculty and their research interests is available on the Ph.D. in Engineering website at: www.engineering.wright.edu/phd/.

1.6. Dayton Area Graduate Studies Institute Partnership

Through Wright State University, the Ph.D. in Engineering Program is a partner of the Dayton Area Graduate Studies Institute (DAGSI). DAGSI is a consortium of graduate engineering schools in the Miami Valley region of Ohio. DAGSI integrates and leverages the combined resources of its partnering schools, which include the faculty, facilities, equipment, and other assets of the institutions. In addition to Wright State, the DAGSI partnership includes the University of Dayton, a private institution, and the Air Force Institute of Technology, a federal institution. The DAGSI partnership has been extended to include The Ohio State University (OSU), the University of Cincinnati (UC), and Miami University.

Collaboration opportunities provide students access to the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology (AFIT) and the University of Dayton (UD). Additionally, students enrolled in the Ph.D. in Engineering Program are effectively considered resident students of both AFIT and UD. Students also have the faculty and research resources of OSU and UC available to them, as well as courses on a transfer-credit basis.

1.6.1. DAGSI Course Registration

Through DAGSI, students in the Ph.D. in Engineering Program can register for courses at either the University of Dayton or Air Force Institute of Technology with minimal effort. To register, the student must complete a *DAGSI Cross Registration Form* (see Appendix B, p. B-3) and submit it to the Wright State University Registrar's office. After completing the course, the student will receive credit, which will appear on the student's advising report and transcript. Please refer to section 1.7.2 for additional details.

1.7 Financial Support Opportunities

There are a variety of financial support opportunities available to students in the Program in the form of research and teaching assistantships, DAGSI scholarships and fellowships, and Program assistantships.

1.7.1 Teaching and Research Assistantships

Research assistantships are available from sponsored research projects, and students are encouraged to inquire of faculty members in their research focus area about potential assistantship opportunities.

Offered through the engineering departments, teaching assistantships are available on a competitive basis for students who have established strong academic credentials and can demonstrate good communication and teaching skills. For more information, students should contact the department chair(s) within their research focus area.

1.7.2 DAGSI Scholarships and Fellowships

DAGSI offers a variety of scholarships that are available to students in the Program. The types of scholarships offered include full tuition plus stipend, industrial full tuition, and general full tuition, and provide support for up to three years. Students are required to apply online at www.dagsi.org; no paper applications will be accepted. DAGSI generally begins accepting applications for scholarships during the fall quarter until the deadline date of March 15. Students must have admission status in the Program before the scholarship application deadline.

DAGSI also offers a Ph.D. Fellowship Program to B.S. and M.S. students who are U.S. citizens. Students are required to apply online (www.dagsi.org) by the fellowship program's deadline date of, typically, December 15.

Students in the Program who do not have a DAGSI assistantship or fellowship and want to register for a course at a DAGSI-partner institution can apply for a *DAGSI Program Enhancement Scholarship* to receive tuition support on a per quarter basis. Students can register for up to two courses in one quarter. To be considered for this scholarship, a student must first complete the *DAGSI Program Enhancement Scholarship Form* (see Appendix B, p. B-5) before submitting it to the Dean's office in 405 Russ Center. Only a limited number of scholarships will be awarded, per the availability of DAGSI funding.

Existing Ph.D. students who are planning to take classes at UD or AFIT as part of their Program of Study should apply for Enhancement Scholarships as early as possible because of limited resources and because other graduate students of the College of Engineering & Computer Science are competing for these scholarships.

1.7.3 Ph.D. in Engineering Program Assistantships

The University and the College of Engineering and Computer Science provide resources to the Program to increase the graduation rate of Ph.D. candidates. Each spring quarter, the Program calls for applications, which have a deadline. Assistantships provide the student with full tuition and a stipend of \$15,000 per year to begin the subsequent Summer or Fall quarter. To be considered for this assistantship, students must complete the *Ph.D. in Engineering Program Assistantship Application* (see Appendix B, p. B-7) and meet all requirements as listed on the application form.

The requirements for these assistantships are as follows:

- Full-time Ph.D. student status
- Finished Program Qualification
- Finished candidacy exam
- Finished research proposal
- Currently funded by some other means
- Assistantship can be given only for one year
- Realistic expectation of graduation within one year

The Ph.D. Program Affairs Committee considers exceptions to these requirements on a yearly basis. The assistantship selections are announced before the end of spring quarter.

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 School of Graduate Studies. The student is expected to meet the requirements for admission into the Program as described below:

- B.S. degree 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
- GRE scores (analytical + quantitative = 1300). The average GRE scores among the students enrolled in the Program are 738 (quantitative) and 640 (analytical). Expected score on analytical writing portion of GRE is 4.5
- Statement of Objectives
- Three letters of recommendation
- International students must have a minimum TOEFL (Test of English as a Foreign Language) score of at least 550 (old system) or 213 (new system) or an IELTS (International English Language Testing System) score of 6

Note: Students who possess an undergraduate degree outside of engineering will be considered on a case-by-case basis. These students 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. Information on course requirements for engineering degrees can be found at http://www.cs.wright.edu/degrees_ug.html.

Students can help to expedite the admission process by including the following information in their Statement of Objectives: the research focus area of interest; the research that was performed during undergraduate or graduate study; and the name of the WSU faculty with whom the student would like to do research, but only if this has been mutually agreed upon.

2.2 Admission Application Evaluation Process

The applications for admission are submitted to either the School of Graduate Studies (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 requirements are met, the application is then forwarded to the respective research focus area

chair for evaluation and an initial recommendation on acceptance and the name of a permanent or tentative program advisor is provided to the Program office. The statement of interest of all applicants is forwarded to all dissertation-qualified faculty for solicitation of potential advisors, with a requested turnaround time of two weeks. The application is then forwarded to the Ph.D. in Engineering Student Affairs Committee for approval and then to the Program Director for final review and signature.

3. Program Requirements

3.1 First-Quarter Registration

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

3.2 Recommended Timelines

Students and advisors are strongly encouraged to follow the recommended timeline for meeting Program milestones (see Appendix A). In addition, certain Program milestones carry deadlines for completion. Milestone deadlines and associated consequences are discussed in Section 3.2.1, Milestone Deadlines.

The Program Coordinator will monitor student progress. Focus area chairs and faculty advisors will be notified when students fall behind the timeline. The timelines are specified for students entering the program with an M.S. degree. Students entering with a B.S. degree will have an additional 45 credit hours to meet the specified milestones.

3.2.1 Milestone Deadlines

Milestone 1. By the time a student has completed* 48 credit hours after the M.S. degree, the student is required to complete either the Program Qualification or the Candidacy Exam.

Milestone 2. By the time a student has completed* 96 credit hours after the M.S. degree, the student is required to take the Candidacy Exam and complete the Program Qualification.

Milestone 3. By the time a student has completed* 144 credit hours after the M.S. degree, the student is required to present the Research Proposal.

Milestone 4. Within completion* of 192 credit hours after the M.S. degree, the student is required to have completed the Dissertation Defense.

*course work plus research hours, including courses with “m” grades

Consequences

If a student fails to meet a milestone,

- A. financial support, including tuition, from any University source will be stopped;
- B. in the following summer, the student will not be permitted to register for dissertation or independent study hours;

until the student is in compliance with the objective of the milestone.

It is acknowledged that certain research involving human subjects and associated approvals by the Institution Review Board (IRB) requires more time. Students involved in such research will receive an extension of two years to complete their projects (Milestone 4). The dissertation advisor will submit a memo detailing the reason for the extension to the Program Office along with the completed Record of Research Proposal Defense.

For other exceptions, the student may petition to the Student Affairs Committee.

3.3 Dissertation Advisor

Students are strongly encouraged to choose a dissertation advisor, with mutual consent, by the last day of classes during the first quarter of enrollment. To facilitate the selection of an advisor, the student should discuss his or her educational objectives with several focus area, dissertation-qualified faculty members within the first six weeks of his or her first quarter.

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

3.4 Dissertation Committee

The Dissertation Committee is responsible for administering the Candidacy Examination (in some Focus Areas), Research Proposal Defense, and Dissertation Defense. The committee also plays an advisory role to the student during research study.

By the end of the first year of study (24 credit hours of regular graduate course work), the student, in consultation with the dissertation advisor, should select a Dissertation Committee of at least five graduate faculty members, including the dissertation advisor, who will serve as the committee chair.

Since the WSU Engineering Ph.D. Program is a member of DAGSI, it is strongly encouraged that a faculty member from a DAGSI partner serve on the committee.

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.

Committee Members:

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

- Two faculty members from WSU with full graduate status, at least one of whom shall be a Ph.D. in Engineering dissertation-qualified faculty member. 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.
- There must be at least one external member from the graduate engineering faculty of either one of the four collaborating DAGSI-partner institutions (Air Force Institute of Technology, The Ohio State University, University of Cincinnati, and University of Dayton) or from a Carnegie-classification doctoral research university, having full graduate status at their home institution. Adjunct faculty members cannot fulfill this role.
- A final member of the committee can be from WSU, another research university, a government laboratory, industry, or a non-academic research institution. This member must have either full graduate status or adjunct full graduate status. For additional information on graduate status, refer to *Graduate Council and School of Graduate Studies' Policies and Procedures Manual*.
- In all cases, the majority of the members of the Dissertation Committee shall be WSU Engineering Ph.D. Program Faculty.
- 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 Affairs Committee.

Once the members have been selected, the student must submit a *Dissertation Committee Form* (see Appendix B, p. B-8) for approval by the Engineering Ph.D. Program Director, the Dean of the College of Engineering and Computer Science, and the Dean of the School of Graduate Studies. 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.

3.5 Program of Study

Every graduate student is required to file a Program of Study with the School of Graduate Studies. Students in the Program must complete the *Program of Study Form* (see Appendix B, p. B-9) 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 (211 Russ Center) for the Director's signature and submission to the School of Graduate Studies.

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 quarter 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 quarter 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 45-60 credit hours.

3.6 Grade Standards

Grade standards in the Ph.D. in Engineering Program are identical to those of the School of Graduate Studies. 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.

3.7 Credit for Previous Graduate Work

The students need to refer to the *School of Graduate Studies 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 forty-five hours. Additionally, the ninety-hour residency requirement must be met.

Upon the recommendation of the student's dissertation advisor and the approval of the Program Director and the School of Graduate Studies, 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 ninety-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 twelve quarter hours.

For students entering the Program without the master's degree:

The student may have up to 45 quarter 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 135 quarter graduate credit hours beyond the bachelor's degree in engineering or an equivalent degree, or 90 quarter 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.

To meet the 135 quarter graduate credit hours required for the Ph.D. in Engineering degree, a student with a B.S. degree must:

- Complete at least three interdisciplinary core courses and earn a minimum grade of "B" in each course.
- Complete 24 quarter credit hours of major courses (700-level and above) in electrical engineering, biomedical engineering, human factors engineering, mechanical engineering, materials science and engineering, or in a focus area.
- Complete at least 12 quarter credit hours of research focus area courses, i.e., graduate courses (600-level and above). This may include core courses and courses used to satisfy graduate course requirements.
- Complete at least 12 quarter credit hours of breadth courses, i.e., graduate courses (600-level and above) outside the research focus area.
- Complete 8 quarter credit hours of graduate (600-level and above) courses in mathematics (MTH) or statistics (STT).
- Complete 6 quarter credit hours of EGR 891, Ph.D. Seminar.
- Complete at least 10% of course work at a DAGSI-partner institution.
- May take no more than 5 quarter credit hours of independent study (Course number 890).
- Complete between 45-60 quarter credit hours of dissertation research.
- Complete the requirements of the Program Qualification.
- Present a 50-minute dissertation seminar during an EGR 891 course meeting.
- 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 School of Graduate Studies.

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.

For students with M.S. degrees, the graduation requirements are identical to those listed above for students with B.S. degrees, as well as the following:

- The student may request that up to 45 graduate credit hours be counted for the M.S. degree.
- The student is required to take at least 4 quarter credit hours of graduate MTH or STT courses.
- A core course requirement may be waived if the course was taken at WSU and a minimum grade of “B” was obtained.
- The student may transfer a core course only if a similar graduate level course was taken at another university.

4.2 Core Course Requirement

The purpose of the core course requirement is to assure that the student has a strong knowledge of engineering fundamentals. To satisfy this requirement, the student must complete three of five interdisciplinary core courses. The core courses are as follows:

EGR 701–Linear Systems (4 credit hours)

TSignal representation, orthonormal bases, and generalized Fourier series. Description of linear, discrete, and continuous systems. Systems analysis via classical equations, convolution, and transform methods. Prerequisite: EE 521. *Offered fall, winter, and spring quarters.*

EGR 702–Systems Engineering and Analysis (4 credit hours)

Exposes students to the design of systems and tools for the analysis of complex technological systems. Prerequisite: STT 361, MTH 232, MTH 233. *Offered winter quarter.*

EGR 703–Computation Engineering Analysis (4 credit hours)

Course is designed to expose students to practical and efficient computational techniques that are routinely encountered in modeling, simulation, and analysis of engineering problems. Prerequisite: Programming, Linear Algebra, Differential Equations. *Offered fall quarter.*

EGR 704–Design Optimization (4 credit hours)

Concepts of minima and maxima; linear, dynamic, integer, and nonlinear programming; variational methods. Interdisciplinary engineering applications are emphasized. *Offered winter quarter.*

EGR 705 Design and Analysis of Engineering Experiments (4 credit hours)

Introduction to planning and analysis of engineering experiments. Topics include basic statistics review, linear models, regression, analysis of variance, experiment designs, response surface methods, and engineering applications. *Offered fall and spring quarters.*

Core courses taken beyond the required three may be used to satisfy major or breadth requirements.

4.3 Collaboration Requirement (DAGSI Courses)

A DAGSI course is a course that is taken at a DAGSI-partner institution other than Wright State University (WSU), specifically, the Air Force Institute of Technology (AFIT) or the University of Dayton (UD). Students in the Program are required to take at least 10% of their course work outside of Wright State whether or not they have a DAGSI scholarship.

At times, students may find themselves in situations in which they have exhausted all of the 700-level courses for their research focus area or want to take a course similar to a Wright State course that is not offered during the quarter in which they want to take it. These situations are addressed in the following subsections.

4.3.1 Graduate Level Course Equivalents

Students taking courses at AFIT are expected to register at 600- or 700-level for the DAGSI requirement. Similarly, UD graduate-level courses start with 500-level numbering for DAGSI credit. For more information on courses offered, please see the appropriate website:

AFIT course offerings: <https://courses.afit.edu/>
UD course offerings: <http://www.udayton.edu/~registr/>

4.3.2 Similar Courses

Students are permitted to take courses at DAGSI-partner schools that are similar to WSU courses, but only if the WSU course is not available during the quarter the student wishes to take it. Otherwise, students will not receive credit for the course.

Students are not permitted to take a course at a DAGSI-partner institution that is very similar to a course they have already taken at WSU. For example, UD's MTH 547 is similar to EGR 705 and will not be accepted for credit if the student has already taken EGR 705.

4.4 EGR 891, Ph.D. Seminar

Students are required to complete six credit hours of the Ph.D. seminar course, EGR 891. EGR 891 is taught Fall, Winter, and Spring quarters with teaching responsibilities assigned to the engineering departments as follows:

Fall Quarter: Department of Mechanical and Materials Engineering

Winter Quarter: Department of Biomedical, Industrial, and Human Factors Engineering

Spring Quarter: Department of Electrical Engineering

In this course, students will hear from faculty, researchers, and Ph.D. candidates on topics related to current engineering research.

4.4.1 Seminar Credit for Conference Presentations

Students may satisfy up to two credit hours of the seminar requirement by presenting their Ph.D. research at national conferences organized by professional societies or international conferences. One qualifying conference presentation would earn one hour of credit. In order to earn substitute seminar credit for a presentation, the following conditions must be met:

- The student must be both the primary author and the presenter of the research
- The student's presentation must include a reviewed, published paper of four pages or more, or the student must write and submit brief reviews of five additional presentations from the same conference along with the written abstracts from those presentations
- The conference must take place over at least two days

To apply for substitute credit, students must submit the appropriate materials to the Program office for review by the Ph.D. Student Affairs Committee.

4.5 Program Qualification

After completion of the core-course requirements, usually no later than one year or 36 quarter hours (whichever comes later) after entering the Program, the student's academic record is checked for satisfactory performance in the Ph.D. Program. The student has to demonstrate satisfactory performance in basic engineering principles as well as in the Ph.D. core courses.

4.5.1 Basic Engineering Principles

There are four possibilities for the student to demonstrate satisfactory performance in basic engineering principles:

- passing of the Fundamentals of Engineering Examination
- graduation from an ABET accredited engineering program within the past seven years
- Master's degree in engineering from an engineering school or department
- passing of the Basic Engineering Exam

The Basic Engineering Exam is of broad scope and tests fundamental skills in engineering. It is based upon the general part of the FE exam, for which practice exams and study materials are widely available. Further, EGR 482 provides a preparation for this exam.

The format of the Basic Engineering Exam is similar to that of the Fundamentals of Engineering Examination. The duration of the exam is 4 hours with 120 multiple-choice questions. Students are not allowed to bring any supporting materials; the *Fundamentals of Engineering Supplied-Reference Handbook* will be handed out at the beginning of the exam.

The Basic Engineering Exam will be given in December and June.

The exam questions will be selected and the exams will be graded by a subcommittee established by the Student Affairs Committee. The Student Affairs Committee will review the results and make the final decision on pass or fail.

4.5.2 Core-Course Evaluation

The following is a list of core courses:

EGR 701-4 Linear Systems

EGR 702-4 Systems Engineering and Analysis

EGR 703-4 Computational Engineering Analysis

EGR 704-4 Design Optimization

EGR 705-4 Design and Analysis of Engineering Experiments

The students in the Program must take at least three core courses and are considered to show satisfactory performance if they receive an A or B in each of these courses. Students receiving less than an A or B in a specific course may elect to repeat the course once.

4.5.3 Required Action

Each student must complete and submit a *Request for Program Qualification form* (see Appendix B, p B-11) to the Program office as soon as all requirements for basic engineering principles and core courses are met. The same form is to be used to request a Basic Engineering Exam.

4.5.4 Outcome

Students whose performance is judged to be unsatisfactory are given a maximum of two quarters to remedy their deficiencies. If they are not successful, they are dismissed from the Program.

4.6 Candidacy Examination

4.6.1 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 at hand.

4.6.2 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.

4.6.3 Required Action

The candidate must complete and submit a *Request for Candidacy Examination Form* (see Appendix B, P. B-13) to the Program Coordinator no later than 30 days before the scheduled examination. The dissertation advisor and Program Director must sign this form.

4.6.4 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 subsection 4.6.7.

4.6.5 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* (see Appendix B, p. B-14) is signed by all members of the examination committee and forwarded to the Program Coordinator.

4.6.6 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.

4.6.7 Specific Focus Area Guidelines

4.6.7.1 Computational Design and Optimization

The Computational Design and Optimization 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.

4.6.7.1.1 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.

4.6.7.1.2 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 45 quarter 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.

4.6.7.1.3 Examination Content

The Candidacy Exam will cover a total of three topic areas taken from the list below. Topic area 1 (Engineering Mathematics) is required for all students, while the remaining two topic areas are selected by the student.

1. Engineering Mathematics (Required) - Suggested prior course work: MTH 599 Advanced Engineering Mathematics I and II, or equivalent
2. Solid Mechanics - Suggested prior coursework: ME 612 and ME 720, or equivalent
3. Dynamics - Suggested prior coursework: ME 660, ME 710 and ME 712, or equivalent
4. Design Optimization - Suggested prior coursework: ME 608 and ME 708, or equivalent
5. Fluid Dynamics - Suggested prior coursework: ME 730 and ME 734, or equivalent
6. Thermal Sciences - Suggested prior coursework: ME 736 and ME 744, 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 subsequent 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 June. A grade of Pass in all three topic areas is required for advancement in the Ph.D. Program.

4.6.7.1.4 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.

4.6.7.1.5 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.

4.6.7.2 Controls and Robotics

The Controls and Robotics 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.

4.6.7.2.1 Examination Committee

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

4.6.7.2.2 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 45 quarter 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.

4.6.7.2.3 Examination Content

The Candidacy Exam will cover a total of three topic areas taken from the list below. Topic area 1 (Linear Systems) is required for all students, while the remaining two topic areas are selected by the student.

1. Linear Systems (Required) - Suggested prior course work: EGR 701 Linear Systems or equivalent, EE 702 Linear Systems II
2. Control Systems - Suggested prior coursework: EE 613, EE 615, EE 617 and ME 608 or equivalent
3. Dynamics - Suggested prior coursework: ME 605, ME 632, ME 642, ME 660, ME 715, ME 716 and ME 754, or equivalent
4. Modern Control - Suggested prior coursework: EE 720, EE 725 and EE 726, or equivalent
5. Intelligent Control - Suggested prior coursework: EE 619 and CEG 765, or equivalent
6. Robotics - Suggested prior coursework: EE/ME 656, EE/ME 756, CEG 724, CEG 759, 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 subsequent offerings of the Candidacy Exam). Each topic area will be tested through a combination of written and oral components. 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 June. A grade of Pass in all three topic areas is required for advancement in the Ph.D. Program.

4.6.7.2.4 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.

4.6.7.2.5 Oral Exam

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

4.6.7.3 Electronics, Microwave, VLSI, and Nanotechnology

The Candidacy Exam will be administrated over the course of one business week. The selected topic area will be tested through a combination of written and oral components.

4.6.7.3.1 Examination Committee

The examination committee will consist of a team of three program faculty.

4.6.7.3.2 Examination Deadlines

A student must take the Candidacy Exam no later than one year after completion of his or her core courses and major course work in the Ph.D. program. The examination team of three program faculty must approve the selected courses for the exam at least two months prior to the date of the Candidacy Exam (see Section 4.6.7.3.3 below).

4.6.7.3.3 Examination Content

The Candidacy Exam consists of both written and oral components and will cover one of three topic areas taken from the list below. A candidate must take and pass exams in one of these three areas to pass the Candidacy Exam.

1. Microwave
2. Power Electronics
3. VLSI

The Candidacy Exam is intended to ensure that the Ph.D. candidate has sufficient understanding and background knowledge in the area of specialization. The advisor and the student will define the scope of the exam by selecting at least 3 courses from the list of major area courses in the student's Program of Study. The examination team of three program faculty must approve the selected courses for the exam at least two months prior to the date of the Candidacy Exam.

4.6.7.3.4 Written Exam

The written component will consist of a minimum of 3 questions and will be prepared and approved by the examination team of three program faculty. The written component will be take-home exam, with a period of one week for completion.

4.6.7.3.5 Oral Exam

The examination team of three faculty members will also administer the oral component. The oral component will commence following the written component, which will provide the examination team with an opportunity to review the student's written responses. The examination committee will determine the outcome of the exam based on simultaneous consideration of both the written and oral components.

4.6.7.4 Industrial and Human Systems

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.

4.6.7.4.1 Examination Committee

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

4.6.7.4.2 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 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 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.

4.6.7.4.4 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 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.

4.6.7.4.5 Written Exam

The student receives the questions and prepares written responses to each question. The Focus Area Chair must receive these responses no later than seven days after the date of receipt by the student. Each answer shall not exceed ten double-spaced pages. The Focus Area Chair will provide the student response to the student advisor. 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.

4.6.7.4.6 Oral Exam

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

The Candidacy Examination Committee bases determination of the student's capability to continue his or her doctoral studies on a composite evaluation of both the written and oral components. At the conclusion of the oral component, the committee will decide on one of the three outcomes. There must not be more than one dissenting vote by those attending the oral component for an outcome to carry. In cases for which no agreement can be obtained, the examining committee can be dissolved and a new Candidacy Examination process initiated.

4.6.7.5 Materials and Nanotechnology

The Materials and Nanotechnology focus area Candidacy Examination will cover topic areas in Materials Science and Engineering, and will be administered as a common written examination over two sessions of 3 hours each, followed by a one hour oral examination.

4.6.7.5.1 Examination Committee

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

4.6.7.5.2 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 45 quarter 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.

4.6.7.5.3 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 570, 571), materials thermodynamics (ME 575), physical metallurgy (ME 576), polymers (ME 672), ceramics (ME 683) and mechanical behavior (ME 677), and advanced topics covered in courses such as thermodynamics (ME 760), phase transformations (ME 762), polymers (ME 772), and ceramics (ME 783).

4.6.7.5.4 Written Exam

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

4.6.7.5.5 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.

4.6.7.5.6 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, (s)he will be dismissed from the Engineering PhD program (Materials and Nanotechnology Focus area).

4.6.7.6 Medical and Biological Systems

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.

4.6.7.6.1 Examination Committee

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

4.6.7.6.2 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.

4.6.7.6.4 Examination Content

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

4.6.7.4.5 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 student receives the questions and prepares written responses to each question. 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.

4.6.7.5.6 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.

4.6.7.7 Sensor Signal and Image Processing

4.6.7.7.1 Examination Committee

The WSU faculty members of the Dissertation Committee are responsible for administering the candidacy exam.

4.6.7.7.2 Eligibility

In addition to the items listed under 4.6.2, the student must have passed the Program Qualification and have the membership of the Dissertation Committee in place.

4.6.7.7.4 Examination Content

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

4.6.7.7.5 Written Exam

The examination will consist of two or more written questions, at least one being open-ended and relating to the candidate's chosen area of specialization. The dissertation advisor will interact with the committee members to achieve the desired content and rigor of the questions. The examination committee decides if it is a take-home or sitting exam, what supporting materials are allowed for a sitting exam, and how much time is allocated to create the answers to the questions.

In addition, a written critique of one seminal paper, not authored by a WSU faculty member, is to be prepared within a three-day period.

4.6.7.7.6 Oral Exam

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

4.7 Research Proposal Defense

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

4.7.1 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.

4.7.2 Eligibility

The examination may be taken no earlier than the quarter in which the candidate completes the twelve credits of course work, as required by the focus area. The candidate must have finished the Program Qualification and candidacy examination requirements.

4.7.3 Required Actions

The candidate must complete and submit a *Request for Research Proposal Examination Form* (see Appendix B, p. B-15) 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 Thesis/Dissertation Handbook*. 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.

4.7.4 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 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* (see Appendix B, p. B-16). A copy of the signed form will be given to the student and dissertation advisor.

4.8 Dissertation Seminar

As part of the Ph.D. requirements, each student must present a one-hour seminar on his/her research results. This seminar is given as part of the EGR 891 class. The seminar must be given in any quarter prior to the Dissertation Defense period. At the beginning of the planned quarter, the student needs to confirm the seminar schedule with the responsible department faculty member. During summer quarter, EGR 891 is not offered, so advance planning is recommended.

The department with teaching responsibility is responsible for preparing the seminar announcement. Announcements, including the abstract, may be produced in the form of a flyer and be posted in engineering departments and e-mailed to College faculty and students at least one week prior to the seminar. The seminar may also be announced on Russ Center TV.

4.9 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 Coordinator.

4.10 Dissertation Defense

The dissertation must meet all of the requirements of the School of Graduate Studies. 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.

4.10.1 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.

4.10.2 Eligibility

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

4.10.3 Required Actions

The candidate must complete and submit a Request for Dissertation Defense Form (see Appendix B, p. B-17) 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.

4.10.4 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* (see Appendix B, p. B-18).

4.11 Dissertation Submission and Binding

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

The focus area's home department is responsible for ordering the advisor's copy of the dissertation as well as a copy for the Ph.D. in Engineering Program.

4.12 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* (see Appendix B, p. B-19) 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 School of Graduate Studies, 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* (see Appendix B, p. B-21).

APPENDIX A

RECOMMENDED TIMELINES

- Recommended Timeline for Full-time Student with M.S. Degree
- Recommended Timeline for Full-time Student with B.S. Degree

Activity	Deadline
Select dissertation advisor	End of first quarter
Submit Program of Study	End of second quarter
Apply for Program Qualification Identify Dissertation Committee	End of first year
Apply for Candidacy Exam	After completion of focus area recommended coursework
Apply for Research Proposal Exam	After completion of coursework
Conduct Dissertation Seminar	At least one quarter prior to Dissertation Defense
Submit journal article	Prior to Dissertation Defense
Apply for graduation	One quarter prior to Dissertation Defense (check with School of Graduate Studies for deadline date)
Distribute copies of dissertation to Dissertation Committee and focus area chair	Two weeks before Dissertation Defense
Dissertation Defense	

Figure A-1. Recommended Timeline for Full-time Student with M.S. Degree

Activity	Deadline
Select dissertation advisor	End of first quarter
Submit Program of Study Identify Dissertation Committee Apply for Program Qualification	End of first year
Apply for Candidacy Exam	After completion of focus area recommended coursework
Apply for Research Proposal Exam	After completion of coursework
Conduct Dissertation Seminar	At least one quarter prior to Dissertation Defense
Submit journal article	Prior to Dissertation Defense
Apply for graduation	One quarter prior to Dissertation Defense (check with School of Graduate Studies for deadline date)
Distribure copies of dissertation to Dissertation Committee and focus area chair	Two weeks before Dissertation Defense
Dissertation Defense	

Figure A-2. Recommended Timeline for Full-time Student with B.S. Degree

APPENDIX B

PROGRAM FORMS

- Application for Faculty Membership Form
- Program Faculty Renewal Form
- DAGSI Cross Registration Form
- DAGSI Program Enhancement Scholarship Form
- Ph.D. in Engineering Assistanship Application Form
- Dissertation Committee Form
- Program of Study Form
- Request for Program Qualification Form
- Record of Program Qualification Form
- Request for Candidacy Examination Form (4 versions)
- Record of Candidacy Examination Form (2 versions)
- Request for Research Proposal Defense Form
- Record of Research Proposal Defense Form
- Request for Dissertation Defense Form
- Record of Dissertation Defense Form
- Doctoral Dissertation Assessment Form
- Assessment of Learning Outcomes—Exit Interview Form



Application for Faculty Membership

Name: _____

Focus Area (Select one area for primary affiliation):

- Computational Design and Optimization
- Controls and Robotics
- Electronics, Microwave, VLSI, and Nanotechnology
- Industrial and Human Systems
- Materials and Nanotechnology
- Medical and Biological Systems
- Sensor Signal and Image Processing

Date appointed to Graduate Faculty: _____

Please indicate level of faculty membership for which you are applying:

- Program Faculty Dissertation-Qualified Faculty

Instructions: Members with full graduate faculty status may complete and sign this cover sheet. Focusing on your activities for the last three years, provide the information requested below on **two pages** (maximum length) and attach to this cover sheet for review by the Ph.D. in Engineering Program Affairs Committee. Submit your application to Alysoun Taylor, Program Coordinator.

- Journal publications (published, accepted)
- M.S. theses or Ph.D. dissertations supervised (student name, title, year)
- External contracts and grants submitted and awarded (sponsoring organization, project title, duration, funding)
- Ph.D. level courses taught (course number, title, quarter)
- Honors and awards received (title, awarding agency, year)
- Professional outreach activities (editor, session chair, reviewer)
- Other information pertinent to the Ph.D. in Engineering Program.

Signature

Date



Program Faculty Renewal Form

Name: _____

Focus Area (Select one area for primary affiliation):

- Computational Design and Optimization
- Controls and Robotics
- Electronics, Microwave, VLSI, and Nanotechnology
- Industrial and Human Systems
- Materials and Nanotechnology
- Medical and Biological Systems
- Sensor Signal and Image Processing

Please indicate level of faculty membership for which you are applying for renewal:

- Program Faculty Dissertation-Qualified Faculty

Instructions: Please complete and sign this cover sheet. Focusing on your activities for the last five years, provide the information requested below on two pages (maximum length) and attach to this cover sheet for review by the Ph.D. in Engineering Program Affairs Committee. Submit your application to Alysoun Taylor, Program Coordinator.

1. Journal publications (published, accepted)
2. M.S. theses or Ph.D. dissertations supervised (student name, title, year)
3. External cotntracts and grants submitted and awarded (sponsoring organization, project title, duration, funding)
4. Ph.D. level courses taught (course number, title, quarter)
5. Honors and awards received (title, awarding agency, year)
6. Professional outreach activities (editor, session chair, reviewer)
7. Other information pertinent to the Ph.D. in Engineering Program.

Signature

Date



THE DAYTON AREA GRADUATE STUDIES INSTITUTE CROSS REGISTRATION FORM

Date: _____

Term, Year Requested: _____

STUDENT INFORMATION

STUDENT SSN: _____ GENDER: _____

NAME: _____
(Last) (First) (Middle Initial)

LOCAL STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

DAYTIME PHONE _____ E-MAIL ADDRESS (Required) _____

DATE OF BIRTH _____

APPROVAL

HOME	AFIT	PARTNER
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	UD	<input type="checkbox"/>
<input type="checkbox"/>	WSU	<input type="checkbox"/>

Home Advisor Approval _____

Home Registrar Approval _____

Partner Registrar Approval _____

This information is for administrative purposes only.

Citizenship: USA Other If other, what country? _____
(Only US Citizens are eligible to attend AFIT)

Type of VISA: _____

Are you a U.S. Government Employee (either military or civilian)?
 Yes No Rank (if military): _____ Grade (if civilian): _____

State of Residence: _____

Major: _____ Masters Ph.D.

Have you ever attended the PARTNER Institution? Yes No

Have you applied for a DAGSI Program Enhancement Scholarship for the course(s) listed below? Yes No (You must be registered before approval is given for a Program Enhancement)

Do you currently have a DAGSI Competitive Scholarship? Yes No

COURSE INFORMATION

Course Nr.	Course Title	Credit Hours	Instructor/Department Approval (if required)	Registrars' Initial/Date	Add	Drop

I certify that the information by me is accurate. I agree to follow all rules, regulations, practices, and policies of the partner institution and DAGSI while enrolled. I authorize the partner institution to send a transcript of the cross registered course grades to my home institution.

Student's Signature: _____ Date: _____

FAX to PARTNER Institution FAX to DAGSI – 937-781-4005

FORM PROCEDURES

1. The DAGSI Cross Registration form is available on-line at www.dagsi.org or can be obtained at the Registrar's Office at your Home Institution.
2. Advisor – Identify appropriate course(s) and any enrollment restrictions or prerequisites. Advisor approval of these courses verifies that they are a part of the student's approved program of study.
3. Home Registrar – Verify student's eligibility to register with Partner Registrar. The student is responsible for obtaining any additional departmental approvals needed to register.
4. Once eligibility has been established, the Partner Registrar will register the student and inform him/her of approval and registration status.
5. **The student is responsible for meeting all registration, drop, add, withdrawal dates of the Partner Institution.**

DAGSI Policy and Procedure

1. When cross registering for a course, all tuition and fees are paid directly to the partner institution.
2. DAGSI scholarships pay **TUITION ONLY**. DAGSI will not pay for any of the following: audit courses, undergraduate courses, remedial courses, courses taken outside the partner schools of engineering and computer science, late fees, dropped course charges, registration or university fees, graduation fees, books, and other miscellaneous items.
3. Program Enhancement scholarships pay for at most two courses per term at a partner institution. (Exception: when a course has an attached lab that is zero credits.)
4. If a student drops a DAGSI course, it is the student's responsibility to notify the Registrar at the HOME Institution **PRIOR** to the drop and refund deadlines of the school teaching the course. Otherwise, any charges associated with dropping a course will be the student's responsibility.
5. **First time cross-registrants to AFIT, MUST** hand carry proof of U.S. citizenship (birth certificate, naturalization) to the AFIT Registrar's Office, building 641, room 105. You will also be required to obtain a base pass. Only U.S. citizens are eligible to attend AFIT. Call (937) 255-6234 x3192 for more information.
6. Visit our web site at www.dagsi.org for further information on DAGSI Policy. It is the student's responsibility to be familiar with DAGSI Policy.
7. This form is subject to the Privacy Act of 1974 (5USC 552A).

CONTACTS

AFIT

Billie Lynn Gemind
bgemind@afit.edu
Phone: 937-255-6234 x3122
FAX: 937-255-2791

UD

Kitty Monnin
Kathryn.Monnin@notes.udayton.edu
Phone: 937-229-3723
FAX: 937-229-4177

WSU

TR Hartrum
tr.hartrum@wright.edu
Phone: 937-775-5581
FAX: 937-775-5597

DAGSI

Kim Elam, Administrative Assistant
kelam@dagsi.org
Phone: 937-781-4001
FAX: 937-781-4005

Add 1, page 2



**THE DAYTON AREA GRADUATE STUDIES INSTITUTE
PROGRAM ENHANCEMENT SCHOLARSHIP**

STUDENT INFORMATION

DATE: _____ STUDENT SSN: _____

HOME INSTITUTION: AFIT UD WSU

PROGRAM OF STUDY: _____ Ph.D.: MS:

NAME: _____
(Last) (First) (Middle Initial)

LOCAL STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

DAYTIME PHONE _____ E-MAIL ADDRESS (Required) _____

REQUESTED COURSE(S) FOR DAGSI ENHANCEMENT SCHOLARSHIP

Course Nr.	Course Title	Credit Hrs.	Institution	Term
Zero-Credit Labs:	Course Title	Credit Hrs.	Institution	Term

APPROVAL

I have reviewed the following course(s) and have determined it is an acceptable part of the student's program of study. I recommend that you approve a DAGSI Program Enhancement Scholarship for the course(s).

 ADVISOR APPROVAL DATE DEPT. CHAIR APPROVAL DATE

 DEAN APPROVAL DATE DAGSI APPROVAL DATE

FORM PROCEDURES

After all Home Institution approvals are received, this form will be faxed to DAGSI for the Director's Approval. A copy will be returned to the student, the faculty advisor and the department. The original will be kept on file in the dean's office.

DAGSI approval is not given until the student has registered for the course(s) requested. (Note: The student must complete the DAGSI cross-registration form in addition to the Program Enhancement form.) Once registration is complete, the final DAGSI approved copy will be faxed to the bursar's office at the partner institution and the dean's office at the student's Home Institution. Email confirmation will be sent to the student.

DAGSI PROGRAM ENHANCEMENT AND TUITION POLICY

1. Program Enhancement scholarships pay for at most **two** courses per term at a partner institution. (Exception: when a course has an attached lab that is zero credits.)
2. DAGSI pays **TUITION ONLY**. DAGSI will not pay for any of the following: audit courses, undergraduate courses, remedial courses, courses taken outside the partner schools of engineering and computer science, late fees, dropped course charges, registration or university fees, graduation fees, books, and other miscellaneous items.
3. If a student drops a DAGSI course it is the student's responsibility to notify the Registrar at the HOME Institution **PRIOR** to the drop and refund deadlines of the school teaching the course. Otherwise, any charges associated with dropping a course will be the student's responsibility.
4. **First time cross-registrants to AFIT, MUST** hand carry proof of U.S. citizenship (birth certificate, naturalization) to the AFIT Registrar's Office, building 641, room 105. You will also be required to obtain a base pass. Only U.S. citizens are eligible to attend AFIT. Call (937) 255-6234 x3192 for more information.
5. Visit our web site at www.dagsi.org for further information on DAGSI Policy. It is the student's responsibility to be familiar with DAGSI Policy.
6. This form is subject to the Privacy Act of 1974 (5USC 552A).

FAX NUMBERS

AFIT	Dean	937-255-6569	WSU	Dean	937-775-5009
	Registrar	937-255-2791		Registrar	937-775-5597
	Bursar	937-656-4775		Bursar	937-775-5775
UD	Dean	937-229-2471	DAGSI		937-781-4005
	Registrar	937-229-4177			
	Bursar	937-229-4117			



Dissertation Committee

Name: _____

- Focus Area: Computational Design and Optimization Controls and Robotics
 Electronics, Microwaves, VLSI, and Nanotechnology
 Industrial and Human Systems Materials and Nanotechnology
 Medical and Biological Systems Sensor Signal and Image Processing

Tentative Title of Dissertation:

The members of my committee are:

Name:	Institution/Affiliation
1.	
2.	
3.	
4.	
5.	
6.	

Approved by:

_____ Date

_____ Date

_____ Date

_____ Date



Program of Study

Name: _____ Date: _____

Focus Area: _____ Dissertation Advisor: _____

Entered Ph.D. Program: _____ UID _____

Entered program after BS or after MS Date previous degree awarded _____

Name of M.S. Institution _____

Category	Course Number and Title	Credit Hours (CR)	When Taken (Qtr/Yr)	Grade	MS (max 45 CR) (✓)	Other or transfer (✓)	Focus area (12 CR min) (✓)
Core Courses (min 12 CR)							
	Subtotal						
Major Courses (≥700 level) (min 24 CR)							
	Subtotal						



Request for Candidacy Examination

Name: _____

Focus Area: Electronics, Microwave, VLSI, and Nanotechnology

Title of Dissertation:

Topic Area: Microwave Power Electronics VLSI

The members of my Examination committee are:

1.
2.
3.

The oral examination is scheduled for:

Date: _____ Time: _____ Location: _____

Student's Signature Date

Approved by:

Dissertation Advisor Date

Focus Area chair Date

Program Director Date

Note: This request must be submitted to the Ph.D. Engineering Program Office no later than 30 days prior to the examination date.



Request for Candidacy Examination

Name: _____

Focus Area: Sensor Signal and Image Processing

Title of Dissertation:

The WSU members of my Dissertation Committee are:

Name:

Institution/Affiliation:

1.	
2.	
3.	
4.	
5.	
6.	

The oral examination is scheduled for:

Date: _____ Time: _____ Location: _____

Student's Signature

Date

Approved by:

Dissertation Advisor

Date

Focus Area Chair

Date

Program Director

Date

Note: This request must be submitted to the Ph.D. in Engineering Program Office no later than 30 days prior to the examination date.



Record of Candidacy Examination
Computational Design and Optimization

Name: _____

Examination Dates: _____ through _____

Dissertation Advisor: _____

Exam Section 1: _____ Date: _____

On behalf of the exam section committee, I testify that the candidate was evaluated and

- Passed
- Did not pass; may repeat after strengthening specific areas of weakness
- Failed

Exam Committee Chair Date

Exam Section 2: _____ Date: _____

On behalf of the exam section committee, I testify that the candidate was evaluated and

- Passed
- Did not pass; may repeat after strengthening specific areas of weakness
- Failed

Exam Committee Chair Date

Exam Section 3: _____ Date: _____

On behalf of the exam section committee, I testify that the candidate was evaluated and

- Passed
- Did not pass; may repeat after strengthening specific areas of weakness
- Failed

Exam Committee Chair Date

Focus Area Chair Date

Program Director Date



Record of Research Proposal Defense

Name: _____ Date: _____

Dissertation Advisor: _____

Tentative Title of Dissertation:

We testify that the candidate was evaluated and

- Passed; candidate 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
- Failed but may submit a new Research Proposal and submit to another Research Proposal Defense after completing additional course work, independent study, or re-search
- Failed and will not be readmitted to another examination

Dissertation Committee Members:

Name Date Signature Date

Name Date Signature Date

Name Date Signature Date

Name Date Signature Date

Name Date Signature Date



Record of Dissertation Defense

Name: _____ Date: _____

Dissertation Advisor: _____

Title of Dissertation:

We testify that the candidate was evaluated and

<input type="checkbox"/> Passed; Dissertation accepted <input type="checkbox"/> The committee is temporarily ad-journed; candidate will be examined again	<input type="checkbox"/> Passed; Dissertation will be accepted after specific revisions have been made <input type="checkbox"/> Did not pass; may not repeat
--	---

Dissertation committee members:

Name	Date	Signature	Date
------	------	-----------	------

Name	Date	Signature	Date
------	------	-----------	------

Name	Date	Signature	Date
------	------	-----------	------

Name	Date	Signature	Date
------	------	-----------	------

Name	Date	Signature	Date
------	------	-----------	------

Name	Date	Signature	Date
------	------	-----------	------



Doctoral Dissertation Assessment Form

Student's Name: _____

Qtr/Yr: _____

Dissertation Advisor: _____

Focus Area: _____

Dissertation Title:

Please evaluate the following aspects of the dissertation research. This evaluation does not supplant the overall assessment of the student's research determined by dissertation approval to be competent and passable. This information is collected and processed as a component of the program assessment process.

1. Communication. To what extent are the student's oral and written presentations effective and professional?

- superior excellent good marginal poor N/A

2. Quality of Problem. To what extent does the topic of this dissertation represent a legitimate and significant area of research?

- superior excellent good marginal poor N/A

3. Experimental Methodology. To what extent did the strategies and methodologies employed provide for the successful execution and development of this research?

- superior excellent good marginal poor N/A

4. Technical Merit. To what extent did the application of technical concepts and theories meet acceptable standards for the field?

- superior excellent good marginal poor N/A

5. Contribution. To what extent did this research represent an original contribution to the field?

- superior excellent good marginal poor N/A

Optional. Additional comments or assessments: <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
--



Assessment of Learning Outcomes—Exit Interview

Student's Name: _____ Date: _____

Focus Area: _____

Note: On the reverse side of this form, please list current contact information.

Career Plans: (Are you currently employed? Have you applied for a position, been interviewed, received any offers, or accepted a position in industry, in academia, or with the government?)

Curriculum: (How well has the independent research experience prepared you for real-world challenges? How well have the graduate courses prepared you in gaining advanced knowledge in the field? What are the top three courses in the program perceived as providing the knowledge and skills necessary to solve technical problems in the focus area?)

Interactions: (During the course of your research, have you interacted with other faculty at WSU and DAGSI partner schools, government sponsors, others?)

Assessment of Abilities Related to Outcomes: (How many articles have you written or co-authored? How many conference papers have you presented? What honors/awards/recognition have you received for your work?)

Faculty: (Did you perceive the dissertation advisor to be competent, caring, and supportive?)

Facilities: (What are the best and worst things about the College and Labs and Research Infrastructure?)

Comments: