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GRADUATE PROGRAM REQUIREMENTS

Departmental Requirements for the degrees of

Masters of Science, Thesis Option

Masters of Science, Non-Thesis Option

Masters of Engineering

Doctor of Philosophy

Version 16

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A. INTRODUCTION

The Chemical Engineering Department has four graduate degree programs: (1) the Master of Science with Thesis program (**MS**) which requires advanced course work and research experience, including a thesis, and provides preparation either for further education or for industrial work; (2) the Master of Science Non-Thesis program (**MSNT**), which is intended for students who hold an accredited Chemical Engineering Bachelor's degree but who desire to complete a graduate degree in one academic year with minimal research involvement; (3) the Master of Engineering (**ME**) which is a non-thesis program intended for those without an accredited Chemical Engineering Bachelor's degree and for off-campus students; and (4) the Doctor of Philosophy Degree (**Ph.D.**) program, which involves in-depth study in fundamentals and practice, and calls for significantly greater creative research effort.

Financial stipend support through departmental sources will not be available to students enrolled in the ME or MSNT programs.

General requirements for the various degree program as well as descriptions of courses can be found in the University of Florida Graduate Catalog. A student is normally regulated by the rules set forth in the catalog published in the academic year of the student's first term.

B. MASTER OF SCIENCE (M.S.)

Course Requirements.

The Graduate School minimum requirement for the M.S. degree is 30 semester credits including up to 6 credits in thesis research work (ECH 6971); the Chemical Engineering Department requires a minimum of 21 credits in courses, plus one credit in seminar (ECH 6926) per semester of residence after the first semester of residence.

Included in the 21 credits are three *required* courses that should be taken in first Fall semester: These are the Molecular Basis of Chemical Engineering (ECH 6272), the Continuum Basis of Chemical Engineering (ECH 6270), and the Mathematical Basis of Chemical Engineering (ECH 6847). Each student is expected to take a graduate course in reaction engineering, kinetics or biochemical engineering if offered before they graduate. In addition, at least two graduate Chemical Engineering science courses must be taken

If a minor is chosen, at least six credits of courses must be taken in it. All courses taken in the Chemical Engineering Department must be at the 5000 level or above to be credited toward the degree program.

Research and Thesis

Near the end of the first semester after enrolling in the program, the student will choose a research adviser. By the end of the first semester, the student must also, with the advice and consent of the research adviser, nominate a Supervisory Committee. The Supervisory Committee must have at least two members, one of whom must be Graduate Faculty member of the Chemical Engineering Department. If a minor is chosen, at least one member of the supervisory committee must be from the minor department. The supervisory committee is very important and should be chosen carefully. The supervisory committee advises the student, monitors the student's progress, supervises the preparation of the thesis, and conducts the final examination.

In Chemical Engineering, a candidate for the M.S. degree must prepare and present a thesis acceptable to the Supervisory Committee and the Graduate School. The candidate should consult the Graduate School Editorial Office for instructions about the form of the thesis. The University Calendar specifies final dates for submitting three copies of the abstract to the Dean of the Graduate School and for submitting the original copy of the thesis bound with an abstract. The college copy should be submitted to the college or department by the specified date. After the thesis is accepted, it will be available electronically from the University Libraries.

When the student's course work is substantially completed and the thesis is in final form, the supervisory committee is required to examine the student orally or in writing on (1) the thesis, (2) the major subjects, (3) the minor or minors, and (4) matters of a general nature pertaining to the field of study. A written announcement of the examination must be sent to the Dean of the Graduate School. This exam may not be scheduled earlier than the term preceding the semester in which the degree is to be conferred.

The supervisory committee (2 faculty members) and any other appropriate faculty members and the candidate must be present at the final examination. At the time of the examination, all committee members may sign the thesis signature page and the Final Examination Report, although these can be retained by the supervisory committee chair until acceptable completion of corrections.

Other Remarks

Graduate level work, totaling no more than 9 credits with a grade of "B" or higher, may be transferred from an institution approved by the Graduate School or 15 semester hours from post-baccalaureate work at the University of Florida. These credits will be applied toward the degree, but the grades will not be computed in the student's grade point average. Transfer of credit requires approval of the student's Supervisory Committee, the Chemical Engineering Department, and the Dean of the Graduate School. Petitions for transfer of credit for the M.S. degree must be made during the first semester of study and, if approved, transfer of credits must be included in the program of coursework.

Students have historically needed 16 to 20 months (4 to 5 *academic-year* semesters) to complete the degree requirements. Financial support is normally provided to the student through the completion of his/her degree program (as defined by submission of the final thesis to the graduate school). Of course, continued support depends on satisfactory progress by the student. Satisfactory progress is determined by a student's thesis research adviser. A letter from each student's adviser on his/her progress is required at the end of each semester.

Students are strongly encouraged to register for required courses at the earliest possible opportunity. An example of the course of study for the M.S. degree is given in Table 1.

TABLE 1. Typical M.S. schedule

First Year	Second Year
Fall	Fall
(3) ECH 6270 Continuum Basis	(1) ECH 6926 Seminar
(3) ECH 6272 Molecular Basis	(8) ECH 6971 Thesis Research
(3) ECH 6847 Mathematical Basis	
(Audit) Res. & Prof. Career Development	
<i>Total of 9 credits</i>	<i>Total of 9 credits</i>
Spring	Spring
(6) Two Chemical Engineering graduate courses, including a course in reaction eng., kinetics or biochemical eng. if offered	(6) Two elective courses
(1) ECH 6926 Seminar	(1) ECH 6926 Seminar
(2) ECH 6971 Thesis Research	(2) ECH 6971 Thesis Research
<i>Total of 9 credits</i>	<i>Total of 9 credits</i>
Summer	Summer
(6) ECH 6971 Thesis Research	(6) ECH 6971 Thesis Research
<i>Total of 6 credits</i>	<i>Total of 6 credits</i>

C. Master of Science, Non-thesis option (M.S. NT)

The Masters of Science. Non-Thesis (MSNT) degree program in Chemical Engineering at the University of Florida is designed to be completed in one academic year (namely, consecutive Fall, Spring, and Summer semesters). The program provides an opportunity to develop an in-depth knowledge of chemical engineering fundamentals, to emphasize a specific specialization area, and to acquire basic experience in research or industrial practice through a short internship.

Course Requirements

The MSNT program requires a total of 30 credits of graduate courses. Of these, 15 credits must be taken in the Chemical Engineering Department (including the three Basis courses: Molecular Basis, Mathematical Basis and Continuum Basis of Chemical Engineering), and 7 credits must be used to either carry out research in the chosen area of specialization or to conduct an internship with a partner industry or a government laboratory facility. This plan leaves 8 or more credits available for courses that may be taken in other departments, allowing the students to develop a specialization focus.

Note: the course *ECH 6971 Masters Research* cannot be counted towards satisfying the 15 credits that must be taken in the Chemical Engineering Department.

Research and/or Internships

The 7 credits of research activities are intended to give the students experience in carrying out academic research. Alternatively, these 6 credits can be used to carry out a 3-month internship with a sponsoring company or US government laboratory, based on the availability of such opportunities. The department will facilitate the interaction with potential internship providers who will carry out interviews and generate offers based on their own set of criteria. A final written report describing the activities undertaken under the 7 credits of research or internship activities is required for graduation. The report must bear the joint signatures of the student and of the research or internship adviser, and must be submitted and approved before the end of the semester.

Other

The MSNT program is a non-funded degree program; therefore, there is no opportunity for students pursuing this degree goal to obtain a graduate assistantship or fellowship of any kind from the University of Florida until they finish the M.S. non-thesis degree. However, students who perform well in the MSNT program can apply for admission to the Ph.D. program; if admitted, such students will receive a graduate assistantship and a tuition waiver for the duration of their doctoral studies.

A typical schedule of courses is shown below. The sequence of courses is organized to allow students to take 10 credits in the Fall semester, 13 credits in Spring semester, and 7 credits in the Summer semester.

IMPORTANT: Students who intend to apply for the PhD must (without exception) complete the MSNT requirements before they receive funding for the PhD and begin their doctoral program. Such students are strongly advised to adhere to the suggested program of study given below.

FALL semester

- (3) ECH 6847 Mathematical Basis of Chem. Eng.
- (3) ECH 6270 Continuum Basis of Chemical Eng.
- (3) ECH 6272 Molecular Basis of Chemical Eng.
- (1) ECH 6929 Chemical Engineering Seminar

Total: 10 credits

SPRING semester

- (3) Any Chem. Eng. Dept. course (including one reaction, kinetics or biochemical course if offered)
- (3) Any Chem. Eng. Dept. course (including one reaction, kinetics or biochemical course if offered)
- (3) Elective course taken inside or outside of the Chem. Eng. Dept.
- (3) Elective course taken inside or outside of the Chem. Eng. Dept.
- (1) ECH 6929 Chemical Engineering Seminar

Total: 13 credits

SUMMER semester

- (6) ECH 6971 Masters Research (6 credits) - Carry out Research Project and (1) ECH 6905 Individual Work (1 credit)
- or
- (7) ECH 6905 Individual Work (7 credits) - Carry out an internship with industry or a US government laboratory

Total: 7 credits

Tuition and Fees. The MSNT program requires the completion of a total of 30 credit-hours. Students can calculate the cost of the program by multiplying 30 times the cost of one credit hour. The tuition and fees charges per credit hour are updated annually by the University of Florida, typically in the month of July, and the updated information is posted at the web site

<http://www.reg.ufl.edu/regadate.htm>

and also at

<http://fa.ufl.edu/ufs/studentlinks.html>

<http://fa.ufl.edu/ufs/cashiers/feecalcreg.html>

Note that the cost of a credit hour depends on whether the student is a Florida resident or non-Florida resident (which is the case for all international students).

Cost-of-Living Expenses. Additional cost-of living expenses can be estimated from the data posted at the following sites:

<http://www.reg.ufl.edu/regadate.htm>

<http://www.rgp.ufl.edu/education/graduateadmissions.html>

Financial Requirements for all International students. In order to qualify for a student visa to enter the United States, all international students admitted to the MSNT program are required to submit a *Certification of Financial Responsibility* form demonstrating that they have adequate financial support to cover all the costs of education and living expenses. A copy of the form can be obtained at the site:

<http://www.reg.ufl.edu/financial-certification.html>

Please refer to the bottom part of the form for a specific quotation of the financial requirements. Note that the figures quoted in the *Certification of Financial Responsibility* are based on a 24-credit program. Since the MSNT program requires 6 more credit hours for total of 32 credits, the student's financial needs should be planned so that he/she has sufficient funds to cover the cost of registering for 6 additional credits hours plus the cost of summer living expenses.

D. Master of Engineering (M.E)

The Master of Engineering degree is intended for students whose B.S. degree is not from an accredited Chemical Engineering curriculum.

The M.E. degree requires competency at the Bachelor's level in Chemical Engineering. Therefore, depending upon their prior education, students are generally required to take a set of undergraduate courses that cannot be included as part of the M.E. course requirements. Students lacking a significant number of undergraduate Chemical Engineering courses (e.g., a student with a B.S. degree in another field of study) are generally admitted to the department with post-baccalaureate (6EG) status, and must complete a set of undergraduate courses needed to assure BSChE level competency as defined by the minimum ABET requirements. These undergraduate course requirements will be determined individually after review of previous coursework by the M.E. faculty adviser designated by the department. Subsequent graduate (7EG) admission of such students requires at least a 3.0 grade point average in the undergraduate Chemical Engineering courses taken at the University of Florida and a combined verbal and quantitative GRE score of 1000. Students who earn an average between 2.0 and 3.0 in the undergraduate Chemical Engineering courses can continue for a BSChE degree.

The Graduate School minimum is 30 credits for the (non-thesis) M.E. degree. Only graduate and non-Chemical Engineering undergraduate courses numbered 3000 or higher will be counted toward the degree requirement. As the courses to be taken depend on each student's background, M.E. students should see Dr. Svoronos, the M.E. adviser, to develop a schedule. Regulations on transfer of graduate credits are the same as for the M.S. degree. A student seeking the M.E. degree is required to pass an oral examination as outlined in the graduate catalog. ME students need to have a supervising committee.

E. Doctor of Philosophy (Ph.D.)

As detailed below, the Doctor of Philosophy (Ph.D.) program requirements consist of:

1. Completion of at least 90 credits beyond the B.S. with a minimum of 1 year in residence.
2. Completion of at least 30 credits of graduate courses, not including seminar.
3. Registration for graduate seminar (ECH 6926) in each semester of residence.
4. Successful completion of a written and oral QUALIFYING EXAMINATION which includes a written program-of-study proposal.
5. Completion of a written DOCTORAL DISSERTATION and successful defense of the dissertation in a FINAL ORAL EXAMINATION.
6. Service as a *Teaching Assistance* for two semesters.
7. Present a research seminar to the department on the final results of the doctoral work.

The Ph.D. degree is for those who wish to attain mastery of a field of knowledge and demonstrate accomplishment in research. Study for the Ph.D. degree will be open only to those with demonstrated competence in the core areas of Chemical Engineering.

Course Requirements

Beyond the B.S. degree the Ph.D. degree requires successful completion of a minimum of 90 credits subject to restriction and classifications approved by the department. A minimum of 30 credits of courses acceptable for graduate credit and taken after the Bachelor's Degree are required. These 30 credits must include the three Basis courses that are offered in the Fall semester, a course in either reaction engineering, kinetics or biochemical engineering (or suitable

equivalent), as well as at least two more courses in Chemical Engineering. Ph.D. students shall register for Chemical Engineering graduate seminar (ECH 6926) every semester of residence after the first semester; the credits earned cannot be counted toward the 30 required credits.

Transfer of MS Credits from other Institutions

Students with MS degrees in Chemical Engineering from other institutions may petition to transfer up to thirty credits toward their PhD requirements. Some of these transferred credits may be used to satisfy the Departmental requirements on core courses as well as the Engineering Science courses.

Campus Residency Requirements

Full-time student status requires at least 30 credit hours in each calendar year, or 36 hours within four semesters in two calendar years. After the first year, students must register for at least 9 credit hours in the Fall and Spring semesters, and at least 6 credit hours in the Summer.

Research

Students will be assigned a research advisor during the first semester of study. Before the end of the second semester, PhD students will nominate, with the advice and consent of the research adviser, the three or more other members of the Supervisory Committee, which include two other Graduate Faculty members from the Chemical Engineering Program, and one Graduate Faculty member from outside the Chemical Engineering Program. If a minor is pursued, it must be approved by the minor department and one member of the supervisory committee must be from the minor department. The research adviser is the Chairman or co-Chairman of the Supervisory Committee.

The Supervisory Committee is very important and should be chosen carefully; it assists in preparing and approves the program of study, approves the dissertation research, administers the candidacy examination, periodically reviews progress, and conducts the final oral examination. The Supervisory Committee is responsible for assuring that the completed dissertation is original research and is a contribution to the body of knowledge. The adviser and Supervisory Committee may assist the student in understanding all regulations governing the Ph.D. program, but the student has the ultimate responsibility for being aware of and meeting all requirements.

The Ph.D. candidate, upon completion of other degree requirements, will submit his/her dissertation to the Supervisory Committee and the Graduate School. The dissertation will be examined for at least two weeks by the committee, after which the research will be defended with at least four faculty members present with the candidate. The final oral examination shall be publicly announced and open to the public, although the dissertation committee may conduct a continuation of the examination in private with the candidate after the public presentation is

completed. In any case, only the Supervisory Committee and other designated faculty sign the dissertation signature pages.

Qualifying Exam and Advancement to Candidacy

Final acceptance into the Ph.D. program requires successful completion of the QUALIFYING EXAM. The purpose of the exam (written and oral proposal) is to assess the student's potential to perform scholarly research at the PhD level. The student is to be evaluated for:

- Depth of knowledge in research area (i.e., review of relevant literature).
- Breadth of knowledge in fundamentals. These should include thermodynamics, transport phenomena, chemical engineering kinetics, and fundamentals related to research area (e.g., chemistry, biology, mathematics, materials, and surface chemistry).
- Ability to formulate a research plan.
- Critical thinking.

Eligibility

To be eligible to take the PhD the qualify exam, students must:

1) Maintain an average GPA of 3.0 in the three core Basis courses (Continuum Basis, Molecular Basis, and Mathematical Basis of Chemical Engineering) and remain in good academic standing (see the subsection I titled “coursework”). A student who gets less than a B in a Basis course must retake the course on the next available offering and obtain a B or better.

2) The students must also maintain a GPA of 3.5 or better for research in the semesters prior to the exam. This grade must be assigned by the research adviser, discussed with the student and placed on record in the students file prior to the examination.

Written Exam

The written exam is in the form of a research proposal due **February 1st** of the second year of the second year. This document must outline the area of research and its importance, problem statement, background to the research area, specific tasks that will be performed, preliminary results, and subsequent steps. A number of excellent manuals (consult, for example, references

available via www.nsf.gov) are available on writing research proposals and may be used as guides in preparing the proposal. A maximum of 25 single-spaced, typed (12-point font) pages, including figures and tables is recommended. It should include a title, a table of contents, and an abstract. The main body of the text would typically consist of the following:

1. **Introduction:** A concise overview of the research area and topic and their importance.
2. **Background:** Literature review and relevant background needed to place the proposed study in the larger context and to highlight the relevance and the novelty of the proposed work.
3. **Problem description:** A description of the specific problem and the objectives of the proposal and the novelty of the proposed work.
4. **Specific tasks:** A description of proposed theoretical and/or experimental work and a list of specific tasks (including feasibility probes) needed to accomplish the proposed objectives.
5. **Preliminary work:** Description of any preliminary work performed by the student and an analysis or discussion of such preliminary work.
6. **Future tasks:** Details of the subsequent steps planned to achieve the specific objectives of the research.
7. **Concluding remarks:** Closing remarks.
8. **References:** A list of references cited in the proposal.
9. **Tables & Figures:** Tables and figures used in the proposal should be integrated into the text.

Oral Exam

The student must take the oral exam within four months of the written exam submission or **June 1st** of their second year. The student will orally present the research proposal then answer questions about the research plan and general questions from the supervisory committee. The committee will evaluate the quality of the proposal and the response to questions about the proposal in order to assess the candidate's oral communication skills, depth of knowledge in research area, breadth of knowledge in chemical engineering fundamentals, ability to think critically, and ability to formulate and defend a research plan.

All members of the committee must be present during the examination. If a member is unable to attend, a suitable substitute approved by the Department must be appointed. The substitute member should be given sufficient time to read the report and prepare for the exam. A minimum of two weeks is recommended.

Outcomes

Students who successfully pass the oral and written exams have formally entered PhD candidacy. Students who fail the exam may be given the option (on the advice of the supervisory committee) of retaking the exam within 4 months or terminating with an MS degree (with or without thesis depending upon the advice given by the adviser), or an Engineer's degree should the student already have an MS degree.

Important Dates to Remember

February 1	Written proposal due (1 copy to Room 219 CHE—Shirley Kelly, and copies to the committee members)
Before June 1st	Oral Examination for qualifying exam and advancement to candidacy

Teaching-Assistantship Requirement

To gain valuable teaching and communication experience consistent with of the PhD degree, all PhD candidates are required to serve two semesters as a Teaching Assistant, as part of their graduate requirements. Exceptions will not, ordinarily, be permitted, and TA assignments will be made based on student course preferences in July of each year for the following academic year, students are ultimately responsible for ensuring their TA requirement is met. Student who anticipate graduating within one year but have not yet fulfilled the two-semester TA requirement must notify the Graduate Coordinator.

Research-Seminar Requirement

Graduate students enrolled in the Ph.D. program are required to present a seminar to an audience comprised of all the graduate students and faculty. The seminar should be scheduled to take place during the last two semesters of the student's residence at UF and should cover selected results from the student's doctoral thesis. The students should provide the Seminar Coordinator with a title and a short abstract for the presentation in advance, and the seminar presentation should last no more than 30 minutes, including a 10-minute period for questions. The Ph.D. candidate is responsible for contacting the department Chairman or the department's Seminar Coordinator to schedule the time and date of the seminar. The doctoral degree will not be issued to candidates until the seminar requirement is satisfied.

Other Remarks

The minimum requirements for the Ph.D. program can be met in 3 years following the Bachelor's degree and all students are urged to complete their work as expeditiously as possible. If a longer period is required to complete the research project, students are encouraged to consider broadening their education by taking more than the minimum of courses.

F. GENERAL Policies and Requirements

Florida State Residency Requirement

For tuition purposes, all eligible students (i.e. those who receive tuition waivers and who are U.S. citizens, permanent resident aliens, or legal aliens granted indefinite stay by the Immigration and Naturalization Service) must take appropriate actions to become in-state residents by the end of their first year. Failure to do so may result in loss of the tuition waiver.

Course Registration Procedures

Graduate students must get the approval of their adviser for registration of courses, prior to registration. Approval forms can be obtained in 227 CHE Bldg.

Continuance Policy for Stipends

The graduate program is one of intensive study and each student is expected to work seriously toward completion of the degree requirements. Each student will continue to receive stipend support up to 5 academic years of full time study for PhD students and 2 years for MS students, subject to funding availability and satisfactory progress toward completion. Extensions of this limit may be requested by petition that includes a written plan and timeline for completion of the degree.

Concurrent Degrees

Graduate students who wish to enroll in a concurrent degree program must obtain the appropriate forms from the graduate school. The graduate coordinator will sign these forms *only after consulting the chair and after the student's graduate adviser has given written approval for the student to enroll in the concurrent degree program*. A copy of all communications regarding the application for the program will be maintained in the student's graduate folder with the Graduate Program Assistant (Shirley Kelly).

Leave Policy

Though Graduate Research Assistantships and Fellowships do not formally provide for leave or vacation time, the Department of Chemical Engineering has established guidelines for granting student leave time. Stipend-supported graduate students accrue 15 business days of leave each fiscal year (a fiscal year begins July 1 and ends on June 30 of the following academic year; business days exclude weekends and University of Florida holidays). Unused leave may accumulate from one fiscal year to the next, but the total annual leave may not exceed 20 business days in any given fiscal year. No compensation for unused leave shall be made at the end of a student's studies. Students whose leave exceeds the limits, without written approval of the advisor, are subject to reductions of stipend and may lose the privilege of receiving a tuition waiver for one or more semesters.

The specific dates of absence must be pre-approved by the student's advisor by signature on the leave form (appended below), which is to be completed and submitted to Mrs. Shirley Kelly in 227 CHE Bldg. Importantly, the form includes contact information during the student's absence must be provided in the event that an emergency should develop.

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Fax: (352) 392-9513
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LEAVE FORM

STUDENT NAME: _____

UF ID NUMBER: _____

FISCAL YEAR: JULY 1 20 ____ TO JUNE 30 20 ____

LEAVE INFORMATION

DATE OF DEPARTURE _____

DATE OF RETURN _____

TOTAL NUMBER OF BUSINESS DAYS OF ABSENCE _____

CONTACT INFORMATION DURING ABSENCE (PROVIDE A PHONE NUMBER IF AVAILABLE)

SIGNATURES

STUDENT: _____

Signature

Date

ADVISER: _____

Signature

Date