

**PAPER AND CHEMICAL ENGINEERING**

**MASTERS OF SCIENCE**

**PROGRAM DESCRIPTION**

**MIAMI UNIVERSITY**

**OXFORD, OH 45056**

**11/28/06**

## **INTRODUCTION**

This document provides an outline for the Master of Science degree in the Paper and Chemical Engineering Department. This guide is provided to help graduate students plan their degree program. Requirements of the degree are outlined.

It is the student's responsibility to be familiar with and adhere to the policies and regulations of the Department, the Graduate School, and Miami University. The *Graduate Catalog* and *A Handbook for Graduate Students and Faculty* should be consulted for information not covered in this manual. The latter provides valuable information on degree requirements, guidelines for theses, scholastic information, and graduate award information.

Master's level graduate training is an extension of undergraduate education with emphasis on research and study of advanced and specialized subjects. Students are expected to demonstrate clarity of thinking, verbal and written communication skills, maturity, scholarship and technical competence in all endeavors. Successful students will demonstrate the motivation and ability to do independent, often original, research.

## **PROGRAM OBJECTIVES**

The major objectives of the Paper and Chemical Engineering Graduate Program are to:

1. Bring the student to an adequate level of knowledge in paper and chemical engineering to qualify him/her for entry-level and advanced research and engineering positions in the paper, chemical, and allied industries.
2. Prepare the student so that they can be admitted to and be successful in Ph.D. programs in Paper and Chemical Engineering.
3. Develop the student's scientific research capabilities to the level where he/she can initiate, execute, and successfully complete a significant research project with a minimum amount of direct supervision.

## **DEGREE REQUIREMENTS**

1. Complete 24 credits of graduate level courses in Engineering as approved by the student's thesis advisor and the graduate director of the Paper and Chemical Engineering Department.
  - a. All courses must be 500 or 600 level courses
  - b. At least 12 credits must be 600 level courses
2. Take PCE600, graduate seminar for each semester enrolled in the program (minimum 4 credits).
3. Complete a research thesis under the direction of a faculty advisor.
  - a. Enroll for PCE700 for a total of 6-10 credits.
  - b. Orally defend your thesis to the faculty of the PCE department.
4. Present a total of 34-semester hours of credit with a minimum GPA of 3.0.

The Master's Degree must be completed within five calendar years, unless an extension of the time is granted through petition to the Graduate School. The normal time period for completion of the degree is two calendar years.

## **ACADEMIC STANDARDS**

1. A graduate student on an assistantship must be enrolled for a minimum of 10 credits and a maximum of 14 credits per semester.
2. Graduate students receiving less than a cumulative grade point average of 3.0 for a semester will be placed on probation and warned, by letter, of their deficiency.
3. After consecutive semesters with a cumulative GPA below 3.0, you will not be allowed to register for any further graduate credit at Miami University.
4. An accumulative grade point of 3.0 in graduate course work must be achieved for graduation.
5. Incompletes must be removed within a 12-week period.

## GRADUATE COURSE REQUIREMENTS

1. Students are required to take 24 semester hours of courses (This excludes PCE600 and PCE700.)
2. Courses are freely chosen by the student and advisor, but the chosen program should show some coherence toward a particular area of concentration. Courses available in the department (PCE) include

503 Heat Transfer	550 Unit Operations
505 Industrial Environmental Control	573 Chemical Process Design
512 Chemical Engineering Thermodynamics	582 Process Control
514 Mass Transfer	604 Process Analysis
515 Chemical Kinetics and Reactor Design	611 Transport Phenomena in Engineering
516 Biochemical Engineering	612 Chemical Engineering Analysis
517 Biomedical Engineering	613 Fluid Mechanics
541 Pollution Prevention in Environmental Management	620 Papermaking
542 Air Pollution Control	621 Paper Physics
	630 Pulping

Up to 3 courses can be chosen from graduate programs in other departments of Miami U.  
Note: At least 12 credits must be 600 level courses

3. All students are required to take PCE 600, Graduate Seminar, for each semester of residence.
4. All Students are required to take PCE 700, Thesis Research, for 6 credits. (710 Industrial Practicum may be used with department approval.)

Students planning a general program in the department can design their course list with their advisor. Suggested curricula for students specializing in the department's three main focus areas are given below.

<b>PAPER</b>	<b>ENVIRONMENTAL</b>	<b>BIOCHEMICAL</b>
611 Transport Phenomena in Eng.	604 Process Analysis	604 Process Analysis
612 Chemical Engineering Analysis	611 Transport Phenomena in Eng.	611 Transport Phenomena in En.
621 Paper Physics	612 Chemical Engineering Analysis	612 Chemical Engineering Analysis
620 Papermaking	IES612 Envir. Analysis and Modeling (4)	613 Fluid Mechanics
630 Pulping	541 Pollution Prevention	516 Biochemical Engineering
514 Mass Transfer	542 Air Pollution Control	517 Biomedical Engineering
541 Pollution Prevention	505 Industrial Envir.Control	514 Mass Transfer
582 Process Control	515 Chem. Kinetics and Reactor Des	515 Chem. Kinetics and Reactor Des
600 Graduate Seminar (4)	600 Graduate Seminar (4)	600 Graduate Seminar (4)
700 Thesis Research (6)	700 Thesis Research (6)	700 Thesis Research (6)
<b>Total Credits: 34</b>	<b>Total Credits: 35</b>	<b>Total Credits: 34</b>
Unless noted by ( ) all courses are 3 credits.		

## **TIMETABLE**

### **Semester 1**

1. Take 10-14 hours of course work. This should include at least 8 credits of courses, one hour of PCE 600 and one hour of PCE 700.
2. Select a research advisor and reading committee.
3. Decide on a thesis topic and prepare draft proposal

### **Semester 2**

1. Take 10-14 hours of course work. This should include 6 credits of courses one hour of PCE 600 and two hours of PCE 700.
2. Prepare a thesis proposal by Spring Break.
3. Select a thesis reading committee if not done in first semester.
4. Submit a thesis research proposal to the advisor and reading committee. Make a presentation of proposed work.

### **Semester 3**

1. Take 10-14 hours of course work. This should include 6 hours of courses, one hour of PCE 600, and three hours of PCE 700.
2. Carry out thesis research.
3. Submit semester progress report to Graduate Program Director.

### **Semester 4**

1. Take 10-14 hours of course work. This should include 6 hours of courses, one hour of PCE 600 and three hours of PCE 700.
2. Complete thesis research.
3. Write thesis and submit it to the faculty.
4. Present thesis seminar and pass oral thesis examination.

### **SUMMER FELLOWSHIP**

Graduate students are encouraged to conduct their thesis research over the summer. Students enrolled in at least 6 credits for both summer sessions I and summer III are eligible for summer fellowship. Typically, students enroll for 1 credit of PCE 600 and 5 credits of PCE700 for each summer session. In addition, summer stipend may be available through the thesis advisor. During summer students may work 20 hours per week as either a researcher for a faculty member or elsewhere on campus. Students may also complete a summer internship in industry.

### **OUTSIDE WORK**

Graduate students are expected to work 20 hours a week on their assistantship assignment. Course work and thesis research are expected to fill the rest of the student's schedule. Students that must take on outside work for special circumstances need to petition the faculty to do so. Permission must be granted from the Dean of the Graduate School.

### **ACADEMIC ADVISORS**

Upon beginning your studies in the Paper and Chemical Engineering Department at Miami University, the Director of Graduate Studies will serve as your advisor. After selecting a thesis advisor, he/she will act as your main advisor. Responsibilities of your advisor will be to:

1. Assist you in selecting courses of study and act as an advisor in all academic matters.
2. Discuss areas of research with you and assist in the selection of a research advisor.

After discussing fields of research which interest you with graduate director, you should select a research advisor and two additional faculty members to serve with your research advisor as a reading committee for your proposal and final report of your thesis. The duties of the research advisor are:

1. Assist you in your academic program
2. Assist you in preparing your research proposal.
3. Assist you in selecting a reading committee.
4. Assist in the preparation of a research progress report each semester a student is in the lab.
5. Direct the student's thesis research.
6. Assist the student in the preparation of a thesis that meets departmental and university standards.
7. Assist the student in the preparation of a thesis seminar.
8. Act as chairman at the student's thesis seminar and examination.
9. Schedule regular meetings with student to discuss progress in research and courses.
10. Summarize and document decisions and actions taken in the proposal seminar.

## RESEARCH PROPOSAL

Students are strongly urged to complete the process of producing an acceptable research proposal preferably during the middle of, but certainly by the end of the second semester that they are in residence. Failure to do so will result in the student being placed on probation for their third semester, during which time it is absolutely imperative that an acceptable proposal be produced and submitted to the advisor.

After the student has received approval of the advisor and a reading committee for the research proposal, an oral presentation must be made to the Paper and Chemical Engineering faculty. This presentation can be part of the PCE 600 course. The student should plan on a 20-minute presentation of the proposed research, followed by 30 minutes of questions about the research and suggestions.

The proposal should briefly present background and state-of-the-art information with appropriate references but should emphasize the objectives of the research and how these goals will be accomplished.

The following outline is suggested for the proposal:

1. Title Page - The title should be brief, yet descriptive. The title page should also include your name, the name of your advising professor, reading committee members, the Department, Miami University and the date scheduled for your proposal presentation.
2. Abstract - The abstract should state briefly the objective and expected results of the proposed research in a manner that clearly identifies the essential points of the research for the reader.
3. Table of Contents - Also include a list of illustrations and tables.
4. Introduction - This section should review the state-of-the-art for the proposed research. Background information should demonstrate the student's familiarity with the area to be studied and include pertinent references. The introduction should lead the reader logically to the problem chosen to be studied.
5. Problem Statement - A concise, one paragraph statement of the problem you propose to study that also clearly states the limits to be imposed on the problem.
6. Proposed Research - This section is the heart of the proposal and should be to the point by explicitly identifying (A) what you want to do, (B) how you are going to do it, and (C) what method of data analysis will be used. The experimental procedure which identifies methods, materials and facilities is very important.
7. References - Should be pertinent, numbered, and listed in the order in which they appear in the text.

9. Schedule - A listing of anticipated times at which major milestones in the project will be reached.

The student should keep in mind that the primary purposes of the oral presentation are to obtain faculty concurrence and to evaluate his/her ability to:

1. Communicate verbally as well as in written form.
2. Demonstrate creative thinking with a novel approach in the research area.
3. Show familiarity and understanding of the field of research.

After the proposal has been approved and the student commences on the research, the graduate student will be required to prepare a mid-semester progress report on his/her thesis program. The report must be reviewed and signed by his/her advisor. The report will be submitted to the Director of Graduate Studies no later than the Monday following the mid-semester break.

## **PCE 600 SEMINAR**

Graduate Seminar is a mix of student presentations and outside speakers. In Graduate Seminar you will learn to give effective technical presentations and be exposed to current technical literature. The seminar will help you develop critical analysis and reasoning skills. This course will be one hour per week, but students maybe required to attend seminars that are outside the scheduled meeting time or exceed the scheduled meeting time.

## **FINAL EXAMINATION AND SEMINAR ON THESIS RESULTS**

Upon the completion of the student's research thesis, the student must present the work in an open seminar followed immediately by an examination. The student should schedule at least a two-hour time period, with approximately 30 to 45 minutes for the seminar and the remaining time for the examination. This examination must not be scheduled later than week 14 of the semester. The final examination will be a closed session involving only the student and faculty members.

The written work must be submitted to the faculty committee members for their review two weeks before the scheduled final exam. Guidelines for thesis preparation are available from the Graduate School.

The cost of the written work preparation and any necessary copies for binding are the responsibility of the student. Courtesy copies of the written work distributed to selected additional faculty members will be paid for by the Department.

When the final exam is passed and the written work has been approved, the student should follow the graduation procedures outlined in *A Handbook for Graduate Students and Faculty*.

## **RESPONSIBILITIES OF GRADUATE ASSISTANTS**

1. REGULAR ASSISTANTSHIPS - It is expected that the student will work an average of 18-20 hours per week for the Department for each semester of appointment.
2. MODIFIED ASSISTANTSHIPS - It is expected that the student will assist the Department's faculty for an average of 8-10 hours per week.

The duties assigned to graduate assistants should be of such a nature that they contribute to the student's mastery of the field and preparation for a professional career, and help fulfill the Department's role in the university.

Most assistantships are related to the teaching of undergraduate students. Competence in spoken English is expected for these duties. If a graduate student is required by the Graduate School to take the SPEAK test, then the student must pass the test before their graduate assistantship will be renewed beyond their first year of residence.

Please note that the University and the Department of Paper and Chemical Engineering expect graduate assistants to return to campus each term one week prior to the first day of classes in order to prepare for their assistantship duties.

### **PETITIONING PROCEDURES**

This manual is meant to serve as a guide for assisting you as you progress through the program. The schedules and sequences have been approved by the Department and, as such, are considered to be “rules” to follow.

If the student wishes to ask the Department to waive or carry out an exception to the rules discussed here, the student should seek the advice of his/her advisor and, if the advisor agrees, then petition the Department for consideration. The advisor will present the petition to the Department for discussion and action.

### **GRIEVANCE PROCEDURES**

It is expected that student grievances can be resolved in an informal manner within the Department through either the Chairman of the Department, Director of the Graduate Program, or advisor. However, if satisfaction is not achieved through these channels, the student may wish to appeal to the Dean of the Graduate School.