

Graduate Student Handbook

Department of Chemical Engineering University of Arkansas

General Information, Admission and Degree Requirements



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University of Arkansas general website: <http://www.uark.edu/>

The Graduate School office: <http://www.uark.edu/depts/gradinfo/>

Information for International Students: <http://international.uark.edu/>

Listing of International Student Organizations: <http://iss.uark.edu/348.htm>

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ADMISSION

The following procedures are for applicants wishing to enter the graduate program in chemical engineering that already have a BS or MS degree in chemical engineering. **Applicants that do not have a chemical engineering degree should skip to p. 19 of this document to the section “Getting Into the Graduate Program if You Don’t Already Have a Chemical Engineering Degree”.**

Admission Requirements

The admission requirements for the graduate program in Chemical Engineering are:

- A grade point average of 3.0 out of 4.0 earned in a BS or MS chemical engineering degree, to be completed before you start grad school here. If your previous school uses a grade scale not based on 4.0, we will convert your grades to a 4.0 scale.
- A minimum GRE score with at least 700 on the quantitative portion and quantitative plus verbal score of at least 1200. The exam score counted for admission must have been taken within five years prior to application. We have to have an official score from the ETS, so tell them to send them your GRE score directly to the University of Arkansas at Fayetteville, institution code 6866, dept code 1001.
- If you do not have a bachelor’s degree from a U.S. university, you’ll need a minimum score on one of the following English proficiency exams:
 - TOEFL paper exam: 550
 - TOEFL computer exam: 213
 - iBT computer exam: 80
 - IELTS: 6.5

The test must have been taken within two years prior to application.

Do not apply if you don’t meet the above requirements, you will not be admitted.

Application to our graduate program is a two-step process:

Step 1. Apply on-line to the Chemical Engineering Department

Step 2. If you are accepted by the department, apply to the University

If you are accepted by the Department in Step 1, you will almost certainly be accepted by the University in Step 2.

Step 1: Application to the Chemical Engineering Department

Fill out the on-line form at <http://www.engr.uark.edu/cheg/2751.php>

Type in as much as you want into each field, there is no limit. We want to know all about you so tell us all you can.

You do not need to send in transcripts, GRE scores, English language scores, letters of recommendation or an application fee for this step. If you are accepted to the Department in this step, you will send all of that information, and the original documents, to the Graduate School in the next step.

Submitting this form will send it directly to the Department where your application will be evaluated. We will email you in a week or two to let you know if you were accepted. If you have any questions about this process or your status, email the department’s graduate coordinator, Dr. Ulrich, at rulrich@uark.edu

Your application will be evaluated in just a few days and you will get an email from Dr. Ulrich regarding your status. Don’t go to step 2 till you get our reply about your departmental application.

Step 2: Application to the Graduate School

After Dr. Ulrich has emailed you that you have been accepted by the Department, you will apply to the University through the Graduate School Office.

Start here: <http://www.uark.edu/depts/gradinfo/recruit/applying.html>

The Grad School's website: <http://www.uark.edu/depts/gradinfo/>

You can email them at: gradinfo.uark.edu

And, here is some helpful information from the grad school:

<http://www.uark.edu/depts/gradinfo/forms/student/appl-instruct.pdf>

The Graduate School requires a \$40 application fee for U.S. students or a \$50 fee for international students but the Chemical Engineering department will pay this for you if you were accepted in Step 1.

You will submit various documents to the Graduate School in this step, including transcripts, GRE scores, English language scores, letters of recommendation. The scores on these documents must match exactly those that you referred to in Step 1.

Once the Graduate School Office accepts you, they will contact you by email and by letter. Dr. Ulrich will also contact you again from the Chemical Engineering Department to see if you accept or reject our offer to come to graduate school here.

When to Apply

American citizens can apply up to a month before the start of classes for any given semester. That means about July 15 for Fall, December 1 for Spring and April 15 for summer.

International students need to apply at least a month before that.

To be considered for the Walton Distinguished Doctoral Fellowships (DDF), described below, apply by January 15. The Doctoral Academy Fellowships (DAF) have no deadline and can be awarded any time of the year.

FINANCIAL AID

Teaching Assistantships and Research Assistantships

Financial aid comes in two forms: a “teaching assistantship” (paid by the department from University funds) or a “research assistantship” (paid by individual professors from their own research money). Both pay all tuition and provide a living stipend paid monthly directly to the student in the amounts shown below. In both cases, the student pays about \$65/hr in university fees that cannot be covered by either a TA or an RA. As you can see from the table below, there is really no difference between the two as far as you the student are concerned.

Note: strong preference in funding is given to PhD students over MS students.

	Teaching Assistantship (TA)	Research Assistantship (RA)
source of funds	Chem E Department	individual professor's research budget
amount	MS: \$12,000/yr PhD: \$20,000/yr, \$30,000/yr or 40,000/yr depending on the form of assistance	MS: \$12,000/yr PhD: \$20,000/yr, \$30,000/yr or 40,000/yr depending on the form of assistance
pays all tuition?	Yes This benefit amounts to about \$7000/year.	Yes This benefit amounts to about \$7000/year.
pays fees?	No, you'll pay \$65/hr.	No, you'll pay \$65/hr.
research duties	no difference	
teaching duties	no difference	
funding time limit	entering with BS, leaving with MS: 4 semesters (1 year + 1 semester) entering with BS, leaving with PhD: 11 semesters (3 years + 2 semesters) entering with MS, leaving with PhD: 7 semesters (2 years + 1 semester) (note: all summer = 1 “semester”)	entering with BS, leaving with MS: 4 semesters (1 year + 1 semester) entering with BS, leaving with PhD: 11 semesters (3 years + 2 semesters) entering with MS, leaving with PhD: 7 semesters (2 years + 1 semester) (note: all summer = 1 “semester”)

According to 1987 changes in the tax laws, all assistantships and fellowships are considered to be taxable income, but the tax rates are very low for these amounts.

Walton Fellowships

There are two rather large graduate fellowships available primarily to U.S. students, but a few international students have received it as well:

Doctoral Academy Fellowships (DAF) - \$30,000 per year plus tuition

GPA: 3.50/4.00 if entering with a BS in chemical engineering, natural science, or other engineering program. 3.65/4.00 if entering with a MS in a similar subject area.

GRE: verbal plus quantitative score of at least 1200 with a GRE writing score of 5.0 or higher

Distinguished Doctoral Fellowships (DDF), \$40,000 per year plus tuition

GPA: 3.65/4.00 if entering with a BS in chemical engineering, natural science, or other engineering program. 3.85/4.00 if entering with a MS in a similar subject area.

GRE: verbal plus quantitative score of at least 1300 with a GRE writing score of 5.0 or higher

Neither one pays university fees, which amount to about \$65/hr. You need to apply by February 1 (for Fall admission) to be considered for a DDF. A DAF may be awarded at any time and has no deadline. Email Dr. Ulrich for more details.

Procedure for Applying for Financial Aid

You don't need to apply for financial aid. All students who are accepted for study are automatically considered. There are no additional forms to fill out and no letters of recommendation are needed. The financial aid decision is made by the Graduate Studies Committee in the Department. The graduate coordinator (Dr. Ulrich) is the chairman of this committee and you can send questions to him. When you are informed that you have been accepted into the graduate program you will be told if you have received financial aid.

For departmental financial aid (Teaching Assistantship, or "TA"), earlier applications arriving in the Department are given first consideration for the following Fall semester, so you should apply as soon as possible. If you are interested in applying for a Walton Fellowship, apply by January 15 and contact Dr. Ulrich for more details; this application is not automatic.

Not all graduate students will be offered financial support. MS students are rarely offered financial support. If you are accepted into our graduate program and are not offered funding at that time, feel free to contact individual professors with research interests similar to yours to see if they have any extra money in their private research funds. Our faculty and their research areas are listed at <http://www.cheg.uark.edu/research.asp>.

Employment Outside of the Department

No student on any kind of graduate financial aid may work at any outside full or part-time employment. Any student working outside the Department while on an assistantship or fellowship will immediately lose financial aid and may be terminated from the graduate program.

Conditions for PhD Funding

If you have entered the PhD program on any kind of financial aid, you can lose that funding immediately if you show any indication of leaving the program without finishing your PhD degree.

ENTRANCE EXAMS

To be successful in our graduate program, students must be well prepared in selected basic chemical engineering skills, and it will benefit students to identify and address any problems early in their degree program. The core skills are encompassed in the topics and courses listed as these courses:

Material and energy balances (CHEG 1123 or CHEG 2313)
Fluid mechanics (CHEG 2133)
Thermodynamics (CHEG 1123 or 2313 and CHEG 3323)
Heat transfer (CHEG 3143)
Mass transfer (CHEG 3153)

Students can demonstrate the adequacy of their preparation in three ways:

- Students can demonstrate competency by completion of the following courses in our department with a course grade of B or better.
 - CHEG 1123 or CHEG 2313 (material and energy balances)
 - CHEG 2133 (fluid mechanics)
 - CHEG 3323 (thermodynamics)
 - CHEG 3143 (heat transfer)
 - CHEG 3153 (mass transfer)
- For students with a BSChE from an ABET accredited institution, students can demonstrate competency by presenting a course grade of B or better on their transcript in equivalent courses to those listed above. Course equivalency will be assessed by the Graduate Studies Committee.
- Students not able to demonstrate competency with a B or better in either the course or its equivalent can do so by passing an exam over the subject matter. The Chemical Engineering Competency Exam will be given during the first month of the student's residency. A list of potential questions will be provided to the student when they are accepted into the program along with a list of appropriate resources. The exam will be closed book except for the resource materials provided by the department at the time of the exam; the exam will be administered over five 60 minute periods over the course of two or three days. The exam will test a mix of concepts and calculations. The exam will be evaluated by the Graduate Studies Committee, and a plan for addressing any lack of adequate preparation indicated by the exam results will be developed by the student's major advisor in conjunction with the Graduate Studies Committee. The Competency exam is not intended to exclude students from the program but rather to identify areas where students need additional work to be prepared for successful completion of the program. The topics covered by the Competency Exam will include the core skills outlined above.

COURSEWORK

The coursework requirements are satisfied by a combination of departmental and approved non-departmental courses, thesis and dissertation hours, and seminars. The specific selection of courses should be made in consultation with your research advisor. No course taken for undergraduate credit may be used for graduate credit. It's generally a good idea to get the courses done as quickly as possible in order to free up time for your research project.

You must have a cumulative GPA of at least 3.0 in order to graduate. Any semester in which your semester GPA is below 3.0 does not constitute acceptable progress and your grades must improve to stay in the program. Two consecutive semesters with averages below 3.0 may be grounds for termination from the program. No class with a D or F can count for graduate credit.

The complete University of Arkansas Schedule of Classes is at:

<http://www.uark.edu/registrar/classes/>

Course Designations

At the University of Arkansas, the courses are identified as follows:

1000, 2000, 3000 and 4000 (such as CHEG 2133 or MATH 4163):

These are undergraduate courses.

1000 and 2000 level courses can never be used for graduate credit

3000 level courses can be used for graduate credit if you fill out a form

here's the form: <http://www.uark.edu/depts/gradinfo/forms/student/3&4level.pdf>

4000 level courses can be used for graduate credit but you might have to fill out the form

The 3000 and 4000 level classes must be approved for grad credit; if it's listed in the university's Grad Catalog then you can use it for grad credit.

5000 and 6000 are graduate-level courses and can be used for graduate credit.

The last digit is the number of semester hours the course provides.

Lecture Course - A course with lectures, homework, exams just like you're used to with most of your undergraduate courses. Most of these are carry 3 hours of credit, but there are a few 4 hour classes in this category.

Non-Lecture Course - A course that requires your participation but little actual effort. Examples include:

600V: Master's thesis. No grade is given in this course, there are no class meetings and nothing to hand in. It is used to reflect time spent on research on Master's degree projects. V = number of hour credit such as 6003 for three hours.

700V: PhD Dissertation. No grade is given in this course, there are no class meetings and nothing to hand in. It is used to reflect time spent on research on PhD degree projects. V = number of hour credit such as 7003 for three hours.

CHEG 6801 or 5801 is a seminar course where you'll hear about the various graduate research projects and outside speakers and will have the opportunity to report on your own work. These two classes meet at the same time in the same place and are run by the graduate coordinator.

Grad Course Checklist: PhD

MATH 3423 Advanced Applied Math

You need to fill out a form to get grad credit for this class, you can get it from here:
<http://www.uark.edu/depts/gradinfo/forms/student/3&4level.pdf>

CHEG 5113 Transport Process I (Advanced Applied Math is prerequisite or corequisite)

CHEG 5133 Advanced Reactor Design

CHEG 5333 Advanced Thermodynamics

CHEG 5353 Advanced Separations

CHEG 6123 Transport Processes II

CHEG 6203 Preparation of Research Proposals

Chemical Engineering Electives - 3 hrs

Any 4000 or 5000 CHEG level course.

Electives - 15 hrs

4000, 5000 or 6000 level. The 4000 level classes must be approved for grad credit; if it's listed in the university's Grad Catalog then you can use it for grad credit.

Must be a lecture course, not a special project, seminar or independent research topic.

CHEG 5801 or 6801 Graduate Seminar or CHEG 688V Special Topics in CHEG - 9 hrs

CHEG 700V Dissertation - 30 hrs

You must take at least one hour of CHEG 7001 every semester after you become a PhD candidate. This is a Grad School rule that they take very seriously.

Plant Design Requirement for International PhD Students only

If you have a BS CHEG from a non-U.S. university and you are seeking a PhD here, you will be required to take our senior-level plant design course, CHEG 4443, in order to come up to speed on our philosophy of plant design.

If you enter our PhD program and already have an MS in Chemical Engineering, the department's Graduate Coordinator will subtract your MS courses from the above requirements, thus lowering the hours you need at Arkansas to complete your PhD. You will also need to take 24 hrs of dissertation instead of the 30 listed above.

Grad Course Checklist: Thesis MS

MATH 3423 Advanced Applied Math - 3 hrs

You need to fill out a form to get grad credit for this class, you can get it from here:
<http://www.uark.edu/depts/gradinfo/forms/student/3&4level.pdf>

CHEG 5113 Transport Process I - 3 hrs

Advanced Applied Math is prerequisite or corequisite.

CHEG 6203 Preparation of Research Proposals - 3hrs

Other Chemical Engineering Core Courses - 6 hrs from this list

CHEG 5133 Advanced Reactor Design
CHEG 5333 Advanced Thermodynamics
CHEG 5353 Advanced Separations
CHEG 6123 Transport Processes II

Chemical Engineering Electives - 3 hrs

Any 4000 or 5000 CHEG level course. The 4000 level classes must be approved for grad credit; if it's listed in the university's Grad Catalog then you can use it for grad credit.
This may be a CHEG core course that you didn't take to satisfy the core requirement.

Mathematics - 3 hrs

Pure or applied mathematics beyond differential equations, 4000, 5000 or 6000 level.

Electives - 3 hrs

4000, 5000 or 6000 level.

Must be a lecture course, not a special project, seminar or independent research topic.
These may be CHEG core courses that you didn't take to satisfy the core requirement.

CHEG 600V Thesis - 6 hrs

CHEG 5801 Graduate Seminar - every semester

Grad Course Checklist: Non-Thesis MS

MATH 3423 Advanced Applied Math

You need to fill out a form to get grad credit for this class, you can get it from here:
<http://www.uark.edu/depts/gradinfo/forms/student/3&4level.pdf>

CHEG 5113 Transport Process I (Advanced Applied Math is prerequisite or corequisite)

CHEG 5133 Advanced Reactor Design

CHEG 5333 Advanced Thermodynamics

CHEG 5353 Advanced Separations

CHEG 6123 Transport Processes II

CHEG 6203 Preparation of Research Proposals

Chemical Engineering Electives - 3 hrs

Any 4000 or 5000 CHEG level course. The 4000 level classes must be approved for grad credit; if it's listed in the university's Grad Catalog then you can use it for grad credit.

Electives - 6 hrs

4000, 5000 or 6000 level.

Must be a lecture course, not a special project, seminar or independent research topic.

CHEG 5801 Graduate Seminar - every semester

Coursework Loads

If you are on any kind of financial aid, such as a TA, RA or Walton, then you have to take at least:

Spring or Fall Semesters: 6 hours minimum, 15 hours maximum
Total for Summer Semesters: 3 hours minimum, 9 hours maximum

If you are not on any kind of financial aid but, instead, are paying for your education out of your own pocket, the requirements are relaxed and there is no minimum.

If you are an MS student who has finished all the lab work and is only writing your thesis, the minimum is zero; you don't even have to be enrolled. But, if you are a PhD student, you have to be enrolled every semester and take at least one hour a semester of Doctoral Dissertation (CHEG 700V) each time. You can even defend your thesis for the MS and not be registered, but you do have to be registered to defend your dissertation for the PhD.

These courseload hours include all courses, lecture and non-lecture. For the spring or fall semesters, a course load of 9 hours of lecture courses is normal but 12 is reasonable, although it may be difficult to perform much research with that amount of homework and exams. It's best to get your lecture classes out of the way as quickly as possible to leave time for research as your project becomes better defined. MS students should complete them in about a year and PhD students in about two years.

Extra Coursework

You may not take courses beyond the minimum degree requirements without the approval of both your research advisor and the graduate student coordinator. The 6 hours of outside electives for the Master's degree and 18 for the PhD and should enable you to at least sample any area of you want to study.

RESEARCH PROJECTS

During your first semester in residence you should visit with each faculty member to determine what projects are available and you should choose a research advisor by the end of the first semester. Under some circumstances, the selection of a specific research advisor will be a condition of your admission, particularly when a research assistantship is involved. Active research interests of our faculty are listed at <http://www.cheg.uark.edu/research.asp>.

Your research advisor and you will work closely together to help plan your overall program and coordinate the course work and research activities. Frequent contact between you and your advisor is necessary to ensure the success of your project. The research can be either analytical or experimental in the MS program but an advanced-level experimental or theoretical component is required for PhD students. Research, by nature, cannot be precisely programmed. The first experimental design and/or technique is frequently unsuccessful, requiring the application of different procedures. You are therefore encouraged to initiate your research activities early in your graduate residency.

Soon after you and your advisor choose a research topic, the two of you will select a research committee consisting of faculty inside and outside of the Chemical Engineering Department. The committee makeup is as follows:

MS: at least three members:
the advisor
one other CHEG professor
one professor from outside of the Department

PhD: at least five members:
the advisor
two or three other CHEG professors
one or two professors from outside of the Department

Extra members are fine. No later than the end of the first year you, along with your advisor's help, should propose the research project to the committee for their approval and suggestions. The day-to-day performance of the research project will be supervised by your research advisor.

A written thesis or dissertation must be prepared to provide a detailed documentation of the research activities and their results. This document is prepared in accordance with Graduate School format and procedures, and must be comprehensive in covering the work that was done from problem definition, through experimental procedure, to results and discussion.

Finally, your committee gets back together so you can present the results of your work, event called your thesis or dissertation defense. They may require some changes to your thesis or dissertation document before passing you. Although it rarely happens, it is possible to fail this oral examination and have to go back to the lab for more work, followed by another defense in front of your committee.

Thesis and Dissertation Preparation

Thesis and dissertation preparation should be done carefully to ensure that the final document meets Graduate School specifications, described at: <http://www.uark.edu/depts/gradinfo/dean/thesisguide.html>

You need to get your thesis or dissertation document printed out, have the Grad School check it to make sure the format is OK, then submit one copy on any kind of paper to the Department. We'll make the copies you need on the required cotton-based paper and give two to the Grad School, one to the Department, one to your advisor, and one to you.

GETTING YOUR DEGREE

We want you to complete your graduate degree without undue delay and move on to the first phase of your career as an MS or PhD chemical engineer. To help ensure that, there are certain milestones and objectives that you need to meet in order to make acceptable progress.

Coursework

It is recommended that you complete your coursework as soon as possible to avoid it from getting in the way as your research project ramps up. As a guideline for full-time students, you should be able to finish the 24 hours of lecture courses required for the MS degree in one calendar year or the 48 hours for the PhD in two years. Of course, specific research commitments, co-op assignments and other extenuating circumstances can force you to extend your classes beyond these times. Your committee will look to see if you are on schedule to finish your coursework in a timely fashion taking into consideration any other research and service tasks you may also have.

You must have a cumulative GPA of at least 3.0 in order to graduate. Any semester in which your semester GPA is below 3.0 does not constitute acceptable progress and your grades must improve to stay in the program. Two consecutive semesters with averages below 3.0 may be grounds for termination from the program. No class with a D or F can count for graduate credit.

Research

As with coursework, the appropriate rate of progress in research depends on many circumstances such as funding, equipment issues, and the risks taken in the project's scope. Good research pushes the envelope of knowledge and technique, and this can sometimes cause unexpected delays. However, there are some milestones for which you should aim:

During your first semester:

- Select a graduate advisor and define a project topic
- Select a research advisory committee

During your second semester:

- Present your research proposal to your committee

After your proposal is completed, acceptable progress in research activities will be defined by your research advisor and your committee. There are many potential problems in any research program that can cause your intended schedule to be unavoidably delayed. If this is the case, your graduate advisor will inform the committee and these factors will be taken into consideration.

Proposal to the Student's Committee

It is the policy of this department that all graduate students present a written and an oral proposal to their committee for the purpose of defining their research program. The written part will constitute the exam for PhD candidacy, with the major professor and the committee determining what constitutes a "pass" for that test. After passing the exam, the major professor should inform the graduate coordinator and the coordinator will write the required memo to the Grad School declaring that the student is now a PhD candidate.

Safety Practices

Chemical engineering research often involves handling and disposing of hazardous materials. It is important that you learn to do this properly for your own safety, the safety of others around you, and as valuable training for your future. Each semester, you will receive instruction in safety practices as part of Graduate Seminar. You will be expected to take what you learn into the lab on a daily basis and to conduct your research activities at a level of safety performance equal to or exceeding standards common in the U.S. chemical industry. **Violations of safety practices, whether they result in accidents or not, are absolutely unacceptable** and may result in you losing lab privileges or even termination from the graduate program.

Assisting in Undergraduate Teaching

Grading papers, overseeing lab sessions, and giving an occasional lecture when the professor is out of town are valuable services to the Department, a useful technical review for you, and good practice for a career in academia. All grad students are required to participate in these activities. By departmental policy, grad students will never be asked to teach an entire course.

Forms for the Graduate School

There are several forms that the Grad School is going to want you to turn in during your time here. Links are provided in this handbook to many of these so you can download them. The Grad School seems to change the links from time to time and, if the provided links don't work, you can probably go to the Grad School's website and find the right path. Also, let Dr. Ulrich know that the link in this document is bad so he can fix it.

Most of these forms require signatures from various people:

“Chair of the Committee” = your research advisor

“Department Head/Chair” = Dr. Ulrich or Dr. Spicer

“Office of the Graduate Dean” - you never need to get this one, the Grad School will take care of it

It would probably be a good idea to make a copy of any form you turn in to the Grad School in case it gets lost. If you want, Dr. Ulrich can put it in your student file for safekeeping.

You can find most of their forms at:

<http://www.uark.edu/depts/gradinfo/forms/index.html>

and

<http://www.uark.edu/depts/gradinfo/forms/degreeforms.html>

More specific links are provided in the *Checklist for the MS* and *Checklist for the PhD* in the following sections.

Acceptable Progress Toward the Degree

Acceptable progress toward degree completion is required to maintain a student's status in the department. Measures of progress include:

(1) Finding an advisor within four months after either entering the graduate program or after leaving another advisor's research group. Non-thesis MS students are advised by the Graduate Program Coordinator.

(2) Acceptable grades in coursework.

(3) Acceptable progress in research work toward a thesis or dissertation, if applicable.

Students who do not make acceptable progress toward degree completion by these standards will be informed of the actions they must take to remain in the program. Lack of a timely, adequate response to this communication may be grounds for dismissal by vote of the Graduate Studies Committee.

Annual Progress Evaluation

Each year you'll meet with your advisor and research committee to determine if your progress has been acceptable. If it is unacceptable, they will also tell you in writing exactly what you need to do to remedy the situation and to bring your performance up to a satisfactory level. In that case, a second special review will be scheduled six months later. If your performance has not sufficiently improved, you may be terminated from the program at that time. If you refuse to participate in the review process, you can also be terminated immediately.

DEGREE REQUIREMENTS FOR THE PhD

The PhD in Chemical Engineering program consists of the following components:

- coursework, see page 8
- assisting in departmental teaching
- proposal of your research plans to your committee
- research resulting in a successfully-defended dissertation

You should be able to finish the lecture coursework requirement in 2.0 to 2.5 calendar years by taking 9 hours each Spring and Fall plus 6 in the Summers. This leaves a couple of years at the end of your residency to dedicate for research activities.

Upon entering the PhD program you are a "PhD applicant" and, upon completion of all coursework and the proposal, you are a "PhD candidate".

Getting an MS on the Way to a PhD

It is not necessary to obtain an MS degree in this department on the way to a PhD but it may be desirable for you and/or your advisor. This is a decision for the two of you to make. If a thesis MS in ChemE is sought, all requirements for that degree, as described earlier in this document, must be satisfied including defending your thesis in front of your committee and later having that thesis accepted at the Grad School. A non-thesis MS can be earned in the PhD program if you satisfy all of the requirements for the non-thesis MS degree as described later in this handbook. If you are on departmental funding, you need your committee's permission to get a non-thesis MS.

Checklist for the PhD

- Select a graduate advisor during first semester.
- Select a graduate advisory committee. For the PhD degree, this committee consists of at least five members: the advisor, at least two other CHEG representatives, and at least one representative from outside of the Department.
- Fill out the two forms *Doctoral Dissertation Committee* and *Doctoral Program Advisory Committee*. These two forms are almost identical but the Graduate School will want them both. This should be done during the first year.
 - PhD Dissertation Committee:*
<http://www.uark.edu/depts/gradinfo/forms/student/doctoral-diss-comm.pdf>
 - PhD Program Advisory Committee:*
<http://www.uark.edu/depts/gradinfo/forms/student/doctoral-comm.pdf>
- Select a dissertation topic and title.
- Fill out the *Doctoral Thesis Title* form and give them to the Grad School, preferably in the first year, but at least one year prior to the dissertation defense.
<http://www.uark.edu/depts/gradinfo/forms/student/doctoral-title.pdf>
- Present a formal proposal of research to your committee for approval and suggestions. When you pass, have your advisor inform the grad coordinator. No form is necessary.

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- Apply for graduation in the Graduate School office at the beginning of your last semester. While you're there, ask them at this time "What else do I need to do to graduate?" just to make sure no steps are missed with the Graduate School.
 - Prepare the dissertation in accordance with the Graduate School format, described at: <http://www.uark.edu/depts/gradinfo/dean/thesisguide.html>
 - Two weeks before your defense, go to the Grad School office and give them your defense date and ask them to send a blank *Doctoral Record of Progress* form to your advisor. This form cannot be downloaded.
 - Submit your dissertation to your advisory committee at least one week prior to your defense.
 - Pass the dissertation defense, and complete and file the cardboard form *Doctoral Record of Progress Degree*. The entire committee will sign this. Give the completed form to the Graduate School. It's a good idea for you to have this form ready to be signed at the defense, along with the three signature sheets on 100% cotton paper to be bound into the copies of your dissertation.
 - Print out your final dissertation on any kind of paper, have the Grad School check it for format, and give that copy the Department along with the signature sheets on 100% cotton paper. The Department will make copies for all who need them. Give the Department a few days to do this, please! Don't bring it in at 3:30 on the day it's due at the Grad School. When you hand in the copy at the Grad School, they will have a couple of other forms for you to fill out, then you're done.

DEGREE REQUIREMENTS FOR THE THESIS MS

The thesis MS in Chemical Engineering consists of the following components:

- coursework, see page 9
- assisting in departmental teaching
- research resulting in a successfully-defended thesis

You should be able to finish the lecture coursework requirement in one calendar year by taking 9 hours in the Fall, 9 in Spring and 6 in summer. This leaves time at the end of your residency to dedicate for research activities.

Checklist for the Thesis MS

- Select a graduate advisor during first semester.
- Select a graduate advisory committee. For the master's degree, this committee consists of at least three members: the advisor, at least one other CHEG representative, and at least one representative from outside of the Department.
- Fill out the two forms *Master's Thesis Committee* and *Master's Program Advisory Committee* and give them to the Grad School. These two forms are almost identical but the Graduate School will want them both.
Master's Thesis Committee:
<http://www.uark.edu/depts/gradinfo/forms/student/masters-thesis-comm.pdf>
Master's Program Advisory Committee:
<http://www.uark.edu/depts/gradinfo/forms/student/masters-adv-comm.pdf>
- Select a thesis topic and title.
- Fill out the *Master's Thesis Title* form and give it to the Grad School. Do this preferably in the first semester, but at least one year prior to the thesis defense.
<http://www.uark.edu/depts/gradinfo/forms/student/masters-thesis-title.pdf>
- Apply for graduation in the Graduate School office at the beginning of your last semester. While you're there, ask them at this time "What else do I need to do to graduate?" just to make sure no steps are missed with the Graduate School.
- Prepare the thesis in accordance with the Graduate School format, described at:
<http://www.uark.edu/depts/gradinfo/dean/thesisguide.html>
- Submit your thesis to your advisory committee at least one week prior to your oral defense.
- Pass the thesis defense, and complete and file the cardboard form *Master's Record of Progress*.
<http://www.uark.edu/depts/gradinfo/forms/student/progress-record.pdf>
The entire committee will sign this. Give the completed form to the Graduate School. It's a good idea for you to have this form ready to be signed at the defense, along with the three signature sheets on 100% cotton paper to be bound into the copies of your thesis.
- Print out your final thesis on any kind of paper, have the Grad School check it for format, and give that copy the Department along with the signature sheets on 100% cotton paper. The Department will make copies for all who need them. Give the Department a few days to do this, please! Don't bring it in at 3:30 on the day it's due at the Grad School. When you hand in the copy at the Grad School, they will have a couple of other forms for you to fill out, then you're done.

DEGREE REQUIREMENTS FOR THE NON-THESIS MS

The non-thesis MS in Chemical Engineering consists of the following components:

- coursework, see page 10
- assisting in departmental teaching

You should be able to finish in 1.5 - 2 years

Students in the non-thesis MS program who are not on funding (RA or TA) will be part of the normal rotation of grading for undergraduate courses. They will be paid \$750 per semester.

Students on funding (RA or TA) must receive approval of their committee or, if they don't have a committee, of the Grad Studies Committee to get this degree.

GETTING INTO THE PROGRAM IF YOU DON'T ALREADY HAVE A CHEMICAL ENGINEERING DEGREE

The Department offers the Master's and the PhD degree for students who do not have a BS in chemical engineering but have a Bachelor's degree in another subject. This program enables a student to build on his/her background in other fields of engineering, mathematics, chemistry, physics, and the humanities or social sciences to obtain an advanced chemical engineering degree. However, the graduate degrees will be obtained without ever having achieved a BS in CHEG.

You will not enter grad school directly, but will instead take a number of "deficiency courses" to prepare you for graduate work. Upon completion of these deficiency courses, you will then apply to the graduate program.

This program is administered by Dr. Ed Clausen eclause@uark.edu and you should contact him for more information about it.

Approximate Completion Time from the time you enter the program.

PhD 5 - 5½ years
MS 3½ years

NOTE: You should understand that your participation in this program with a Bachelor's degree in anything besides engineering makes you ineligible to take the Fundamentals of Engineering exam and thus to become a licensed Professional Engineer. Only graduates from an ABET accredited BS engineering program (such as our BSChE program or any other school's ABET accredited BS in any field of engineering) are eligible to take the Fundamentals of Engineering exam.

You must satisfy the GRE requirements of at least 700 V and V+Q at least 1200 before you apply for undergraduate deficiency coursework at the University of Arkansas. You will be required to make up deficiencies in chemical engineering undergraduate courses of approximately 39 hours, which should take about three semesters. Those courses are:

- CHEG 1123 – Introduction to Chemical Engineering II
- CHEG 2133 – Fluid Mechanics
- CHEG 2313 – Thermodynamics of Single-Component Systems
- CHEG 3143 – Heat Transport
- CHEG 3153 – Non-Equilibrium Mass Transfer
- CHEG 3253 – Chemical Engineering Computer Methods
- CHEG 3323 – Thermodynamics of Multi-Component Systems
- CHEG 3333 – Chemical Engineering Reactor Design
- CHEG 4163 – Equilibrium Stage Mass Transfer
- CHEG 4413 – Chemical Engineering Design I
- CHEG 4423 – Automatic Process Control
- CHEG 4443 – Chemical Engineering Design II
- CHEG 4813 – Chemical Process Safety

Mathematics through differential equations; analytical, physical, and organic chemistry; and university physics are required as well. Depending on your background, you may already have many or all of these courses or course equivalents already. They are:

- MATH 2554 – Calculus I
- MATH 2564 – Calculus II
- MATH 2574 – Calculus III
- MATH 3404 – Differential Equations

- PHYS 2053 – University Physics I

PHYS 2051L – University Physics Lab I
PHYS 2073 – University Physics II
PHYS 2071L – University Physics Lab II

CHEM 1123 – University Chemistry II
CHEM 1121L – University Chemistry Lab II
CHEM 3603 – Organic Chemistry I
CHEM 3601L – Organic Chemistry Lab I
CHEM 3613 – Organic Chemistry II
CHEM 3611L – Organic Chemistry Lab II

6 hours of advanced chemistry or physics

The deficiency program coordinator (Dr. Clausen, eclause@uark.edu), in conjunction with your research advisor if one exists at that time, will perform an evaluation of your individual deficiency requirements when you enter the program. Your progress will be monitored by the undergraduate advisor each semester to ensure a 3.0 grade point average in all chemical engineering deficiency courses. As the chemical engineering deficiencies are completed, you enter the regular graduate program through the regular admission process. You never will complete a BS degree, which would take another year or so, but you'll enter the graduate program once you have taken enough courses to perform well in graduate school. If you fail to maintain a 3.0 GPA, you will not be allowed to enter the graduate program and will be directed into the undergraduate program to complete the BS.

The Accelerated Program

For students who qualify, an accelerated program is available, also administered by Dr. Clausen (eclause@uark.edu). This may reduce your total time here by up to a year. You will either be admitted to the regular deficiency program or the accelerated program—admission to a hybrid between the two programs is not possible.

Approximate Completion Time from the time you enter the program.

PhD 4½ years
MS 3 years

Admission Guidelines

Students seeking admission to the accelerated program should have earned a BS in Chemistry or Biochemistry. The undergraduate degree program should include at least two semesters of calculus, two semesters of calculus-based physics, two semesters of general chemistry, two semesters of organic chemistry and at least six hours of upper-level chemistry or physics. Students from other undergraduate degree programs may be required to complete additional courses prior to entering the program. Students may choose to take these courses either at the U of A or the BS degree granting institution.

Students seeking admission to the accelerated program must have a GPA of at least 3.5 in their undergraduate degree programs.

You must satisfy the GRE requirements of at least 700 V and V+Q = at least 1200 before you apply for undergraduate deficiency coursework at the University of Arkansas.

Progress Toward Degree

First Semester Coursework (MScE or PhD)

CHEG 1123 (Fundamentals of Chemical Engineering II)
CHEG 2133 (Fluid Mechanics)
CHEG 3143 (Heat Transport)

MATH 3404 (Differential Equations)

Meeting of Graduate Committee to Discuss First Semester Progress

If the student earns at least a 3.4 GPA, with no C's, in these first four courses (or three courses if Differential Equations is not required), he/she is qualified to continue in the accelerated program.

If the student earns less than a 3.4 GPA or earns a C in one or more of the courses, additional courses will likely be required before the student is allowed to enter the graduate program. The number of undergraduate chemical engineering courses will not exceed the number of courses listed in the attached document of undergraduate courses required for chemical engineering. The student must earn at least a 3.0 GPA on all undergraduate chemical engineering courses to be admitted to the graduate program.

If the student is qualified to continue with the accelerated program, he/she will choose between the Accelerated MSChE program and the Accelerated PhD program. The requirements for the two programs are detailed below. If the student is not qualified to continue with the accelerated program, a plan of study will be developed for the student by the graduate program coordinator.

PhD Program

1. Upon satisfying the requirements of the first semester of the accelerated program, the student is eligible for departmental financial aid.
2. In the second semester, the student must take CHEG 3153 (Non-Equilibrium Mass Transfer) and CHEG 3323 (Thermodynamics of Multi-Component Systems) and receive a B or better in both courses. If either of the courses is not offered in the second semester, the student must take them on the first date they are offered. These may not be counted for graduate credit.
3. The student may take, with advisory committee consent, up to six additional hours of graduate courses during this second semester.
4. The student must take CHEG 4443 (Design II) for graduate credit.
5. With approval of the student's advisory committee, the student may take one of the following for graduate credit: CHEG 4163 (Equilibrium Stage Mass Transfer), CHEG 4423 (Process Control) or CHEG 4813 (Safety).
6. The student will be required to complete the requirements for the Accelerated MS program if he/she decides to switch from the PhD program to the MSChE program.

MSChE Program

1. In the second semester, the student must take CHEG 3153 (Non-Equilibrium Mass Transfer) and CHEG 3323 (Thermodynamics of Multi-Component Systems) and receive a B or better in both courses. If either of the courses is not offered in the second semester, the student must take them on the first date they are offered. These may not be counted for graduate credit.
2. The student may take, with advisory committee consent, up to six additional hours of graduate courses during this second semester.
3. The student must take CHEG 4443 (Design II) for graduate credit prior to graduation.

Financial Aid

Students may go onto research assistantship money at any time if they can find a research advisor willing to pay them. Departmental funding is given on a case-by-case basis.