



# College of Technology

## Ph.D. Program Handbook

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## **Foreword**

The purpose of this handbook is to provide faculty and graduate students with relevant information and guidelines pertaining to the College of Technology's Ph.D. program. The policies documented herein are established by the College of Technology Ph.D. Committee and are administered by the College's Assistant Dean for Graduate Studies.

### **1.0 Ph.D. Program Vision**

The College of Technology is committed to its graduate program and to offering the technology profession's leading Ph.D. and Master's programs. These graduate programs implement its scholarly responsibility to advance the disciplines of technology and to develop advanced level professionals who engage in technology, technological education, and related leadership. The faculty recognize a genuine responsibility to prepare future scholar-practitioners for the technological enterprise in both public (education and government) and private sector environments. The Ph.D. program represents the College's most advanced manifestation of this commitment.

#### **1.2 Ph.D. Program Purpose**

Via the College of Technology's Ph.D. degree program, the faculty seek to provide degree candidates with the knowledge and skills necessary to advance the discipline and its practice. The primary purposes of this Ph.D. program are to prepare scholarly faculty for technology education programs throughout the nation and world, and advanced leader/researchers for public and private sector environments employing such levels of personnel. In doing so, the program also develops the concomitant skills involved in technology-relevant knowledge development, synthesis and assessment. Candidates, by judicious program design, may also prepare for leadership roles in fields such as technology transfer, technology human resource development/technology teaching, or supervision of technology in private and public sector agencies.

Graduates of the program are expected to demonstrate an appropriate level of mastery of the discipline of technology, both in general and with respect to the technological focus built into their program. Given this, the program is structured to enable the development of the technological focus as well as a broad understanding of the discipline. Successful Ph.D. candidates will demonstrate advanced ability to:

1. envision, plan and conduct research and development activities;
2. identify, comprehend, analyze, evaluate and synthesize research;
3. evaluate technologies and technology-related programs;
4. assess individual performance with, and understanding of, technology;
5. communicate effectively and employ constructive professional and interpersonal skills; and
6. function in one or more of the technology disciplines.

## 2.0 Ph.D. Program Overview

The College of Technology's Ph.D. Program is based on practices at Purdue and other leading institutions. These include a requirement for 90 (minimum) credit hours, maintenance of a B or better grade point average, and satisfactory progress each semester. At least one third of the total credit hours used to satisfy the degree requirements must be earned in continuous residence at Purdue. Ph.D. students have five years from passing their preliminary examination in which to complete their degree requirements.

Ph.D. advisors, working interactively with the student, will consider all prior graduate coursework accepted for transfer into the program while developing the plan of study. In addition to a technology focus, each plan of study will necessarily include a solid discovery foundation sequence of research courses and a cognate designed to add depth and a second discipline's perspective to the student's research and/or professional goal-related field. A dissertation will serve as both a culminating synthesis experience and as a visible demonstration of performance.

The College of Technology's Ph.D. program consists of four components:

- Technology (the major/field of specialization) 21 cr minimum
- Discovery Foundations 12 cr minimum  
(Research Methodology, Statistics and Experimental Design)
- Cognate 12 cr minimum  
(from any appropriate Purdue School other than Technology)
- Dissertation Research 15 cr minimum

Total Hours beyond the Master's degree	60 cr minimum
Master's degree	30 cr maximum
Total Graduate Study	90 cr minimum

Details of this program are shown in the program planning template provided in Section 4's Figure 1.

The College of Technology's Ph.D. program **Technology Major** component is used to develop 21st Century cognitive skills by means of a set of core courses and an additional set of courses creating a technology focus. Courses from any of the College's departments may be used in this component.

The intent of the **Cognate** component in the College of Technology's Ph.D. program is to enable candidates to establish a supportive area of competence relevant to the candidate's career objective. Typically the cognate consists of 12 semester credit hours of coherent courses. The validity of the cognate is attested to by a doctoral level graduate faculty member who serves on the candidate's Ph.D. program committee.

The intent of the **Discovery Foundations** component in the College of Technology's Ph.D. program is to develop a mastery of a solid set of research, development and discovery skills sufficient to enable the candidate's dissertation research project and the critical evaluation of other's research. As a direct consequence of this degree component, College of Technology Ph.D. candidates are expected to be able to design, conduct and report research and knowledge/capability development activity and outcomes.

## **3.0 Ph.D. Program Procedures**

### **3.1 Admission**

Ph.D. applicants are admitted through an evaluation process of the graduate faculty in the College of Technology. A controlled enrollment approach will insure that only a manageable number of highly talented degree aspirants with genuine academic leadership potential will be admitted. It is the College's goal that every admittee will have the opportunity to be supported by one of the College's research and development projects or teaching assignments.

Persons seeking admission to the program should have relevant prior course work and experience in the discipline to ensure a significant potential for success in the program. Additionally, a requirement for acceptance is that the application package (including interview if employed), satisfies at least one of the College's doctoral advisor faculty that a match exists between the applicant's goals and interests and that of the program's intent and their individual or disciplinary scholarship. When faculty, in their judgment, identify deficiencies in either the applicant's formal education or experiential background, they have a responsibility to require appropriate prerequisite experiences in addition to the standard program requirements.

#### **3.1.1. Admission Criteria**

The admissions process selects highly qualified applicants into the College's Ph.D. program by considering each of the following criteria in judging the overall strength of the applicant. Typically, no criterion is used as a sole determinant for admission.

- A Graduate GPA of 3.5 or better and an undergraduate GPA of 3.25 or better (or equivalent class rank) from accredited institutions and in programs with specific relevance to technology will be required for unconditional admission
- A relevant earned master's degree
- GRE or GMAT scores at or above the 50th percentile (for each subscale) are required for unconditional admission. Note, pursuant to ETS' recommended practice, the program does not require a specific minimum score.
- At least two years of relevant work experience is preferred as is breadth in educational experience
- Review and recommendation for acceptance by the relevant department's graduate faculty at least one of which is willing to serve as major professor
- A statement of purpose judged to be a good fit for the College's Ph.D. program mission
- A positive admission interview report evidencing oral English proficiency
- Personal and professional characteristics commensurate with success in the profession
- International applicants whose first language is not English and who have not graduated from a University or College using English as the primary language of instruction, must present a TOEFL score of 560 (paper test or the equivalent on the computer based examination) or higher
- Demonstration of a high level of competence in written communication as evidenced by a writing sample such as a thesis or other significant and personally written product.

### 3.1.2. Application Package Components

All applicants will be required to submit the following items to create an application package suitable for effective review of the applicant's potential for success in the College of Technology's Ph.D. program.

- Purdue University Graduate School On-Line Application Form and fees as specified
- A detailed reflective statement of purpose highlighting career goals, capabilities to be developed, and a self assessment highlighting both strengths and weaknesses.
- Detailed resume
- Transcripts of all universities/post-secondary institutions attended
- Official GRE (preferred) or GMAT scores
- A writing sample that documents a high level of competence in written communication such as a thesis or other significant personally written product
- At least three letters of recommendation from faculty with the doctoral degree and others well qualified to judge potential for success in research and Ph.D. programs
- Official TOEFL score (if required)
- Documentation of financial support (required only for international applicants)

### 3.1.3. Admission Procedures

- Applicants complete Purdue University's On-Line electronic application and submit the Graduate School's application fee
- Applicants submit all other application materials to the College's Graduate Office
- The College of Technology Graduate Office assembles complete application package
- The completed application package is routed to the relevant department in the College of Technology
- At least one of the reviewers interviews the candidate if at all possible. Although in-person interviews are desirable from both the College's and applicant's perspective, alternative procedures (such as telephone interviews) may be employed
- Faculty review package and report assessment
- Note, it is the responsibility of every international student applicant to supply all documentation needed by the United States Immigration and Naturalization Service and Purdue University to establish eligibility for entrance into the USA as a student. This necessarily includes documentation of sufficient financial resources to sustain the anticipated period of study. **International graduate students must not begin to travel to Purdue University until formally notified of their acceptance by the Graduate School and they have received the needed visa documents!**

### 3.1.4. Admission Deadlines

Candidates for admission must have submitted all necessary application materials by the deadlines indicated below.

- February 15<sup>th</sup> for Summer admission (for international students applying from outside the US)
- April 1<sup>st</sup> for Summer admission (for domestic students and international students applying from inside the US)
- April 1<sup>st</sup> for Fall admission (all students)

- September 1<sup>st</sup> for Spring admission (for international students applying from outside the US)
- October 1<sup>st</sup> for Spring admission (all domestic students and international students applying from inside the US)

### **3.1.5. Major Professor (Advisor) Assignment**

Each graduate student is assigned an initial advisor from the faculty whom have indicated a willingness to serve in this role. The student must confirm this person (or designate another qualified faculty member) as their permanent major professor and establish the program committee on or before the end of the second semester. The major professor's role is to ensure that the student develops an appropriate plan of study, arrange committee meetings, coordinate the qualifying examination questions, and monitor the student's progress toward the degree. Additionally, the major professor will assist the graduate student in establishing his or her dissertation topic and subsequently develop a proposal.

### **3.2 Graduate Advisement**

Ph.D. advisement involves a very systematic and ongoing interaction between the major professor/advisor, the Ph.D. student, and in many cases the faculty serving on the student's Ph.D. committee. The Purdue University Graduate School faculty have addressed the responsibilities of students and faculty by developing a set of guidelines that serve to illuminate mutual expectations. These are provided in Appendix A. The advisement process typically involves:

- Formulation and/or validation of the student's career objectives
- Encouraging the student's reflective self-assessment to identify strengths and weaknesses relevant to the career objectives and the College of Technology Ph.D. program mission
- Conceptualizing a plan of study to develop target competencies and knowledge base
- Regular progress monitoring and assisting students meet key timelines
- Helping prepare students for the major program examinations
- Assisting with the identification and detailing of the student's Ph.D. research project
- Engaging in professional acculturation activities such as conference attendance, joint publications, and assistance with the search for appropriate employment

## **POLICY ON MONITORING, PROBATION AND DISMISSAL**

### **Minimum Cumulative GPA Requirements (in graduate courses)**

- Graduation: 3.00/4.00
- Probation: 2.75/4.00
- Dismissal: 2.50/4.00

### **Monitoring**

- Graduate student grades and academic progress will be monitored at the departmental level.

- The major professor and department should receive the student's grades, and an updated academic record copy for each semester the student is enrolled. A copy will also be forwarded to the Graduate School.
- If a student has a **semester** GPA *less than* 3.00/4.00 and a **cumulative** GPA *less than* 3.00/4.00, a letter will be drafted by the department head to the student, with a copy to the major professor, to the Graduate School, and to the student's file, indicating the last semester was determined to be an unsatisfactory performance. This periodic review will take place after six (6) credit hours have been attempted and then every semester thereafter in which the student is enrolled.

### **Probation**

- If a student's **cumulative** GPA falls below 2.75/4.00 the student will be placed on academic probation.
- The COT Assistant Dean for Graduate Studies will generate a letter informing the student, major professor, department head and the student's file of the probationary status. A copy will also be forwarded to the Graduate School.
- The student will have two semesters to raise their cumulative GPA to the required level and return to good standing.
- Eligibility for an assistantship will be left to the Department Head's discretion.
- During the probationary period, remedial coursework may be required.

### **Dismissal**

- A student will be dismissed from the program if they remain on probation for two consecutive semesters without improving their cumulative GPA to the specified minimum listed above. This policy is independent of any assistantship the student may hold.

### **Appeal**

- A student may appeal their probationary status by contacting the Assistant Dean for Graduate Studies in writing within thirty (30) days of the date of the probationary notification letter. The appeal should include the student's specific reasons for exception to the probation policy.
- The appeal will be reviewed by a subcommittee three (3) members of the College of Technology Graduate Education Committee (excluding the Graduate Education Committee representative from the student's home department).
- The decision of the appeal subcommittee will be considered final and will be delivered within thirty (30) days of the student's request for exception to probation.

## **3.3 Student Ph.D. Committee**

The student's Ph.D. Advisory Committee will normally consist of three appropriately certified PhD graduate faculty members of the College of Technology, and at least one faculty member from outside of the College of Technology who represents the student's cognate. Faculty without a PhD can serve on a PhD committee by requesting approval from the Assistant Dean of Graduate Studies in the College of Technology. A co-advisor may be designated when advantageous to the student and where it can build faculty experience with the Ph.D. program. Students and major professors should note that if a student's plan of study and/or research project would be significantly improved by the expertise of a faculty member or a person outside of the university, they may request consideration for special certification for such service. Such requests require a rationale

and description of the expertise and are routed to the Graduate School via the College of Technology Graduate Office.

The student's committee is charged with the responsibility of judging the appropriateness of the plan of study, establishing and conducting qualifying (if used), preliminary and comprehensive examinations, and assessing the suitability of the dissertation. Most important, however, is their mentoring of the student/candidate to the highest standards of the profession.

The student's major professor and Ph.D. committee members are all responsible for helping the student draft and finalize the Electronic Plan of Study prior to the end of the second semester.

## **4.0 Ph.D. Program**

The overall program structure for the College of Technology's Ph.D. is detailed in Figure 1 Ph.D. Program Template. It requires a minimum of 90 graduate semester credit hours (beyond the bachelor's degree but counting up to a maximum of 30 for an appropriate master's degree). Additional details are in individual sections following the template. Student performance on all courses (other than research credits) on the POS must be at the B or better grade point average.

### **4.1 Plan of Study Meeting**

Because of the importance that student's enlist all faculty members of their committee in developing the plan of study, and to establish shared understanding of the student's career goals, reflective self-assessment and plans, it is highly advisable to hold a Ph.D. program planning meeting prior to filing the finalized Electronic Plan of Study (EPOS).

The EPOS constitutes a plan of study that, when successfully completed, will lead to the awarding of the Ph.D. When appropriate in the judgment of the student and their Ph.D. committee, changes may be made to the EPOS as the student progresses through the program. This can be accomplished by clicking on the Create Change Request link available next to an Approved plan of study. The Change Request link will initiate a Change Request form. These procedures all occur electronically via the EPOS procedure. Refer to the following link for directions on accessing and filling out the EPOS.

[https://ias.itap.purdue.edu/gradsch/HELP\\_PAGES/pos\\_student\\_instructions.doc](https://ias.itap.purdue.edu/gradsch/HELP_PAGES/pos_student_instructions.doc)

**Figure 1. Ph.D. Program Planning Template**

<b>Degree Component</b>	<b>Minimum Hours</b>	<b>Existing Courses Taken as part of MS</b>	<b>Courses to be Taken</b> (including a maximum of 9 sch transfer)
<b>Technology Major</b> <ul style="list-style-type: none"> <li>• Core (to be confirmed)               <ul style="list-style-type: none"> <li>○ TECH 646 Analysis of Research in Industry and Technology</li> <li>○ MET 527 Technology from a Global Perspective</li> <li>○ TECH 621 Seminar in Technology (repeated)</li> </ul> </li> <li>• Focus Courses (TECH or any COT department prefixed course, others only with committee approval)</li> </ul>	21		(a minimum of 15 credits of new COT courses is to be taken) (Independent Study – Tech 690 – 9 credits maximum)
<b>Cognate</b>	12		
<b>Discovery Foundations</b> <ul style="list-style-type: none"> <li>• Multivariate statistics</li> <li>• Qualitative &amp; alternative methodologies</li> <li>• Experimental design &amp; Research methodology</li> </ul>	12		
<b>Dissertation/Research</b>	15 min – 30 max		
<b>Total</b>	-----	<b>Maximum 30</b>	<b>Minimum 90</b> (including those in Existing Courses column)
<b>Other Coursework</b>			

**Suggestions for Use:**

1. Have student’s reflective self-assessment, and their description of the contributions they wish their Ph.D. program to make to their development, on hand.
2. Have student enter each of their master’s degree courses in the appropriate row of the **Existing Courses** column.
3. Have student enter each of their already completed courses beyond the master’s degree from Purdue or another university in the appropriate row of the **Existing Courses** column. A maximum of 9 hours is permitted.
4. In interaction with the student/advisor, enter the most appropriate courses that will build the desired competencies in the appropriate rows of the **Courses to be Taken** column. No 300 level courses may be included in this column and 400 level courses may only be used if required as a prerequisite for 500 and 600 level courses included in the plan of study.
5. Adjust the coursework until all the hour minimums are met or exceeded.
6. Confirm that the Technology Major and Cognate degree components include a minimum of 12 semester credit hours of 600 level courses.
7. Confirm that no more than 9 hours max of Independent Study (Tech 690) is included on the plan of study.
8. Confirm that the plan of study includes at least 15 hours of new Ph.D. program coursework to be taken in the Technology Major.
9. Research (TECH 699) credits not part of courses listed in POS but count towards total hour requirement.

## 4.2 Major (Technology)

This central component of the Ph.D. program is intended to be used to flexibly add depth and breadth as appropriate to the student's career/professional goals and simultaneously be consistent with the program's mission. The College of Technology's Ph.D. program Technology Major seeks to develop 21st Century cognitive skills by means of a nine-hour set of core courses and an additional set of courses creating a technology focus. The core courses are:

- TECH 646 Analysis of Research in Industry and Technology
- TECH 621 Seminar in Technology (repeatable)
- MET 527 Technology from a Global Perspective

In addition to the 9-hour core, students may take any appropriate number of other College of Technology graduate courses to create a focus.

Technology Major component courses, beyond the master's degree, must be 500 & 600 level. If 400 level courses are used they must lead to or directly support a higher level course to be taken as a part of the program. No new 300 level courses are permitted as a part of the program although they may be taken in order to establish needed prerequisites.

A maximum of 9 hours of Tech 690 – Independent Study may be included on the plan of study. A minimum of 21 TECH or College of Technology Department prefixed courses (other than TECH 699) must be a part of the program

## 4.3 Cognate

The cognate consists of any coherent set of courses, from outside the College of Technology that creates competence in a field rationally related to the candidate's career objective. A doctoral level graduate faculty member representing the cognate must serve on the candidate's Ph.D. program committee. The intent of the cognate component in the College of Technology's Ph.D. program is to enable candidates to establish a supportive area of competence relevant to the candidate's career objective. Typically the cognate consists of 12 semester credit hours of coherent courses. The validity of the cognate is attested to by a doctoral level graduate faculty member who serves on the candidate's Ph.D. program committee. Some possibilities for cognate areas include, but are not limited to, the following.

- STS Science/Technology Society
- Business/Management
- Engineering
- Human Resource Development
- Safety/Human Factors
- Quality
- Instructional Technology
- Higher Education/College Teaching
- Psychology
- Computer Science
- A language. Meeting (by testing or coursework) a foreign language department's requirements for reading proficiency in a language other than the student's native language or English will be considered the equivalent of a cognate. Students must meet overall program credit hour requirements.
- International Studies

## 4.4 Discovery Foundations

All Ph.D. graduates from the College of Technology's Ph.D. program are expected to not only be able to critically evaluate and utilize research but also to be able to design,

conduct, and report appropriate research in the technology disciplines. To this end, students must demonstrate proficiency in research and experiment design, multivariate statistics, and qualitative research methods. This minimum core will be supplemented by additional study relevant to the specific requirements of the candidate's proposed research project (dissertation).

The intent of the Discovery Foundations component in the College of Technology's Ph.D. program is to develop a mastery of a solid set of research, knowledge/capability development and discovery skills sufficient to enable the candidate's dissertation research project and the critical evaluation of other's research. Both qualitative and quantitative skills are to be developed by coursework in this component as are statistical methodologies including at least multivariate techniques. To this end, students will take as a minimum:

- A course in multivariate statistics
- A course in experimental design
- A course building understanding of and capability with qualitative research

#### **4.5 Dissertation**

The Ph.D. dissertation must demonstrate the candidate's ability to conduct substantial and significant research in the technology disciplines and/or related disciplines that intersect with them. Candidates are expected to demonstrate overview mastery of the key literature in the field and use this to situate the specific project they propose.

Students enroll in TECH 699 Ph.D. Dissertation Research for a minimum of 15 semester credit hours to receive credit for their dissertation research. This enrollment is to be distributed commensurately with the amount of work performed in the semester. Continuous enrollment in TECH 699 is required until the degree is earned.

#### **4.6 Transfer of Credits**

A maximum of 30 semester credit hours will be permitted for credit from completion of a committee approved masters degree.

Of the 90 graduate semester credits required for a Ph.D., at least 33 credits, plus all dissertation research credits, must be earned under the supervision of the student's POS committee.

#### **4.7 Residence Requirement**

According to the Purdue University Graduate School policies,

“The total number of hours of academic credit used to satisfy residency requirements consists of all course credit hours that appear on the plan of study, other graduate course credit hours with grades of C or better that appear on the Purdue transcript, and research credit hours with grades of S that appear on the Purdue transcript. ... In fulfilling these requirements, a

maximum of 15 credit hours will be allowed from any one semester (maximum hours proportional to length of summer session).”

In the university’s Ph.D. programs, “At least one-third of the total credit hours used to satisfy degree requirements must be earned (while registered for Ph.D. study) in continuous residence on the Purdue campus where the degree is to be granted.” (From *Graduate School Handbook*)

#### 4.8 Time Requirements

Ph.D. students have five years from passing their preliminary examination in which to complete their degree requirements.

Student pursuing the Ph.D. degree have up to eight years to complete their program, however this maximum should be required only in rare circumstances. If the student exceeds these limits, the student may be dismissed for lack of satisfactory progress or, when circumstances are justified, may be required to retake some courses or take new courses to replace out-of-date courses.

Continuous registration is required once the student begins coursework. Students deemed not to be making satisfactory progress will be afforded one opportunity to justify progress to their program committee. To continue in the program, such students require the consent of their Ph.D. committee and the Assistant Dean for Graduate Studies. Otherwise they will be dropped from the program.

### 5.0 Examinations

The College of Technology’s Ph.D. program requires students to successfully demonstrate an adequate level of competence as documented by their individual performance on up to three examinations. These examinations are scheduled during the early (Qualifying), mid (Preliminary), and end (Final) periods of the student’s program as depicted in Figure 2.

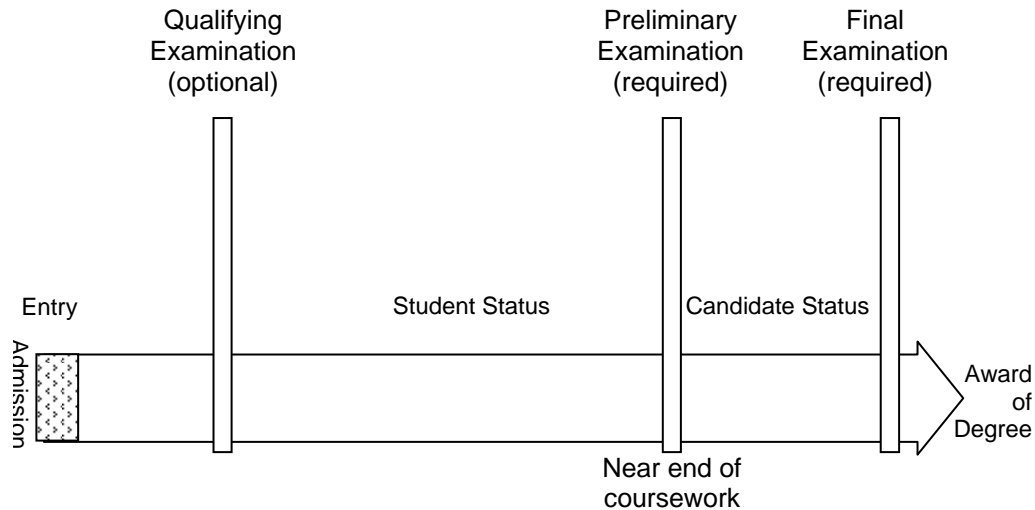


Figure 2. Scheduling of Ph.D. program examinations

## **5.1 Qualifying Examination**

The student's Ph.D. committee may optionally choose to require a qualifying examination before the beginning of the student's third semester of study. The purpose of the qualifying examination is formative and it serves to ascertain the student's mastery of key prerequisites, as bulleted below, and to surface specific areas that need to be addressed by the student's plan of study. If a qualifying examination will be required, the student's Ph.D. committee must advise the student at least eight weeks in advance and they also will determine the form and nature of this examination. Typically, it would consist of both a three-hour written examination and a subsequent oral component. Performance is judged by the student's Ph.D. committee. One effective practice is that the qualifying examination be designed to assess:

- Writing and analytical thinking
- Knowledge of relevant information sources
- Professional awareness appropriate to the student's career goals
- Awareness of key issues and fundamental concepts of technology and the student's technology focus

Consistent with the formative intent of the qualifying examination, the consequences of student performance are reflected in the design of the student's plan of study. For example, a surfaced weakness in writing or a specific set of foundation knowledges might result in requiring a writing course or other prerequisite or skill building course. Such requirements are only determined by the student's Ph.D. committee and may be specified to be a part of the plan of study credit hour requirement or external to it. Although the purpose of a qualifying examination is intended to be formative, the Ph.D. committee faculty may terminate the student's pursuit of the Ph.D. program in exceptional cases. Because qualifying examinations do not require Graduate School authorization, if used, their results do not need to be reported to the Graduate School. However, a report of the exam should be forwarded, using the form provided in Appendix B, to the College of Technology Graduate Office for filing in the student's master file.

## **5.2 Preliminary Examination**

The purpose of the preliminary examination is to comprehensively assess the student's mastery of the knowledge base(s) encompassed by the plan of study. Successful performance on the comprehensive examination admits the student to candidacy for the Ph.D. Unsuccessful performance can result in assignment of additional requirements or dismissal from the program.

One of the major outcomes of the preliminary examination is that students work actively to synthesize knowledge and skills learned while completing the courses required by their plan of study. To this end, major advisors need to work carefully with advisees over an extended period of time to enable them to evolve such integrated capabilities. It is also recommended that students at similar stages in their pursuit of the Ph.D. form independent study groups to help each other employ peer learning to assemble such capabilities.

Purdue University Graduate School policy states that “To become eligible to take the examination, the student must have filed a plan of study, satisfactorily completed most of the formal study, and satisfied any foreign language requirements (if required). The examination should be scheduled as soon as possible and must be completed at least two sessions before the expected date of the Ph.D. final examination.”

The Preliminary examination should be designed by each student’s Ph.D. committee to assess the student’s:

- Mastery of the technology focus area consistent with the student’s plan of study, their articulated purpose for pursuing Ph.D. study, and the Ph.D. program’s mission.
- Understanding of the cognate discipline and its interface with the student’s technology focus area consistent with their articulated purpose for pursuing Ph.D. study, and the Ph.D. program’s mission
- Ability to assess, design and conduct research appropriate to the student’s articulated purpose for pursuing Ph.D. study, and the Ph.D. program’s mission

While the form(s) of this exam is subject to specification by each student’s Ph.D. committee, **it is intended to systematically assess integrated competence in the technology major, discovery foundations and cognate components of the plan of study.** Performance will be judged by the student’s graduate committee and will be reported to the Graduate School.

Typically this examination will be scheduled during the semester in which the student completes their coursework. This examination must consist of both a written examination and a subsequent oral component. If a conventional test situation is used, two days of assessment are typical and the major professor is responsible for proctoring. The student’s Ph.D. committee faculty may specify what, if any, resources the student will be permitted access to during each portion of the examination.

According to the Graduate School, “The preliminary examining committee must consist of a minimum of three members of the graduate faculty who need not be faculty members with whom the student has taken coursework. All members of the examining committee are to be notified of the scheduled examination. Other faculty members may be requested by any member of the examining committee to participate, without vote, in the examination, and any interested faculty member may be present, without vote. Although only three committee members are required, if the committee has four or more members, a single member may withhold his or her signature of approval.”

Faculty on the student’s Ph.D. committee are to be provided with a complete copy of all of the student’s written responses to all portions of the examination. Committees may, however, divide the formal assessment tasks as they deem appropriate. It is recommended that faculty communicate their assessment of the examination to the major advisor at least one week in advance of the oral portion of the examination. The major advisor may use, as appropriate, any of this input while working with the student to help prepare for the oral examination.

It is recommended that at least a two hour time block be scheduled for the oral portion of the preliminary examination. To schedule the prelim a Graduate School Form 8 *Request to Appoint an Examination Committee* (Appendix D) needs to be filed in the COT Graduate Office a minimum of 3 weeks prior to the scheduled examination date. The Form 8 can be found at the following link:

[http://www.tech.purdue.edu/academics/graduate/forms\\_documents.cfm](http://www.tech.purdue.edu/academics/graduate/forms_documents.cfm)

To insure that student knowledge is current, the Graduate School stipulates that “A preliminary examination passed by a student whose graduate study and/or professional activity has been inactive for five years or more is invalid. (See Section III-B-5.)” Given this, if this amount of time has elapsed, College of Technology Ph.D. committees are to reassess the student’s mastery of the discipline by retesting according to the same guidelines as the initial preliminary examination.

The results of the preliminary examination are pass, pass with conditions, non-acceptable performance. In case of the latter assessment, faculty will be asked to specify whether the student is eligible to retest. If the latter, at least one semester of study and preparation must transpire before a retest is permitted. Upon completion of the oral portion of the preliminary examination, the examination results, the examination itself, and a copy of the student’s responses are forwarded to the College of Technology Graduate Office. The examination report will be recorded and then forwarded to the Graduate School and the examination and responses will be filed in the student’s master file.

### **5.3 Final Examination**

A Final Examination is required after the student’s Ph.D. research is completed and a satisfactory dissertation, as deemed by the Ph.D. advisor or co-advisors, is written. The candidate and advisor subsequently use the COT Form 1 (Appendix C) to request the examination date and room. The Graduate School Form 8 *Request to Appoint an Examination Committee* (Appendix D) also needs to be filed in the COT Graduate Office a minimum of 3 weeks prior to the scheduled examination date. These forms can be found at the following link:

[http://www.tech.purdue.edu/academics/graduate/forms\\_documents.cfm](http://www.tech.purdue.edu/academics/graduate/forms_documents.cfm)

The final examination committee will consist of a minimum of four members of the graduate faculty. The purpose of this examination is to assess the Ph.D. candidate’s capability to demonstrate advanced mastery of research as well as the specific topic investigated. This examination requires:

- Distribution of the advisor-approved dissertation draft to all Ph.D. committee members, and the College of Technology Assistant Dean for Graduate Studies, at least two weeks in advance of the examination date.
- Oral presentation of the research to the Ph.D. examination committee during a publicized session open to the university community
- An oral examination by the Ph.D. examination committee members conducted by the committee in closed session.

The Ph.D. candidate and all examination committee members are expected to participate in the Final Examination. At least three of the committee members, including the major professor, must be physically present for the duration of the examination. Other members may participate using telecommunication if necessary. Performance on the final examination will be judged by the official Ph.D. examination committee appointed on the Form 8. Successful mastery is required in order for the Ph.D. to be awarded.

It is the policy of the University and of the College of Technology that:

- At least two academic sessions devoted to research and writing must elapse between the preliminary and final Ph.D. examinations.
- Final Ph.D. examinations will be announced so that interested members of the Purdue faculty and student body may attend up until the point of committee deliberations which shall be held *in camera*.
- Final examinations must be held before the last week of classes.
- When the Request for Appointment of Examining Committee (G.S. Form 8) is approved by the Graduate School, an approved copy of the form will be sent to the College of Technology graduate office with the following additional materials for the candidate:
  - a) Report of the Final Examination (G.S. Form 11);
  - b) Exit Survey

## **6.0 Dissertation Requirements & Procedures**

### **6.1 Dissertation Procedures**

The culminating demonstration of successful performance in the student's Ph.D. program is their design, conduct, documentation in dissertation format, and defense of a significant research project. Any form of research deemed acceptable and appropriate to the Ph.D. committee may be used to satisfy this requirement. No part of this handbook is intended to signal a preference for quantitative or qualitative research or for research from any particular paradigm.

Quality research cannot be rushed. Given this, it is encouraged that students and Ph.D. advisors begin work on the research project as early as possible. Often, for students employing a typical three year timeline, the second year is appropriately used to define the research topic and generate the proposal. The earlier this occurs during this time the better. The gradual use of TECH 699 credits is one way to encourage such progress although the bulk of them should be taken only after the student is admitted to candidacy.

#### **6.1.1 Dissertation Proposal**

Although the bulk of the student's work towards meeting this requirement typically occurs after the student's passing of the preliminary examination, the student may submit their research proposal to their Ph.D. committee at any time deemed appropriate to their Ph.D. advisor/co-advisors.

The faculty's expectation for the Ph.D. research proposal is that it is of sufficient detail to enable careful assessment of the project's significance, its locus within the literature, and the validity and reliability of the proposed methodology and instrumentation. It is expected that the graduate student will be the primary person conducting the study although studies situated within larger initiative contexts are certainly permissible. If such conditions exist, it is encouraged that the student and advisor thoroughly explore all potential implications of the situation for the student. These include, dependence on others outside of the student's control, shared intellectual property rights, restrictions on publications, timing of progress and the like.

The proposal for Ph.D. research typically contains descriptions of the problem, an indication of its significance, the purpose of the proposed research project, a substantial review of the literature, and an overview and justification of the proposed research methodology. Additionally, students are advised to consider highlighting their anticipated analyses and the anticipated research results. There is an expectation that a dissertation will make a contribution of something new to advance the discipline. Although all sections of the proposal are important, students are advised to pay particular attention to generating a solid review of the literature. This review should document the existence and significance of the problem and it should thoroughly depict what is known and what key gaps exist relevant to the problem. Additionally, the review can be used to establish a rationale for the particular instrumentation and analytical procedures to be employed. Proposals are generally written in the future tense. Details as to format and other requirements are provided by the Graduate School at their web site:

<http://www.gradschool.purdue.edu/thesis.cfm>

Students should discuss with their Ph.D. advisor, the procedures she/he wishes to have followed in preparing the proposal and vetting it with the other committee members. Usually, advisors will want to approve a proposal draft prior to it being circulated to the other members of the student's committee.

While the student is working on the development of their research proposal, and then subsequently engages in conducting their research, it is encouraged that they enroll in several successive semesters of TECH 621 Seminar in Technology. During these enrollments they will have the opportunity to learn of other students' work and see examples of proposals and research activity. Critical evaluations of research quality and effectiveness will be practiced and they will have the opportunity of presenting their proposal in practice form. Upon completion of the proposal defense, and acceptance, the student and their major advisor are to file a revised copy of the proposal with the College of Technology Graduate Office.

### **6.1.2 Dissertation**

Typically, Ph.D. dissertations follow a standard pattern of using five chapters to communicate the research and results. These are:

- Introduction: The Problem and Purpose
- Review of Literature
- Methodology

- Data and Analysis
- Conclusions and Recommendations

The dissertation is to be prepared in accordance with the guidelines developed by Purdue's Graduate School as provided at:

<http://www.gradschool.purdue.edu/thesis.cfm>

### **6.1.3 Publication of the Research**

Because of the usual intense and dynamic interaction of professor and Ph.D. student, there is an expectation the research will lead to one or more joint publications. Typically, the designation of authorships is mutually agreed upon and it follows an order of decreasing contribution to the research and publication. Students and advisors should note the guidelines for ownership of intellectual property developed by Purdue University's Graduate School and which are provided in Appendix E.

## **6.2 Monitoring and Evaluation of Research**

With formal approval of the research proposal documented, the student's work turns to conducting the proposed research activity. Here the student and their advisor work interactively as needed to enable timely progress. The student may, with the concurrence of their advisor, enlist other committee members or other faculty at Purdue or even elsewhere, to assist in appropriate manners. It is, however, the student's responsibility to carry out the necessary work involved.

Typically, the process of conducting research is interactive with the process of documenting it in writing. Detailed, accurate and thorough records must be kept of every activity. Students are encouraged to keep duplicate copies in safe locations so that their work is not vulnerable to accident or loss. Frequent backups of all computer files are absolutely critical. Students and advisors should note the recommendations for data management and retention developed by Purdue University's Graduate School and which are provided in Appendix F.

The major professor monitors each of their advisee's progress on a regular basis and should communicate whether progress is satisfactory or not. As the student submits drafts of the rewritten and augmented proposal gradually converting it into a dissertation, the advisor and committee members when appropriately involved are expected to return drafts with constructive feedback on a timely manner.

## **6.3 Defense of the Research**

Once the major advisor and the committee have agreed that the student's work is ready for the Final Examination, the advisor requests (COT Form 1, Appendix C) a date for the Final Examination. Additionally, advisors need to submit Graduate School Form 8 (Appendix D), *Request for Examining Committee*, no less than 3 weeks prior to the examination date.

Policies, timelines, and details for the Final Examination, and the permissible results, have been described in section 5.3.

## **6.4 Submittal of the Dissertation**

Students are required to provide, in a manner consistent with Graduate School requirements, bound and formatted master copies of their dissertation to:

- the Graduate School
- the College of Technology Graduate Office
- their major advisor/co-advisor
- in addition, it is accepted practice to provide a bound copy to the student's Ph.D. committee members.

In addition, an unbound copy, called the Deposit Copy, must be provided to the Thesis Deposit Office in accordance with the Graduate School's deadlines. All these distributions are required as part of the graduation procedure.

Candidates should note that if they propose to copyright their dissertation, the Graduate School Thesis Manual (<http://www.gradschool.purdue.edu/downloads/thesis/graduate-thesis-manual.pdf>) contains explicit instructions for procedures to follow in securing copyright. These include securing a letter from the major professor and the department head providing the reasons why copyright is "desirable or necessary."

## **6.5 Schedules and Deadlines**

Purdue University Graduate School and the College of Technology Graduate Office will publish each semester's deadlines so that faculty and students can plan to meet them. See:

<http://www.gradschool.purdue.edu/calendar/calendar.cfm?type=Deadlines>

# **7.0 Graduation Procedures**

## **7.1 Graduate School Final Check Procedures**

All students intending to graduate must complete a final check with the College of Technology Graduate Office and the Purdue University Graduate School. These steps involve reviewing that:

- the approved POS is on file with the Graduate School to insure that all requirements for the degree have been met
- all fees are paid
- all library materials are returned
- all keys are returned
- the Exit Questionnaire is submitted
- the Ph.D. Dissertation Agreement Form with University Microfilms, Inc. and an Addendum (G.S. Form 14) is filed
- the survey form on Earned Doctorates Awarded in the United States is filed

During this time, the student is also informed concerning the rent or purchase of graduation gowns and notices are sent regarding recognition ceremonies and receptions.

## **7.2 Participation in Commencement**

All graduating students are encouraged to participate in the university's commencement ceremonies. This is a time justifiably used to reflect on your accomplishments with pride and to share in the success of others, including the faculty, as well.

Of course, such participation is voluntary, however most students prefer to share their achievement with those important to them. In addition, the College typically hosts graduates with various recognition events.

## **8.0 Ph.D. Program Administration**

Overall, the program is administered by the College's Assistant Dean for Graduate Studies who has specific responsibility for graduate studies in the College of Technology. Routine program policy, procedure refinement, and guidance will be provided by the College of Technology's Graduate Education Committee. This committee consists of representatives from each department and is chaired by the College's Assistant Dean for Graduate Studies.

### **8.1 Record Keeping**

The College of Technology Graduate Office will:

- Coordinate the Ph.D. applicant review and admission process
- Assemble the application file
- Record and report progress of students
- Maintain each student's master file
- Process examination schedule requests
- Interface with Purdue University's Graduate School on final graduation check requirements

### **8.2 Program Review**

The College of Technology Graduate Office will on an ongoing basis engage in review of the graduate program. The mechanisms for this will include graduate committee addressing of improvements, solicitation of feedback from students and faculty involved, advisory committee reviews, and conducting follow-up studies of former students.

### **8.3 Doctoral Faculty**

The College of Technology's doctoral faculty consists of faculty certified by the Graduate School. A listing of graduate faculty is posted on the COT's Graduate web site at [http://www.tech.purdue.edu/academics/graduate/graduate\\_faculty.cfm](http://www.tech.purdue.edu/academics/graduate/graduate_faculty.cfm).

It should be noted, however, that any faculty member with specific expertise important to a particular student's research, may be nominated for service on a Ph.D. committee. Such a request, together with a rationale therefore should be submitted by the student, through

their advisor to the College of Technology Graduate Office. The latter will forward with a cover letter to the Graduate School.

### **Policy for Serving on Graduate Student Committees for Regular Graduate Faculty in the College of Technology**

This document establishes policies for regular graduate faculty serving on graduate student committees in the College of Technology (COT). It builds on the broad policy adopted by the Graduate School in Fall of 2005 which is covered in the *Policies & Procedures for Administering Graduate Student Programs* published by the Graduate School at Purdue University. That document is located on the web at <http://www.gradschool.purdue.edu/faculty/publications.cfm> .

In that document under Section I. E. 1. it states: “Appointments to the Graduate Faculty will enable the faculty member to teach graduate-level courses, to serve on graduate student committees, and to co-chair graduate student committees. It is the responsibility of the head of the graduate program to approve the level of participation of a Graduate Faculty member on a student’s committee.”

The College of Technology’s policy for Graduate Faculty serving on graduate student committees is as follows:

Faculty with an earned doctorate can serve on and co-chair PhD committees. After co-chairing their first PhD committee they can then serve as a chair for PhD committees. They can also serve on and chair MS directed project and thesis committees.

Faculty with an earned masters degree can serve on and co-chair MS directed project or thesis committees. After co-chairing their first MS committee they can then serve as a chair for MS directed project committees. They can also serve on PhD committees with the recommendation of the respective departments’ Graduate Education Committee and approval of the Assistant Dean for Graduate Studies in the College of Technology.

### **Policy for Review of Regular Graduate Faculty in the College of Technology**

This document establishes policies for regular graduate faculty to maintain graduate faculty status in the College of Technology. It builds on the broad policy adopted by the Graduate School in Fall of 2005 which is covered in the *Policies & Procedures for Administering Graduate Student Programs* published by the Graduate School at Purdue University. That document is located on the web at <http://www.gradschool.purdue.edu/faculty/publications.cfm> . In that document under Section I. E. 2. it states: “At five-year intervals, heads of graduate programs will be asked to evaluate the performance of graduate faculty in their programs and to recommend either continuance of graduate faculty status for another term of five years or a review of graduate faculty status by the program and the Graduate School. Heads of graduate

programs may initiate reviews at any time. If a review is called for, it will be conducted by the program head, in consultation with other program Graduate Faculty, and the dean of the Graduate School.”

The College of Technology’s policy for reviewing graduate faculty is as follows:

1. At intervals identified by the graduate school, faculty members must summarize their graduate program activity over the previous five years. The documentation should include scholarly publications, grants awarded, activity on graduate student committees, graduate courses taught, and any other service to the COT graduate program.
2. The documentation will be reviewed by the program head and the chair of the program’s graduate committee. As specified by the graduate school, the review will consider two criteria: continued productivity as a graduate faculty member and effectiveness as a graduate faculty mentor.
3. Upon completion of a successful review, graduate faculty status will be renewed for another five year term.

## **9.0 Fellowships and Assistantships**

One key function of the College of Technology Graduate Office is to coordinate the fellowship opportunities for College of Technology graduate students and to advantage applicants in appropriate manners. To this end, the Graduate Office maintains effective contact with the Graduate School’s Director of Fellowships among others.

### **9.1 Teaching Assistantships**

All teaching assistantships are arranged by the Department Heads of the College of Technology’s eight departments. In addition, occasionally there may be opportunities at various College of Technology statewide locations.

### **9.2 Research Assistantships**

Another form of student support is the Research Assistantship. Typically these involve work on a particular externally funded research project. Departments may list these on their own web pages. Graduate students are advised to check with their major professor as to opportunities they know about in their field of interest.

### **9.3 Fellowships**

Purdue University’s Graduate School also administers many university wide and national fellowship and scholarship programs. Students are advised to consult their website at <http://www.gradschool.purdue.edu/funding/> for the latest information on such opportunities.

#### **9.4 Student Applications for Support**

Students interested in assistantship and/or fellowship opportunities are advised to consult with their major advisor, appropriate department heads, and the College of Technology Graduate Office.

## **Appendices**

APPENDIX A	Guiding Standards for Advising and Mentoring Graduate Students
APPENDIX B	Qualifying Examination Report
APPENDIX C	Request to Schedule an Oral Examination (COT Form 1)
APPENDIX D	Request for Appointment of Examining Committee (GS-8)
APPENDIX E	A Guide to Ownership of Intellectual Property for Graduate Students at Purdue University
APPENDIX F	A Guide to Data Management and Retention for Graduate Students

## **Appendix A: Guiding Standards for Advising and Mentoring Graduate Students**

(developed by Purdue University Graduate School Committee on Ethics, December, 2003)

- Graduate faculty will foster the development of excellence in every graduate student.
- The agreement by a member of the graduate faculty to advise a student must be done carefully and thoughtfully. The graduate faculty advisor acts as the student's mentor, shaping the student's values and understanding of research. Before agreeing to advise a student, the advisor and student should consider their research goals; their mutual interests; the compatibility of their expectations, work habits, and personalities; and the career goals of the student.
- The best student/advisor relationships are those that closely approximate the relationship between senior and junior colleagues.
- It is the advisor's responsibility to guide the graduate student through the student's first research experience and to understand and constructively critique the research accomplishments made. In relations with students, graduate faculty will be candid, fair, and committed to the students' welfare and progress.
- Integrity in research is an essential part of Purdue University's intellectual and social structure, and adherence to its spirit and principles must be maintained. These principles include commitment to truth, objectivity, fairness, honesty, and free inquiry.
- The goal of research and scholarship is the discovery of knowledge.
- Graduate faculty are responsible for all phases of graduate education and will be accessible to students who are under their guidance.
- Graduate faculty should establish and communicate clear expectations regarding student commitment and effort to be devoted to the student's graduate program.
- The graduate advisor has the responsibility to discuss career opportunities with the student throughout the student's graduate program, and often after the student has completed their immediate degree objective.
- Graduate faculty must not condone nor tolerate discrimination against any individual on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a disabled or Vietnam-era veteran.
- Graduate faculty will advise students concerning the ethics of the profession; encourage the practice of ethical and responsible conduct in research, scholarship and publication; and assist students in addressing ethical issues.
- Early in a student's graduate tenure, their advisor should make the student aware of university and departmental policies regarding the conduct of research, and rights in data and intellectual property developed in the course of thesis research. Also critical is ensuring that the student understands their advisor's policies and procedures governing authorship and publication of research results.

- Graduate faculty have a responsibility to serve as an exemplar in recognizing and acknowledging the scholarly contributions of others; in providing complete and accurate records and reports of the results and conclusions of their research, scholarly, or artistic endeavors; and in preserving the integrity of the research record.
- Graduate faculty have a special obligation to exemplify the best qualities and highest standards of personal and professional conduct.
- Graduate faculty will strive to enhance the educational value of student assignments/experiences as teaching and research assistants.
- Graduate faculty will be objective in the evaluation of research and academic performance and will communicate that evaluation fully and honestly to their students. Graduate faculty will report accurately on the competence of students to other professionals who require such evaluations.
- Graduate faculty will not permit personal or intellectual differences with colleagues to impede student access to those colleagues or interfere with students' research or progress toward a degree objective.
- When engaged in teaching, research, or supervision, graduate faculty will recognize the power and influence they hold and avoid engaging in conduct that exploits or demeans students or that could be construed as an abuse of that power.

## Appendix B: Qualifying Examination Report

Student: \_\_\_\_\_ Date of Examination: \_\_\_\_\_

Form of Examination: \_\_\_ Written (\_\_\_ Hours duration) \_\_\_ Oral

Overall Examination Results:

\_\_\_ Passed (P) \_\_\_ Passed with conditions (PC) \_\_\_ Non-Acceptable (N)

Conditions if any:

Ph.D. Advisor Signature: \_\_\_\_\_

### Ph.D. Committee Member Signatures

	Name	Department	Graduate ID	Assessment (P PC N)
1.	_____ Ph.D. Advisor	_____	_____	_____
2.	_____ Ph.D. Co-Advisor (if used)	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

**Appendix C:**  
**Request to Schedule an Oral Exam Form (COT Form 1)**

[http://www.tech.purdue.edu/academics/graduate/forms\\_documents.cfm](http://www.tech.purdue.edu/academics/graduate/forms_documents.cfm) )

SOT Grad Studies Form 1

*Please type or print clearly*

**School of Technology  
Graduate Studies**

**Request to Schedule Oral Examination**

*(Must be filed 3 weeks prior to exam date)*

Major Advisor: \_\_\_\_\_

Graduate Student: \_\_\_\_\_

Exam Date: \_\_\_\_\_

Exam Start Time: \_\_\_\_\_

Exam End Time: \_\_\_\_\_

Equipment Required *(check all that apply)* :

Overhead Projector

Computer Projector

Other (please specify at right) \_\_\_\_\_

Examining Committee Members:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Invited Guests Requested:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Examining Committee Same as Advisory Committee?

Yes

No

Requested By:

\_\_\_\_\_  
*Signature, Major Advisor*

Grad Faculty Code: \_\_\_\_\_

**NOTE: Please assume this request has not been received by the School of Technology Graduate Office until you receive confirmation.**

**CONFIRMATION: (For Office Use Only)**

Exam Date: \_\_\_\_\_

Exam Time: \_\_\_\_\_

Room Number: \_\_\_\_\_

Equipment: \_\_\_\_\_

**Appendix D:**  
**Request for Appointment of Examining Committee Form (GS-8)**  
[http://www.tech.purdue.edu/academics/graduate/forms\\_documents.cfm](http://www.tech.purdue.edu/academics/graduate/forms_documents.cfm) )

Graduate School Form 8  
 (Revised 2/90)

(Please type)

**PURDUE UNIVERSITY**  
**GRADUATE SCHOOL**  
**Request for Appointment of Examining Committee**  
 (Adaptable for any degree)

Name of Student \_\_\_\_\_ Student ID No. \_\_\_\_\_

Examination to be taken:

- Preliminary Examination  
 Final Examination

Degree sought (exact title) \_\_\_\_\_

It is recommended that the following serve as members of the Examining Committee:

	Graduate Faculty Identifier	Area
Chair _____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

It is planned to hold the examination:

Date \_\_\_\_\_ Time \_\_\_\_\_ Building \_\_\_\_\_ Room No. \_\_\_\_\_

Thesis Title \_\_\_\_\_  
 \_\_\_\_\_

Recommended by: \_\_\_\_\_  
Major Professor Head of the Graduate Program

Department \_\_\_\_\_ Dept. Code \_\_\_\_\_

Date Submitted \_\_\_\_\_

Graduate School Dean

Submit original plus one copy to the Graduate School

## Appendix E: A Guide to Ownership of Intellectual Property for Graduate Students at Purdue University

(developed by Purdue University Graduate School Committee on Ethics, December, 2003)

During the course of graduate education, students will encounter and utilize intellectual property created by scholars and teachers from whom they learn, and they will create intellectual property as a result of their individual and collaborative efforts. Ownership of intellectual property created by Purdue employees and students, or through use of Purdue University resources is determined through the application of Purdue's policy on *intellectual property (Executive Memorandum B-10; [http://www.purdue.edu/oop/policies/pages/teach\\_res\\_outreach/b\\_10.html](http://www.purdue.edu/oop/policies/pages/teach_res_outreach/b_10.html))*. Graduate students should be familiar with the principles outlined in Purdue's policy so that they understand their rights and their obligations regarding the intellectual property they create.

- ***What is "intellectual property?"***

Intellectual property is a legal term that refers broadly to intangible and tangible property that is a unique creation of the human mind. As used in Purdue's policy, intellectual property is broadly defined to include inventions, copyrightable works, and trademarks, and also tangible research property. **Inventions** are novel, useful and non-obvious processes, methods, discoveries, devices, plants, compositions of matter, or other creations that reasonably appear to qualify for protection under the United States patent law. **Copyrightable works** are original works of authorship, which have been fixed in any tangible medium of expression, and include, but are not limited to, literary, musical, dramatic, choreographic, pictorial, graphic and sculptural works, motion pictures and other audiovisual works, sound recordings, architectural works, and computer programs. **Trademarks** are any words, names, symbols, or devices, or any combination thereof, adopted and used to identify goods or services and to distinguish them from those manufactured or sold by others. **Tangible Research Property** refers to perceptible items produced in the course of research including such items as biological materials, engineering drawings, integrated circuit chips, computer databases, prototype devices, circuit diagrams, and equipment.

- ***Who owns patent rights in inventions created by graduate students?***

Under Purdue policy, the University shall own all domestic and foreign rights in and to any and all inventions made or developed by all faculty, staff, students, and visiting scholars in the course of employment by the University, or through the use of University resources. University resources means any support administered by or through Purdue University, including but not limited to University funds, facilities, equipment or personnel, and funds, facilities, equipment or personnel provided by governmental, commercial, industrial, or other public or private organizations which are administered or controlled by the University.

- ***Who owns copyright to original works of authorship created by graduate students?***

It is the policy of Purdue University that all rights in copyrightable works shall remain with the creator unless:

1. The copyrightable work is created pursuant to the terms of a University agreement with an external party.

2. The copyrightable work is created as a specific, written requirement of employment or as an assigned University duty that is specified in writing or when the copyrightable work is prepared at the University's expense ("work-for-hire").
3. The copyrightable work is specifically commissioned by the University.
4. In the judgment of the University Committee on Patents and Copyrights, the creator of the copyrightable work made more than incidental use of university resources.
5. The copyrightable work is also patentable and/or is associated with a University trademark.

- ***Who owns copyright to original works of authorship created by a graduate student while satisfying degree requirements?***

The general principles of copyright ownership described above apply. However, in accord with academic tradition, and unless excepted by the conditions above, the University does not claim ownership to traditional works of scholarship, regardless of their form of expression. Specifically, the University does not claim ownership to works of students created in the course of their education, such as dissertations, papers and articles, when in the judgment of the Committee on Patents and Copyrights, the creator of the traditional work of scholarship did not make more than incidental use of University resources.

- ***What should a graduate student do if they create intellectual property that may be owned by Purdue University?***

If a graduate student believes that they have created intellectual property that may be owned by Purdue University, they should first bring the intellectual property to the attention of their major professor or supervisor, or the head of their department. Then, the student, in consultation with their advisor, supervisor, or head, should disclose the new intellectual property to the Purdue Research Foundation's Office of Technology Commercialization (OTC). OTC has been assigned responsibility for evaluation, protection, and management of intellectual property owned by Purdue University.

- ***If intellectual property created by a graduate student is licensed by the University, who shares in the revenue generated by the license?***

Under University policy, net proceeds derived from licensing University intellectual property will be distributed one-third to the inventors/creators and two-thirds to the University. One half of the University share will be returned to the inventors/creators departments. However, if the licensed intellectual property was created as a "work-for-hire" or a commissioned work, the inventors'/creators' share will be distributed to the inventors'/creators' department, rather than to the inventors/creators personally.

- ***How can I obtain additional information?***

Additional detailed information about the University's policy can be obtained directly by reading Executive Memorandum B-10. To obtain assistance with the interpretation of the University policy, contact the Purdue Research Foundation's Office of Technology Commercialization.

## **Appendix F: A Guide to Data Management and Retention for Graduate Students**

(developed by Purdue University Graduate School Committee on Ethics, December, 2003)

One major difference between undergraduate and graduate education is a shift in focus from mastering coursework to engaging in original scholarship or research. In classes, you probably spend most of your time learning what others before you have concluded from their data collection and analysis. As you begin to engage in original scholarship or research, you will gather your own data, conduct your own critical analyses, and draw your own conclusions. Critical to original scholarship or research in any discipline is the quality of your data ... your data is the currency of your analysis, the basis for your conclusions. Safeguarding this currency is an investment in your future and the future of your discipline.

- ***What is data?***

Francis Macrina<sup>1</sup> describes data as “any form of factual information used for reasoning.” Data may be a number resulting from a measurement or a picture documenting an event or an inventory of participants in a meeting or the nucleotide sequence encoding a plant protein or a digital mass spectrum derived from analysis of a small molecule. Dr. Macrina points out that some data is “intangible,” like a digital series of numbers recorded from an instrument, and other data is “tangible,” like a fixed and stained histological section of tissue dissected from an earthworm. Each of these forms of data has its own unique challenges to ensure accurate recording and preservation.

- ***Why is data management and retention important?***

In the text cited above, Dr. Macrina suggests several reasons why data management and retention are important. Recorded data provide the platform for analysis and interpretation of results from the field, laboratory, or library. They are also the basis for many forms of scholarly writings, and serve as the definitive source of facts, observations and details of methods, procedures, or analyses. Recorded and preserved data foster the norms of accuracy, replication, and reliability in scientific research. Often of special importance for students or their mentors trying to repeat or resume a project initiated by someone before them is the ability to understand precisely how a procedure was performed by someone else, and what was observed months or years before. Accurate and authenticated data records are critical for the documentation of inventions and the defense of patents. Recorded data are also critical in resolving challenges to data or conclusions, including formal allegations of research misconduct, that may arise long after the primary researcher has moved on to another project or institution.

- ***Who is responsible for data management and retention?***

Everyone who collects, analyzes, or reports data is a stakeholder with a personal and professional interest in the quality, accuracy, and preservation of their data.

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<sup>1</sup> Macrina, Francis L. (2000) *Scientific Integrity: An Introductory Text With Cases*, Chap. 11, ASM Press, Inc, Washington, DC, pp. 231-256.

Therefore, all student scholars or researchers, and their mentors, share responsibility for data management and retention.

- ***Who has rights in the data gathered by graduate students?***

The scholar or researcher who is the primary data collector certainly has rights in the data they collect. Likewise, all who collaborate in the design of an experiment or project may have rights in the data collected. However, Purdue University also has rights in data collected by its employees and students using University resources, especially if the project is supported with University funds or with funds from a third party administered by the University. Specifically, the University has an ownership interest in data collected under a sponsoring grant or contract from a third party such as a federal agency. Generally, the University's Principal Investigator or the faculty mentor directing the scholarship research has custodial responsibility for data collected under a grant or contract to Purdue University. As a result, it is the norm for original data collected under a sponsored project to be retained by the Principal Investigator/faculty mentor. However, it is also customary for a student to retain a copy of data collected in the course of their thesis research.

- ***How long must original data be maintained and accessible?***

Clearly, the best answer is as long as possible. Practical standards for data retention and archiving of data vary between disciplines and with the form of the data. However, if the data were obtained with sponsorship (funding) from a grant or contract from a U.S. federal agency, regardless of discipline or form of data, it is a requirement that all grant or contract records, including original data, must be retained, preserved and available for review for at least three years after the final financial transaction involving the grant or contract. It is the generally the responsibility of the Principal Investigator/faculty mentor to ensure that original data are retained, preserved and accessible.

- ***What is the most important take home lesson for every graduate student?***

Before beginning thesis or dissertation research, every graduate student should have a formal discussion with their advisor to ensure that they have planned how data will be recorded to ensure completeness and accuracy, and to ensure that it is preserved for future reference

