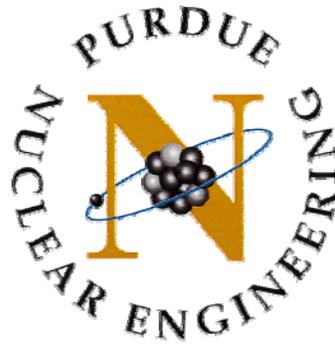


**GRADUATE MANUAL**

**2012 EDITION**



**SCHOOL OF NUCLEAR ENGINEERING**



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## **1.0 INTRODUCTION**

The School of Nuclear Engineering extends a hearty welcome to all new graduate students. The purpose of this manual is to acquaint students with our procedures and regulations as well as to provide them with information likely to be useful during their graduate career. In particular, this manual contains supplementary regulations and procedures that are specific to the School of Nuclear Engineering (hereafter referred to as the "School"). It is not intended to replace information, regulations, or procedures contained in the Graduate School's "Policies and Procedures Manual for Administering Graduate Student Programs" or other University or Graduate School publications. In the event of conflict, the Graduate School and/or University regulations shall prevail over School policies.

This manual supersedes the previous versions. It is designed so that individual sections can be revised as needed. Students will receive a copy of the current version of the manual at the time that they officially enter the graduate program. Students should carefully read each section and review the manual as necessary. The Graduate Office will maintain on the School of Nuclear Engineering website a master copy and a copy of all revisions. Students may choose to follow the manual version in effect when they enter the graduate program or the version in effect during the academic year in which they graduate. Any requests for exceptions must be endorsed by the student's advisor via a written petition and approved by the Graduate Committee.

### **1.1 Organization of This Manual**

Section 2.0 of this manual provides information on getting started in Purdue's Nuclear Engineering Graduate Program. It includes details on how to get an office, a mailbox, access to the computer networks and so on. Section 3.0 outlines expectations of those holding appointments as graduate assistants. Information on registration for courses for the first semester and beyond can be found in Section 4.0. Students pursuing a Master's degree will find information about their program in section 5.0, while information on the Ph.D. program is in section 6.0.

## **2.0 GETTING STARTED**

Upon arrival, the student will be provided with an assigned desk. Keys for entering the Nuclear Engineering building and the student's office (if located in the NUCL building) are available upon request (Main Office NUCL 140). Other laboratory keys will be issued, if needed, upon request from the faculty member responsible for the particular laboratory. The student will be assigned a mailbox, located in NUCL 115, and it is the student's responsibility to check it daily. Outside mail is delivered to the Nuclear Engineering building twice a day.

It is recommended that the student quickly become familiar with the libraries and computer resources. The Engineering Library is located in the Potter Engineering Center. New graduate students are required to take NUCL 597W, Nuclear Engineering Literature (3cr.), in part, to become familiar with the library and the many databases likely to be used for literature reviews. The Physics and Mathematics Libraries are also rich sources of relevant material.

Registered students are automatically provided an Engineering Computer Network (ECN) computer account. Passwords and policies on access and usage may be obtained from the Graduate Office. Each student will be provided with a computer and will have access to additional computers on campus.

## **3.0 OBTAINING AND KEEPING YOUR GRADUATE ASSISTANTSHIP OR FELLOWSHIP**

The School must make efficient use of its limited funding for graduate assistantships to assist faculty in teaching and research as appropriate. These appointments are offered and continued on a competitive basis, and the renewal of graduate assistantships requires satisfactory performance in teaching or research as well as suitable academic progress. Each student's academic performance is reviewed at the completion of each semester by the Graduate Chairperson. Any potential problem situations are brought to the attention of the Graduate Committee for appropriate action. The student's performance is judged on the following basis:

- a. Overall academic performance at Purdue, particularly maintaining A or B grades in all Nuclear Engineering courses as well as at least a B average (3.0 GPA) in all course work.

- b. For teaching assistants (TA's), the review provided at the end of each semester by the instructor to whom the TA was assigned. Comments from students attending the class may also be taken into account in this evaluation. These reviews are retained in the teaching assistant's permanent file.
- c. The grade (Satisfactory 'S' or Unsatisfactory 'U') assigned for research by the advisor.
- d. For research assistants (RA's), including those whose academic advisor is other than the director of the project to which the RA has been assigned, the reviews provided at the end of each semester by the project director as well as the grade assigned for research by the academic advisor are considered. First semester graduate students may also receive a mid-semester performance review. These reviews are retained in the research assistant's permanent file.

Unsatisfactory performance in any of the above areas may result in reduction, termination, or non-renewal of the graduate appointment. Every effort will be made to maintain support for students in good standing (providing that such support is available). However, students whose continued support is in question for reasons of performance, based on reviews by the advisor, will be notified in writing of the reduction, termination, or non-renewal of the appointment. In the case of a lack of funding, every effort will be made to give the student one semester notice of a pending change in the support level.

For master's degree students, the normal period of support, if funds are available, is three semesters (not including summer sessions). For Ph.D. students, the normal period of support, if funds are available, is seven semesters (not including summer sessions).

Terms of a graduate fellowship or assistantship are specified in the offer letter. Students holding a graduate assistantship or fellowship appointment may obtain additional information about their employment and payment schedule from the Nuclear Engineering Business Office (NUCL 132A). If the student has any questions regarding employment conditions, the student should see his or her advisor immediately or, if one has not yet been selected, the Graduate Chairperson. Teaching assistants will receive a course assignment notice during the week before classes begin. All teaching assistants should make sure they understand the nature of their assignment and meet with the professor to whom they are assigned before classes begin.

It is essential for students to understand that their performance as a research or

teaching assistance is important not only to them personally but to the entire School. Faculty members write research proposals to industry or a government agency specifying what research they will conduct and what products they will deliver in a given time period. The budget for the project includes funds to pay graduate students to do part of the work. If the work is not done properly or not completed on time, the project could be canceled, and it could be difficult for the faculty member to win additional research projects. Thus, a graduate student's failure to perform satisfactorily on a research project can jeopardize funding for that student and, perhaps, several others. On the other hand, exceptional performance can lead to recognition for the student and enhanced funding opportunities for the School. A student with a teaching assistantship has the opportunity to improve his or her own understanding of the material and to develop valuable career skills. He or she has the responsibility to help students master the course material. A teaching or research assistant with a 50% appointment is expected to give his or her full attention to assigned duties for an average of 20 hours per week.

Please refer to the Graduate Student Employment Manual on the web for further information: <http://www.gradschool.purdue.edu/funding/studentfunding.cfm>

## **4.0 REGISTRATION**

### **4.1 General Procedures**

As soon as possible, an incoming student should identify a specific area of interest and find an advisor who is willing to guide her or his study in that area. The student and advisor work together to develop a Plan of Study that lists the courses the student will take in order to complete her or his degree. Each semester the student will register for the courses slated for that semester on the Plan of Study. The Plan of Study can be modified at any time the student, advisor and advisory committee agree to do so. If the student does not have an advisor in time to select courses for the first semester, the Graduate Chairperson will serve as a temporary advisor.

When preparing to register, the student will work with his or her advisor to ensure that:

- a. courses are consistent with study objectives and area of specialization,
- b. courses are consistent with graduation requirements,
- c. the student has sufficient background for the more advanced courses. Students

coming from other universities, and/or other scientific and engineering disciplines may be required to take undergraduate courses (NUCL 300, 310, 320 and 402) or an equivalent graduate course (NUCL 501 to develop the required background

- d. courses do not duplicate material the student has already studied.

In case of doubt in choosing between two courses, the student may register for both with the plan to drop one after a few days of classes when a more informed selection can be made. However, the student should be aware of time restrictions for adding or dropping courses. Please note that a late fee will be assessed if the student is not registered before the first day of classes.

The current schedule of classes can be found online via the student's MyPurdue account. Students can find textbooks for courses at the bookstores. If the student wants more information about a course, he or she is encouraged to discuss the course with the instructor.

To register, the student should confer with his or her advisor and complete the Course Request - Form 23. When making course selections, be certain there are no time conflicts. Courses must also meet any visa requirements for international students or requirements from supporting organizations that may apply.

A normal *full-time* graduate coursework/research load is 15-18 credit hours per semester and may not exceed 18 (3-9 credit hours not exceeding 9 during the summer modules). A minimum of 8 credit hours must be taken for Fall and Spring semesters.

Students with assistantships should obtain a staff classification code on the course request form from the Business Office. All completed course request forms should be submitted to the School's Student Services Office for processing. Continuing graduate students should use advanced registration, which is available after Spring Break for summer session and fall semester and after October break for the following spring semester.

#### **4.2 Registration for Research**

Students must be registered for thesis research (Master's - NUCL 698 or Ph.D. - NUCL 699) when they are conducting research requiring faculty direction and/or using University facilities. (NUCL 698 is also currently utilized for students who are conducting non-thesis research.) Graduate students who hold a graduate appointment must be registered for a minimum of three credits (either course or research hours) unless specifically excused by the Graduate School to register for Examination or Degree

Only (see Section 4.4).

### **4.3 Registration for Colloquium (NUCL 696)**

Colloquia are held in the School on a regular basis, bringing to Purdue outstanding nuclear scientists, engineers and others of significance to nuclear engineering. All graduate students registered for research or course work are required to register for NUCL 696 in both fall and spring semesters. If the student has a scheduling conflict, he or she should consult the Colloquium coordinator before any anticipated absence.

Regular attendance is necessary to earn a grade of "Satisfactory" in NUCL 696 (attendance records are kept). Students are expected to participate in the discussions that follow the colloquia lectures. Students with unexcused absences from the colloquia should discuss this with the Colloquium coordinator as soon as possible to avoid a grade of "Unsatisfactory". In the case of an unexcused absence, a student may be required to submit a two-page essay on the seminar topic based on the student's own study is required.

Every graduate student in the School of Nuclear Engineering is required to complete the on-line Collaborative Institutional Training Initiative's (CITI) responsible conduct of research training program during his or her first semester of enrollment. Details on the CITI training will be provided at the first colloquium of the semester. Each graduate student must submit a certificate of completion for the CITI training to the Student Services Office by the last day of classes in order to receive a grade of "Satisfactory" in the colloquium. The certificate of completion will be retained in the student's file.

### **4.4 Registration in the Final Academic Session**

When the student registers for the session in which he or she expects to complete a degree, the candidate status line on the Course Request (Registrar's Form 23) must indicate this intent.

In the semester the student plans to receive his or her degree, the Graduate School normally sends to the School a checklist of requirements yet to be met (candidate certification form); however, it is the student's responsibility to ensure that all requirements are met. Graduation deadlines are available on the Graduate School web page (<http://www.gradschool.purdue.edu/index.cfm>) via the Calendars and Deadlines link. Should the student fail to meet any of the graduation requirements by the deadline specified, he or she will not graduate in that semester and must register in the following semester.

All degree candidates should view a copy of "A Manual for the Preparation

of Graduate Theses" on the Graduate School website

<http://www.gradschool.purdue.edu/index.cfm>. See Section 5.2.5 or 6.2.8 for further information regarding thesis preparation.

If a student has completed all coursework but has failed to complete other requirements in time to graduate, he or she can take advantage of one of the following less expensive registration options as specified in Sections V G.2.a and V G.2.b of the Graduate School's Policies and Procedures for Administering Graduate Student Programs:

a. *Examination Only*. A student who was registered for at least one hour of research, with a grade of "Satisfactory", in the previous spring or fall semester, and who has finished all degree requirements except for the final examination and depositing the thesis prior to the first day of the academic session of graduation may, with Graduate School approval, register for "Examination Only" at a reduced fee. This registration will remain valid only if both a positive *Report of the Final Examination* and a *Thesis Receipt* have been received in the Graduate School by the eighth week of the semester (fourth week of a summer session).

Otherwise, the registration for the current session must be revised following normal registration guidelines. This deadline does not apply to non-thesis option master's students.

b. *Degree Only*. A student who completes all degree requirements except depositing the thesis prior to the first day of the academic session of graduation may, with the Graduate School approval, register for "Degree Only" at a reduced fee. This registration requires Graduate School approval. This registration will remain valid only if a *Thesis Receipt* is received in the Graduate School by the eighth week of the semester (fourth week of a summer session). Otherwise, the registration for the current session must be revised following normal registration guidelines.

This deadline does not apply to non-thesis option master's students.

#### **4.5 Research in Absentia**

Ph.D. students who have completed their course work and Preliminary Examination, made significant progress on their thesis research topic, and established a plan for accomplishing research at a location away from campus may, with the approval of their advisor and the School Head, petition for permission to register for research in absentia. The formal request (Graduate School Form 12) must be received by the Graduate School at least one month prior to the beginning of the initial session for which

absentia registration is sought.

#### **4.6 Change of Duty Station**

On occasion, the University is involved in projects requiring staff, including graduate students holding assistantships or fellowships, to be stationed off campus (either in the U.S. or abroad) for extended periods of time. If a graduate student engaged in such a project is to be paid by or through Purdue University, a change of duty station request is required. The student and advisor must arrange for the student to be registered each academic session during which the student receives a stipend. The level of registration should reflect as accurately as possible the anticipated contribution the research will make to the student's degree program.

#### **4.7 Classification of Degree-seeking Graduate Students**

As a degree-seeking graduate student, the student will be classified by the Graduate School in one of the five categories as follows:

- a. *Master's Student*: Class M - Those students who have been admitted to pursue a master's degree are initially in this group. Their first registration will be under this classification. They will remain in this group until a plan of study has been approved.
- b. *Master's Candidate*: Class B - After a master's Plan of Study has been submitted and approved, the student will be classified as a master's candidate, effective the beginning of the following semester. The student must be registered under this classification in the semester in which the master's degree is to be awarded.
- c. *Doctoral Admittee*: Class A - Those students who have been admitted to pursue a doctoral degree are initially placed in this classification. They will remain in this category until the Ph.D. Plan of Study is approved.
- d. *Doctoral Student*: Class C - After a Ph.D. Plan of Study has been approved, the student will be reclassified as a doctoral student effective at the beginning of the following semester.
- e. *Doctoral Candidate*: Class D - After a doctoral student has taken and passed the Preliminary Examination, he or she is officially admitted to doctoral candidacy effective the following semester. The student must be registered under this classification during the semester in which a Ph.D. degree is to be awarded.

#### **4.8 Readmission and Transfer**

Any graduate student who has not been enrolled for one semester or more

(excluding summer sessions) must apply for readmission on Graduate School Form 1. Such readmission will be evaluated by the Graduate Committee. Transfer to or from another department requires a release by the head of the original department, but the matter should first be discussed with the Graduate Chairpersons of the departments involved. It is required that students considering a transfer inform their advisor and the Graduate Chairperson well in advance of seeking the transfer. The School would like to minimize the impact of the transfer on ongoing research programs and on student support.

## **5.0 MASTER'S DEGREE PROGRAM**

### **5.1 General**

This degree program serves those seeking the Master of Science (M.S.) degree as well as those planning to work eventually toward the Ph.D. degree. A transition to the Direct Ph.D. program can be made during a master's program with the approval of the Graduate Committee provided that certain criteria are met (see Section 6.2.4).

Two master's degree titles are available through the School: an M.S. in Nuclear Engineering (MSNE) for students with a B.S. in an engineering discipline and an M.S. for other students. Degree programs available are (1) thesis option and (2) course work option. The degree requirements are listed in Table 5.1 and described more fully in the following sections. Note that the course work option is intended for students planning to pursue a career in industry and is not encouraged for students interested in research.

Students should plan to finish their program in 2 to 4 semesters depending on their preparation. The combined Undergraduate/Graduate Program within the School normally enables students to begin their graduate programs earlier and finish the graduate program sooner (see Undergraduate/Graduate Program in Section 5.3).

### **5.2 Milestones in Pursuit of the Master's Degree**

The milestones and desired completion dates for master's degree students who are involved in research are listed below and described more fully in subsequent sections.

- a. Selection of area of specialization, academic advisor (also referred to as major professor), and degree program (1<sup>st</sup> semester or as early as possible)
- b. Preparation and approval of a plan of study (1<sup>st</sup> semester - required for 3<sup>rd</sup> semester registration)
- c. Identification of a research topic (2<sup>nd</sup> Semester)

- d. Completion of research work (2<sup>nd</sup> and 3<sup>rd</sup> semester)
- e. Preparation of master's thesis (3<sup>rd</sup> or 4<sup>th</sup> semester)
- f. Final examination (3<sup>rd</sup> or 4<sup>th</sup> semester)
- g. Graduation procedures (see Section 5.2.7)

Steps c through f do not apply for the course work option.

### **5.2.1 Selection of Area of Specialization and Academic Advisor.**

Many students select an area of specialization and an advisor prior to beginning the first semester of graduate school. Often a student selects a graduate institution because it offers an opportunity to work in a particular area or with a particular professor. If an entering student does not have an advisor, a temporary one will be appointed by the Head for the student's first semester of enrollment. Often the temporary advisor will be the Graduate Chairperson.

During the first semester of enrollment, the student with a temporary advisor will work with faculty members to identify an area of specialization and an advisor. The student should talk with and visit the websites of as many Nuclear Engineering faculty members as possible to learn about their work. A faculty member will become a student's advisor only if the student and faculty member agree to establish that relationship. The advisor is not responsible for providing financial support to the student. If the advisor chooses to provide financial support, a formal offer letter is required. It is to the student's advantage, of course, to select an advisor as soon as possible, but an advisor must be selected no later than the last week of classes of the first semester of residency.

### **5.2.2 Satisfaction of Departmental English Proficiency Requirement.**

All graduate students are required to take "Nuclear Engineering Literature" (NUCL 597W) in their first year of study. The objectives of the course are to make students aware of the importance of strong communication skills (written, oral, graphical, and interpersonal) in a successful engineering career and to give the students an opportunity to learn and practice effective communication skills.

### **5.2.3 Preparation and Approval of the Master's Plan of Study.**

All students seeking a master's degree must file a plan of study. The plan of study must be approved before the end of the second semester of the student's registration; otherwise the student will not be allowed to register for the next semester. A tentative plan of study should be submitted by the end of the first academic semester for master's

students. It is important to note that the approved Plan of Study must be filed with the Graduate School prior to the first day of the academic session of graduation. The student will incur late fees as a result of a late submission. Additionally, students who do not meet this deadline will not be eligible to graduate that semester without special permission from the Graduate School. Plans of Study may take weeks or months to process, therefore, submitting as soon as possible is highly recommended. Plans of study are submitted electronically via the student's MyPurdue account located at <http://www.mypurdue.purdue.edu>.

Students should refer to the Electronic Plan of Study Checklist below to ensure successful submission.

1. Enter the student's full legal name, student identification number and date the plan of study is submitted.
2. Enter the official departmental name (Nuclear Engineering) and code (E32).
3. Enter the official degree title (MS or MSNE).
4. Enter a reasonable expected graduation date.
5. Enter an area of specialty (if applicable).
6. List coursework to be used for degree.
  - a. 24 credits of coursework should be listed, including core courses (NUCL 501, NUCL 504, NUCL 510, NUCL 520, NUCL 551, NUCL 597W and 6 credits of Math or Computer Science or other approved quantitative course). Note that NUCL 597W must be listed and taken but is not counted in the 24 hours of technical credit.
  - b. Research credits are not listed on the plan of study.
7. Enter the exact title and course number as it appears in MyPurdue.
8. Enter transfer courses from other institutions, exams and certified undergraduate excess courses. This can add up to 30% (or 9 credits for MS degree) of credits for degree.
  - a. Certified undergraduate excess courses must be approved by the Registrar. Courses previously applied to an undergraduate degree are not eligible.
9. Enter the month and year the course was or is expected to be completed.
10. A minimum of 50% of the coursework must be listed as 'Primary'. Primary

course standards are decided upon by the Major Professor and graduate student.

11. Enter the names and faculty identifier numbers of committee members.
  - a. Master's Thesis committees must consist of at least 3 graduate faculty members.
  - b. Master's Non-Thesis committees must consist of at least 3 graduate faculty members.
  - c. At least 51% of the committee members must be 'Regular' faculty members meaning they must have regular graduate faculty status.
12. Indicate each committee member's area of expertise.

At least one committee member must be from a field outside of Nuclear Engineering. Students can make changes to their plan of study at any time. Each time a change is made an updated plan of study will need to be submitted electronically and receive approval from the student's faculty advisor, committee members and the Graduate School.

#### **5.2.3.1 Core Curriculum.**

The required core courses for nuclear engineering graduate students are NUCL 504 (radiation), NUCL 510 (reactor physics), NUCL 520 (reactor materials), and NUCL 551 (reactor safety). Students without an undergraduate nuclear engineering background, are required to complete NUCL 501 (an introductory course) as well as NUCL 504, 510, 520 and 551. Students who took NUCL 205 and NUCL 305 as undergraduates at Purdue are not required to take NUCL 504.

Students pursuing the thesis option must take a minimum of 24 hours of 500 or 600 level technical courses, including the core courses and 6 hours of mathematics, computer science, or other approved quantitative courses. Students may petition the Graduate Committee to waive the mathematics requirement if they have taken 500-level mathematics or computer science courses elsewhere. If a student has undergraduate credit at Purdue for one or more of the core courses, he or she will take other 500 or 600 level technical courses to fulfill the 24 credit hour requirement. Any Purdue 500-level or 600-level technical course is an acceptable elective provided that it is consistent with the student's program and objectives. For special circumstances, a student may include a maximum of 3 credit hours of a needed undergraduate course on his or her plan of study.

#### **5.2.3.2 Transfer Credits and Undergraduate Excess Credit**

A maximum of 9 hours of graduate-level courses taken elsewhere as a graduate student

can be transferred to the master's plan of study provided that the student supplies adequate proof that each course corresponds to at least a 500-level course at Purdue and that the subject matter is not duplicated by the courses taken here. Graduate level courses the student has taken as an undergraduate, earned a grade of B or better, and had certified as excess (see Undergraduate/Graduate Program in Section 5.3) may also be listed on the master's plan of study. A maximum of 9 credits may be obtained by transfer and undergraduate excess courses. Grades of B or better are required for all such courses.

### **5.2.3.3 Grade Requirements.**

A grade of B or better (B- is not sufficient) is required for each course appearing on the plan of study as a primary course. In addition, residency requirements must be met (see the Graduate School's Policy and Procedures Manual) and a minimum final grade point average of 3.0 is required. The student's faculty advisor routinely reviews each student's academic performance and will advise the student if his or her performance is not meeting the required standards.

### **5.2.4 Advisory Committee.**

The student, with the help and approval of his or her advisor, must assemble a master's advisory committee. For the thesis option, this committee consists of at least two permanent faculty members from nuclear engineering and one member from another discipline with faculty certification known to be familiar with the area of research. For the non-thesis degree option, the committee should consist of at least two permanent nuclear engineering faculty members and one member from another discipline with faculty certification. In all cases, additional advisory committee members may be assigned as needed. Fifty-one percent of the advisory committee members must be regular graduate faculty members.

### **5.2.5 Identification of a Research Topic and Funding of Research Work.**

The student and his or her advisor will work together to identify a research project of mutual interest. Students need to be aware that the selection of a research project is typically influenced by the availability of funding. Faculty members write proposals for funding to support research they want to conduct. The budget for the project typically includes support for one or more graduate students. If the proposal is accepted, the faculty member receives the funding. Along with the funding comes the responsibility to complete the proposed project on schedule. The graduate student's contributions are critical to the success of the

project. Furthermore, success of the project is critical to the student since the future funding of a faculty member's research depends, on part, on past performance.

In ideal situations, a task within a faculty member's project becomes the graduate student's thesis research. Even if the project task and the thesis are not one and the same, the task is related to the student's thesis research. In any case, a 50 percent research assistantship obligates the student to dedicate an average of 20 hours of concentrated effort per week to assigned tasks contributing directly to the success of the research project.

Another source of funding for a student's research project is external fellowships. A student with a major national fellowship is in a position to devote full time to his or her research, although that research is often closely aligned with the advisor's efforts. The National Science Foundation, Department of Energy, Department of Homeland Security and other government agencies have annual fellowship competitions. Nuclear Engineering graduate students with qualifications that make them competitive for a national fellowship are expected to apply. The College of Engineering and Graduate School hold workshops to provide tips on preparing strong applications.

### **5.2.6 Preparation and Deposit of Master's Thesis**

The master's thesis should document research results in a clear and concise fashion, and it should be prepared while in residence. Faculty advisors will be the best guides on matters of organization for each individual thesis.

It is absolutely essential that a student writing a thesis give proper credit for any material or ideas from other work. Giving proper credit is a responsibility of every member of the scientific research community, and failure to give credit (plagiarism) can result in severe academic or legal penalties. Plagiarism is defined in "Academic Integrity: A Guide for Students" (<http://www.purdue.edu/odos/osrr/integrity.htm>) as follows:

"Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- submitting a document written by someone else but representing it as one's own".

Purdue University typically has a license to use a software package that allows a student to check his or her own work for plagiarism. Prior to submitting a thesis to the Advisory Committee for review in preparation for the final defense, the student should make every effort to check his or her own work for plagiarism. On Form 9, the advisor is asked to attest that, to the best of his or her knowledge, the thesis does not contain plagiarized material, and the advisor may choose not to sign the Form 9 unless the student can demonstrate that the document has been checked for plagiarism.

Students should visit the Thesis/Dissertation Office website <http://www.gradschool.purdue.edu/thesis.cfm> before beginning preparation of their theses. The website provides students with links to 'Guidance & Tools', 'Format & Deposit Checklists', 'Required Thesis Forms' and 'Copyright Information'.

### **5.2.7 Final Examination**

When the student and advisor agree that the thesis is complete, a final examination will be held by the advisory committee at a time acceptable to all committee members. To initiate the examination process, the student must prepare a Request for Appointment of Examining Committee (Graduate School Form 8). Form 8, which specifies the date, time and place of the exam, must be signed by the advisor and the Head of the School of Nuclear Engineering and must be submitted to the Graduate School at least two weeks prior to the date of the examination. At this time the student should also schedule a final deposit appointment with the Graduate School.

A final thesis draft copy of "original" quality, suitable for publication must be distributed to the examining committee a minimum of 14 days prior to the scheduled final examination. A thesis delivered less than 14 days prior to the scheduled final examination may not be accepted. Prior to the final examination, the Academic Program Administrator will provide the advisor with the Graduate School Form 7, Report of Master's Examination Committee Form, Form 9, Thesis Acceptance Form and Assessment Rubrics for each committee member.

The final examination is scheduled for 2 hours. The student will make a formal presentation of about 45 minutes on his or her thesis. Anyone is welcome to attend the presentation, and typically those present but not on the examining committee will have an opportunity to ask questions. The second hour of the examination is closed with only the

student and examining committee present. The committee may ask questions about the thesis research and any related Nuclear Engineering concepts.

Upon successful completion of the final examination, the members of the examining committee will sign the Report of Master's Examining Committee (Graduate School Form 7). This report form is forwarded to the Academic Program Administrator who will then secure the additional required signatures before sending the form to the Graduate School.

The student will make committee recommended corrections and/or additions to the thesis. After changes are made, final approval of the thesis is secured by obtaining the signatures of the examining committee members, the Department Head and Department Thesis Format Advisor (Academic Program Assistant) on the thesis acceptance form. Once the Form 9 has been signed, the student will keep his or her deposit appointment with the Graduate School and provide the Graduate School with the fully signed Form 9. At least 24 hours prior to the appointment, the student will submit the thesis via Electronic Thesis Deposit (ETD). Candidates submitting 'Confidential' ETDs must also bring their departmental library copy. If the thesis is acceptable, a Thesis Receipt (Graduate School Form 16) will be issued and should be delivered to the Graduate School before the end of the first working day following the last day of classes.

### **5.2.8 Course Work Option.**

Since some exposure to research is considered an essential ingredient of most master's programs, the 33-hour course work option is available to students anticipating a career in industry. All 33 hours must be comprised of course work at Purdue University.

### **5.2.9 Graduation Procedures.**

Students must meet all deadlines set by the Graduate School and the Office of the Registrar in order to graduate in a particular semester. It is the student's responsibility to know and meet these deadlines. The Graduate School deadlines can be found online at <http://www.gradschool.purdue.edu>. The Office of the Registrar's candidacy requirements and directives can be found online at [http://www.purdue.edu/registrar/candidate\\_status](http://www.purdue.edu/registrar/candidate_status). Students will incur late fees as a result of late submission of the Electronic Plan of Study to the Graduate School, declaration of candidacy beyond the deadline, and listing on the Graduate School's candidate roster for the same degree more than two consecutive sessions in a row. In order for a student to avoid late fees with the Graduate School, he or she must adhere to the posted deadlines.

After all academic requirements are met there are still a few administrative details to be attended to. The checklist below should help avoid any omissions.

- a. Complete the Checkout Sheet (available from the Student Services Office) and return keys, etc. to the Main Office. Please note that failure to complete and return this form may result in non-approval of the candidate certification and failure to graduate.
- b. All research materials accumulated during a student's tenure including the yellow copy of the laboratory notebook should be turned in to the student's supervisor, if applicable. In the case of certain sponsored programs the University has a legal custodial responsibility for such materials.

If a student intends to continue for the Ph.D. degree, he or she may pre-register under the master's degree candidate classification for the following semester.

### **5.3 Undergraduate/Graduate Program**

Nuclear Engineering undergraduates at Purdue University may, with the approval of the department and the permission of the dean of the Graduate School, be admitted to the Graduate School in the session in which the baccalaureate degree is being completed. This program helps students to focus on their graduate course work at an earlier stage, and most importantly, begin to become familiar with a research area and a particular research group in the School. This normally accelerates their graduate program, and may provide an additional opportunity for financial support during the undergraduate program if funds are available.

Early admission to the Graduate School usually is required only if the student is to receive a graduate staff appointment. If early admission is required, the student must submit a complete application along with supporting documents at least two months prior to the desired session of entrance. Otherwise, early admission is not required for undergraduate students wishing to begin graduate study. The student may simply use *Registrar's Form 350* to designate a graduate course as excess of baccalaureate requirements. This form is available from the Student Services Office. The completed form must be submitted to the instructor of the course to be taken for graduate credit at the beginning of the academic session in which the course will be taught in order to earn graduate credit. The instructor must submit the form with the course grades at the end of the session, indicating successful completion at the graduate level. A maximum of 9 hours of graduate credit for such courses with grades of B or better will be granted

only after the student has been awarded an undergraduate degree, achieved a minimum graduation index of 3.00, and obtained approval of the Nuclear Engineering Head.

**TABLE 5.1**  
**MASTER'S DEGREE REQUIREMENTS**

|  | THESIS OPTION  | COURSEWORK OPTION | DIRECT Ph.D. PROGRAM |
|--|--|-------------------|----------------------|
| Credits Required   | 33   | 33                | 33                   |
| Courses Required   | 24*  | 33*               | 33*                  |
| Thesis Credit  | 9 hrs. NUCL 698  | 0                 | 6 hrs. NUCL 698      |
| Transfer Credits Maximum Total from Outside or from Undergraduate Excess (Grade A or B Only) | 12   | 12                | 12                   |
| Final Exam   | Thesis Defense   | N/A               | Thesis Defense       |
| Advisory/Exam Committee Minimum Members  | 3  | 3                 | 4                    |
| Advisory/Exam Committee Minimum Outside Nuclear Engineering                                  | 1  | 1                 | 1                    |
| Common Requirements  | GPA greater than or equal to 3.0, A or B Grades on all primary courses on the Plan of Study, Residence Requirements met (see Graduate School Policies and Procedures Manual) |                   |                      |

\* Including 6 hours of approved math, computer science or other computational courses.

| TABLE 5.2 - GRADUATE FACULTY IDENTIFICATION NUMBERS |             |
|---|-------------|
| NAME:   | FACULTY ID: |
| Allain, Jean Paul                                   | C7099       |
| Choi, Chan K.                                       | C2505       |
| El – Azab, Anter                                    | C8379       |
| Fentiman, Audeen W.                                 | C6733       |
| Garner, Allen                                       | TBA         |
| Harilal, Sivanandan                                 | C7776       |
| Hassanein, Ahmed                                    | C7198       |
| Hibiki, Takashi                                     | C6858       |
| Ishii, Mamoru                                       | C3183       |
| Lopez, de Bertodano, Martin                         | C3940       |
| Miloshevsky, Gennady                                | C7908       |
| Revankar, Shripad                                   | C4869       |
| Sizyuk, Valeryi                                     | C7919       |
| Taleyarkhan, Rusi                                   | C6127       |
| Tsoukalas, Lefteri                                  | C4361       |
| Yang, Won Sik                                       | C8427       |
|   |             |

## **6.0 THE PH.D. DEGREE PROGRAM**

### **6.1 General**

This program is open to students who have successfully earned their master's degree or are enrolled in our master's program and have successfully completed the requirements for our "Direct Ph.D. Program". Based on past experience, a minimum of 2 to 3 calendar years is typically necessary for completion of all degree requirements for students arriving with a master's degree and 3 to 4 years for the Direct Ph.D. Program. Milestones in the Ph.D. program are indicated below. Students who significantly deviate from the milestone sequence should be aware of the Ph.D. program time limitations discussed in Section 6.3.

### **6.2 Milestones in Pursuit of the Ph.D. Program:**

- a. Selection of Area of Specialization and Academic Advisor - also referred to as Major Professor (1<sup>st</sup> semester)
- b. Passing of the Ph.D. Qualifying Examination (2<sup>nd</sup> semester after M.S.N.E., 4<sup>th</sup> semester after M.S. other than in N.E., or 2<sup>nd</sup> semester after B.S. for students intending to enroll in the "Direct Ph.D. Program")
- c. Identification of Thesis Topic (as early as possible)
- d. Admission to the "Direct Ph.D. Program" - applicable if student does not hold a master's degree already (petitioned immediately after successful completion of qualifying examination)
- e. Satisfaction of Departmental Ph.D. English Proficiency Requirement (1<sup>st</sup> year)
- f. Preparation and Approval of Ph.D. Plan of Study (3<sup>rd</sup> semester - required for 4<sup>th</sup> semester registration)
- g. Preliminary Examination (by the 2<sup>nd</sup> semester after passing the qualifying examination)
- h. Preparation of Ph.D. Thesis
- i. Preparation of Scholarly Journal Paper
- j. Defense of Ph.D. Thesis (typically 6<sup>th</sup> semester after master's degree or entry with master's degree or 7<sup>th</sup> semester after bachelors degree for "Direct Ph.D. Program")
- k. Graduation Procedures

These milestones are discussed in detail in the following sections.

### **6.2.1 Selection of Area of Specialization and Academic Advisor.**

Many students select an area of specialization and an advisor prior to beginning the first semester of graduate school. Often a student selects a graduate institution because it offers an opportunity to work in a particular area or with a particular professor. If an entering student does not have an advisor, a temporary one will be appointed by the Head for the student's first semester of enrollment. Often the temporary advisor will be the Graduate Chairperson.

During the first semester of enrollment, the student with a temporary advisor will work with faculty members to identify an area of specialization and an advisor. The student should talk with as many Nuclear Engineering faculty members as possible to learn about their work. A faculty member will become a student's advisor only if the student and faculty member agree to establish that relationship. The advisor is not responsible for providing financial support to the student. If the advisor chooses to provide financial support, a formal offer letter is required. It is to the student's advantage, of course, to select an advisor as soon as possible, but an advisor must be selected no later than the last week of classes of the first semester of residency.

The discussions that lead to the choice of the academic advisor will normally include a discussion of the thesis topic at least in a general form. It is important for the student to start reviewing the technical area and to initiate discussions with the advisor on the topic as soon as possible.

### **6.2.2 The Ph.D. Qualifying Examination**

The purpose of the Ph.D. qualifying examination is to help determine as early as possible whether a student has the capability and background to conduct the original, independent research that is required in the Ph.D. program.

Students must take the qualifying examination within 2 semesters of completing the M.S. MSNE or within 2 semesters of completing the BS degree for those students who are in the direct Ph.D. program. Students entering the Nuclear Engineering graduate program with an MS in a field other than nuclear engineering must take the qualifying examination with 4 semesters after enrolling in the nuclear engineering program. If extenuating circumstances prevent a student from taking the exam within the specified time, the student's advisor will provide written notice to the Graduate Committee.

The examination is administered by the faculty once a year, in the spring semester, with the Graduate Chairperson serving as the coordinator. The exam will consist of (1) a written

portion testing the student's general knowledge of fundamental nuclear engineering concepts and (2) a combined research assessment paper and oral examination covering the student's selected area of specialization. The timeline for the examination will be

- Week 2 of the Spring Semester, students will receive a journal paper which will be the basis for the written research assessment paper.
- Week 5 of the Spring Semester, students will take the written general knowledge examinations.
- Week 6 of the Spring Semester, students will turn in the written research assessment paper.
- Week 7 of the Spring Semester, students will take the oral portion of the exam in the area of specialization.
- No later than Week 9 of the Spring Semester, students will be notified of their final grades on the exam.

A comprehensive list of the concepts with which a student should be familiar for each portion of the written exam and each specialization area will be prepared by the faculty members responsible for each examination and will be posted on the School's website before the students sign up to take the exam.

At the end of October, the Graduate Chairperson will hold a briefing to discuss the qualifying examination. By the middle of November (the specific date will be provided in the briefing), students planning to take the qualifying examination must register with the Graduate Office and indicate in writing their area of specialization. If a student subsequently withdraws from the examination, the exam will be considered a failure except in cases of extenuating circumstances.

#### **6.2.2.1 General Knowledge Portion of the Exam**

Each student will be required to take four one-hour written general examinations. The four areas of the exams are listed below along with the courses in which topics in these areas are currently taught.

1. Nuclear Engineering Fundamentals and Reactor Physics (NUCL 300, 310, 510, 501)
2. Nuclear Materials, including fuel cycle and waste management (NUCL 320, 520, 501)
3. Fluids, Heat Transfer, and Reactor Safety (NUCL 350, 351, 355, 402, 551)
4. Nuclear Radiation Detection and Protection (NUCL 205, 305, 504, 501)

Two written exams will be given in the morning and two in the afternoon. Students will

be given one examination at a time, and the exam will be collected at the end of the hour. The exams will be closed book. Each examination will be prepared by two faculty members who have recently taught courses related to the area of the exam.

In addition to basic knowledge of nuclear engineering fundamentals, the four written examinations will measure qualities such as ability to think logically and analytically, communication skills, problem definition, insight, creativity, synthesis and the ability to formulate solutions. A mastery of basic mathematics, physics, engineering science, and nuclear engineering is expected.

#### **6.2.2.2 Research Assessment Paper and Oral Exam in Area of Specialization**

Each student registering to take the qualifying exam will indicate an area of specialization. The current areas of specialization are fusion, materials, thermal-hydraulics and reactor safety, nuclear structure and radiation interactions, and reactor physics. (Over time, the areas of specialization will change as the faculty, students, and external conditions change.)

The examination in the area of specialization will be conducted by an Area Committee consisting of faculty members (typically 4 members) with expertise in the area. The student's advisor will be a member of the Area Committee conducting the examination. The Area Committee will select the archival journal paper for the student to read, grade the written research assessment paper, and conduct the oral portion of the specialization exam.

The student will be assigned one archival journal paper in his or her area of specialization to read, summarize, critique, and extend. The summary of the paper will demonstrate the student's understanding of the material. The critique will include both the student's own evaluation of the work and a comparison with work of other researchers in the area. It will also include a discussion of the impact of the paper and place the paper in historical perspective. In the extension, the student will identify important questions raised by the paper, gaps in the research, or substantive weaknesses in the paper. He or she will then make a preliminary attempt to address the questions or gaps or otherwise strengthen the paper. An outline of the paper to be written will be provided. The research assessment paper prepared by the student should be double spaced and approximately 15-20 pages long, exclusive of title page, table of contents, abstract, nomenclature, figures, tables, and references.

At the time that the student picks up the archival journal paper to be read, he or she will be asked to sign a form indicating that the student received the research assessment package (article to read, outline of paper the student is to write, and due date) and that the student will work independently. In addition, the student will acknowledge receipt of a statement that if plagiarism is detected in the written assessment paper, the student will receive a failing grade for

the research assessment paper and oral examination and may be subject to further disciplinary action. Written papers submitted by the students will be independently graded by each member of the Area Committee conducting the exam in the area of specialization and will be checked for plagiarism.

The oral examination in the area of specialization will be 2 hours long. The student will give a 30-minute presentation on his or her research assessment paper. Following the presentation the Area Committee members will ask questions about the research assessment paper and related topics in the area of specialization.

### **6.2.2.3 Examination Result**

Within two weeks of the oral portion of the exam, the Head of the School of Nuclear Engineering will inform each student in writing of the results of the exam. The student must pass all 4 portions of the written general exam and the complete specialization area exam (combined written research assessment paper and oral examination) to enter the Ph.D. program. Students who fail any portion of the exam will have a second opportunity to take that portion of the exam that they did not pass the first time. Those students must take the failed portions of the exam immediately the next time the qualifying examination is offered.

### **6.2.3 Identification of Thesis Topic.**

Identification of a research topic that will make a unique contribution to the body of knowledge is one of the most challenging tasks faced by a Ph.D. student. This task is highly dependent upon the research opportunities that exist at the time and the manner in which the student and the research are supported. If a student requires support for research, then the topic is typically constrained to those areas for which current research contracts or grants exist. In the case of self-supporting students or fellowship recipients, the main concern will be to find a topic consistent with the interests of the advisor or advisory committee. In this case, considerable latitude is possible and the student should discuss his or her ideas with the faculty members.

The National Science Foundation, Department of Energy, Department of Homeland Security and other government agencies have annual fellowship competitions. Nuclear Engineering graduate students with qualifications that make them competitive for a national fellowship are expected to apply. The College of Engineering and Graduate School hold workshops to provide tips on preparing strong applications.

### **6.2.4 Direct Ph.D. Program.**

The Direct Ph.D. Program is available for students with outstanding academic records.

This program enables students entering with a bachelor's degree to obtain the Ph.D. degree without investing time in preparing a formal master's degree thesis. It also allows greater flexibility in course selection and research planning. The following steps are required for admission to this program:

- a. Pass the Ph.D. Qualifying Examination
- b. Petition to enter the Direct Ph.D. Program by the student to the Graduate Committee with accompanying recommendation from the student's advisor
- c. Review by Graduate Committee (based on performance on the qualifying examination, academic record, and the recommendation from the student's advisor)
- d. Formal notification to the student

To receive a master's degree in the Direct Ph.D. Program, students must adhere to all of the procedures and requirements set forth by the Graduate School. The master's degree will be conferred to students in this program upon successful completion of the Ph.D. preliminary examination (see Section 6.2.7) and submission of an acceptable master's plan of study. The master's plan of study must be submitted in the semester prior to the preliminary examination in order to receive the degree at the end of the semester in which the preliminary examination is taken. This master's program is considered to be a non-thesis option.

#### **6.2.5 The Nuclear Engineering Ph.D. English Proficiency Requirement.**

All graduate students are required to take a special course entitled "Nuclear Engineering Literature" (NUCL 597W) in their first year of study and earn a grade of B or better

#### **6.2.6 The Ph.D. Plan of Study.**

All students seeking a Ph.D. must file a plan of study. Plans of study are submitted electronically via students' MyPurdue account located at <http://www.mypurdue.purdue.edu>. The plan of study must be approved before the end of the third semester of the student's registration. Otherwise registration for the fourth semester will be prevented.

Students should refer to the Electronic Plan of Study Checklist below to ensure successful submission.

1. Enter the student's full legal name, student identification number and date the plan of study is submitted.
2. Enter the official departmental name (Nuclear Engineering) and code (E32).

3. Enter the official degree title (Doctor of Philosophy).
4. Enter a reasonable expected graduation date.
5. Enter an area of specialty (if applicable).
6. List coursework to be used for degree.
  - a. 48 credits of coursework should be listed, including core courses (NUCL 501, NUCL 504, NUCL 510, NUCL 520, NUCL 551, NUCL 597W and 6 credits of Math or Computer Science). Note that NUCL 597 must be listed and taken but is not counted in the 24 hours of technical credit.
  - b. Research credits are not listed on the plan of study.
7. Enter the exact title and course number as it appears in MyPurdue.
8. Enter transfer courses from other institutions, exams and certified undergraduate excess courses.
  - a. Certified undergraduate excess courses must be approved by the Registrar. Courses previously applied to an undergraduate degree are not eligible.
9. Enter the month and year the course was or is expected to be completed.
10. A minimum of 50% of the coursework must be listed as 'Primary'. Primary course standards are decided upon by the Major Professor and graduate student.
11. Enter the names and faculty identifier numbers of committee members.
  - a. Ph.D. committees should consist of at least 4 graduate faculty members.
  - b. At least 51% of the committee members must be 'Regular' faculty members.
12. Indicate each committee member's area of expertise.
  - a. At least one member must be from a field outside of Nuclear Engineering.

#### **6.2.6.1 Core Curriculum.**

The required core courses for nuclear engineering graduate students are NUCL 504 (radiation), NUCL 510 (reactor physics), NUCL 520 (reactor materials) and NUCL 551 (reactor safety). Students without an undergraduate nuclear engineering background, are required to complete NUCL 501 (an introductory course) as well as NUCL 504, 510, 520 and 551. Students who took NUCL 205 and NUCL 305 as undergraduates at Purdue are not required to take NUCL 504.

Students must take a minimum of 48 hours of 500 or 600 level technical courses,

including the core courses and 6 hours of mathematics, computer science, or other approved quantitative courses. Students may petition the Graduate Committee to waive the mathematics requirement if they have taken 500-level mathematics or computer science courses elsewhere. If a student has undergraduate credit at Purdue for one or more of the core courses, he or she will take other 500 or 600 level technical courses to fulfill the 48 credit hour requirement. Any Purdue 500-level or 600-level technical course is an acceptable elective provided that it is consistent with the student's program and objectives. The Ph.D. Plan of Study must include at least three 600 level courses. In special circumstances, a student may include a maximum of 3 credit hours of a needed undergraduate course on his or her plan of study.

#### **6.2.6.2 Transfer Credits and Undergraduate Excess Credit**

A maximum of 24 hours of course work from one (and only one) master's degree may be used on the plan of study for a doctoral degree provided that the student supplies adequate proof that each course corresponds to at least a 500-level course at Purdue and that the subject matter is not duplicated by courses taken here. Undergraduate credits with grades of B or better that have been certified as excess (see Undergraduate/Graduate Program in Section 5.3) may also be listed on the Ph.D. plan of study. A maximum of 24 credits may be obtained by transfer or undergraduate excess, and grades of B or better are required for all such courses.

#### **6.2.6.3 Grade Requirements.**

A grade of B or better (B- is not sufficient) is required for each course appearing on the plan of study as a primary course. In addition, residency requirements must be met (see the Graduate School's Policy and Procedure Manual) and a minimum final grade point average of 3.0 is required. The student's faculty advisor routinely reviews each student's academic performance and will advise the student if his or her performance is not meeting the required standards.

#### **6.2.6.4 Advisory Committee.**

The student, with the help and approval of their advisor must assemble a Ph.D. Advisory Committee. This committee must consist of four members, including at least three permanent faculty members from nuclear engineering and one member from another discipline with faculty certification known to be familiar with the area of research. This close familiarity is expected to best fulfill the "advisory" as well as the eventual "examination" character of this committee. Additional members may be assigned as needed. Fifty-one percent of the advisory committee members must be regular graduate faculty members.

#### **6.2.7 Ph.D. Preliminary Examination.**

The purpose of the Ph.D preliminary examination is to establish that a suitable research topic has been defined and adequate preparation to embark on the research has been made. The examination consists of a written research proposal and a 2 hour oral examination. The examination committee normally consists of the student's Ph.D. Advisory Committee. In the event that an advisory committee member is unavailable, a substitute may be appointed, but must be approved by the Graduate School.

The research proposal should clearly explain the objectives to be accomplished, how such objectives relate to previous work in the area, the significance of the proposed work, and the approach to be followed. The originality of the objectives and/or approach should be stressed. The proposal should also include the results of an extensive literature survey. The literature survey is important because it helps members of the committee assess the student's knowledge of previous work. The depth and clarity of the presentation should give evidence of a reasonable degree of maturity in the student's knowledge of the field.

The research proposal should be distributed to the Examination Committee no later than 14 days prior to the scheduled preliminary examination. The Graduate School must receive a formal request for the appointment of the Preliminary Examining Committee and the scheduling of the preliminary examination (Graduate School Form 8, obtained from the Graduate School web page) no later than two full weeks prior to the examination.

The examination normally begins with a brief oral presentation in which the student is expected to communicate the key elements of the research proposal. This is followed by a question-and-answer session in which the Examination Committee may probe a variety of areas including: the student's understanding of the research topic and its significance, the student's understanding of related previous work, and the viability of the proposed approach as a whole or any part of it (particularly with regard to proposed experimental and theoretical techniques). Other students, after receiving permission from the committee and examinee, may attend the presentation portion of the exam.

If the report of the Examination Committee is favorable, the student will be formally reclassified as a candidate for the degree of Doctor of Philosophy. If the report is unfavorable, the student may repeat the examination if the Examination Committee so recommends. Should the preliminary examination be failed twice, the student may not be given a third examination, except upon the recommendation of the Examination Committee and with special approval of the Graduate Council.

A recommendation by the Examining Committee for the student to take one or two additional courses not appearing on the plan of study is not incompatible with a

recommendation that the student be admitted to candidacy.

### **6.2.8 Preparation and Deposit of the Ph.D. Thesis.**

Thesis: "A position or proposition that a person advances and offers to maintain by argument" (Webster). The Ph.D. thesis should "argue" the reason for the research document and "argue" that what was done was valid, and "argue" that the interpretation and conclusions are valid. A Ph.D. thesis is supposed to provide a significant advance of understanding in a given area (field) and to communicate this advance in a readily comprehensible form. Previous Ph.D. theses in the School which may be found in the Engineering Library provide an overall perspective of the magnitude of the effort. A student's advisor will be the best guide on matters of organization of the thesis. For this reason, as well as having access to other Committee members, the thesis should be prepared while in residence.

It is absolutely essential that a student writing a thesis gives proper credit for any material or ideas from other work. Giving proper credit is a responsibility of every member of the scientific research community, and failure to give credit (plagiarism) can result in severe academic or legal penalties. Plagiarism is defined in "Academic Integrity: A Guide for Students" (<http://www.purdue.edu/odos/osrr/integrity.htm>) as follows:

"Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- submitting a document written by someone else but representing it as one's own".

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Students should visit the Thesis/Dissertation Office website <http://www.gradschool.purdue.edu/thseis.cfm> before beginning preparation of their theses. The website provides students with links to 'Guidance & Tools', 'Format & Deposit Checklists',

‘Required Thesis Forms’ and ‘Copyright Information’.

### **6.2.10 Final Examination.**

When the student and advisor agree that the thesis is complete, a final examination will be held by the advisory committee at a time acceptable to all committee members. To initiate the examination process, the student must prepare a Request for Appointment of Examining Committee (Graduate School Form 8). Form 8, which specifies the date, time and place of the exam, must be signed by the advisor and the Head of the School of Nuclear Engineering and must be submitted to the Graduate School at least two weeks prior to the date of the examination. At this time the student should also schedule a final deposit appointment with the Graduate School.

A final thesis draft copy of "original" quality, suitable for publication must be distributed to the examining committee a minimum of 14 days prior to the scheduled final examination. A thesis delivered less than 14 days prior to the scheduled final examination may not be accepted. Prior to the final examination, the Academic Program Administrator will provide the advisor with the Graduate School Form 11, Report of Final Examination, Form 9, Thesis Acceptance Form, and Assessment Rubrics for each committee member.

The final examination is scheduled for 2 hours. The student will make a formal presentation of about 45 minutes on his or her thesis. The oral presentation by the candidate conveys the nature of the research work and the accomplishments. Anyone is welcome to attend the presentation, and typically those present but not on the examining committee will have an opportunity to ask questions. The second hour of the examination is closed with only the student and examining committee present. The second hour is typically devoted to discussion and questioning by the members of the examination committee. The student's task is to "defend" the methods, results, and conclusions as valid. In addition, the committee should be convinced that the student has made an original and significant contribution.

Upon successful completion of the final examination, the members of the examining committee will sign the Report of Final Examination (Graduate School Form 11). This report form is forwarded to the Academic Program Administrator who will then secure the additional required signatures before sending the form to the Graduate School.

The student will make committee recommended corrections and/or additions to the thesis. After changes are made, final approval of the thesis is secured by obtaining the signatures of the examining committee members, the Department Head and Department Thesis

Format Advisor (Academic Program Administrator) on the Thesis Acceptance Form. Once the Form 9 has been signed, the student will keep his or her deposit appointment with the Graduate School and provide the Graduate School Form 9. At least 24 hours prior to the appointment, the student will submit the thesis via Electronic Thesis Deposit (ETD). Candidates submitting 'Confidential' ETDs must also bring their departmental library copy. If the thesis is acceptable, a Thesis Receipt (Graduate School Form 16) will be issued and should be delivered to the Graduate School before the end of the first working day following the last day of classes.

### **6.2.11 Graduation Procedures.**

Students must meet all deadlines set by the Graduate School and the Office of the Registrar in order to graduate in a particular semester. It is the student's responsibility to know and meet these deadlines. The Graduate School deadlines can be found online at <http://www.gradschool.purdue.edu>. The Office of the Registrar's candidacy requirements and directives can be found online at [http://www.purdue.edu/registrar/candidate\\_status](http://www.purdue.edu/registrar/candidate_status). Students will incur late fees as a result of late submission of the Electronic Plan of Study to the Graduate School, declaration of candidacy beyond the deadline, and listing on the Graduate School's candidate roster for the same degree more than two consecutive sessions in a row. In order for a student to avoid late fees with the Graduate School, he or she must adhere to the posted deadlines.

After all academic requirements have been met there are still a few administrative details to be attended to. The checklist below should help avoid any omissions.

- a. Complete the Checkout Sheet (available from the Student Services Office) and return keys, etc. to the Main Office. Please note that failure to complete and return this form may result in non-approval of the candidate certification and failure to graduate.
- b. All research materials accumulated during a student's tenure including the yellow copy of the laboratory notebook should be turned in to the student's supervisor, if applicable. In the case of certain sponsored programs the University has a legal custodial responsibility for such materials.

### **6.3 Ph.D. Program Time Limitations**

Students who have not completed their programs by the 12<sup>th</sup> semester (16th semester for direct Ph.D. students) will be dropped from the graduate program unless the student submits a written petition to the Graduate Committee documenting unusual and extenuating

circumstances and obtains permission to continue.