

# Chemical Engineering MS Student Handbook

School for  
Engineering of  
Matter, Transport,  
and Energy

Arizona State  
University

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This document serves as the official graduate student handbook for outlining degree requirements and policies and procedures for completion of a MS degree in Chemical Engineering.

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Welcome to the Chemical Engineering (ChE) program. Please read this handbook carefully, as it is your responsibility to know and to observe all procedures and requirements as defined in this handbook, in the Graduate College Policies and Procedures Manual, and the Format Manual (a guide to assist students writing theses or dissertations). Students may obtain a copy of the Graduate Policies and Procedures manual at the following website:

[http://graduate.asu.edu/faculty\\_staff/policies](http://graduate.asu.edu/faculty_staff/policies) . The format manual may be obtained from the Graduate College online at <http://graduate.asu.edu/formatmanual>.

Graduate students are expected to be familiar with the Code of Conduct and to maintain the highest degree of academic integrity. Violations of the Code of Conduct or incidents of dishonesty such as cheating in examinations, cheating in laboratory work or plagiarism are subject to university discipline, whether committed by individuals or groups. The Code of Conduct can be found at: <http://students.asu.edu/srr/code> and the university academic integrity policy is available at <http://provost.asu.edu/academicintegrity>.

All incoming SEMTE graduate students will be required to submit and have their Plan of Study (iPOS) approved prior to being eligible for registration for third semester classes. This means students who begin in one semester, will have a hold placed on their account before they begin their third semester, including summer, unless they have submitted their iPOS.

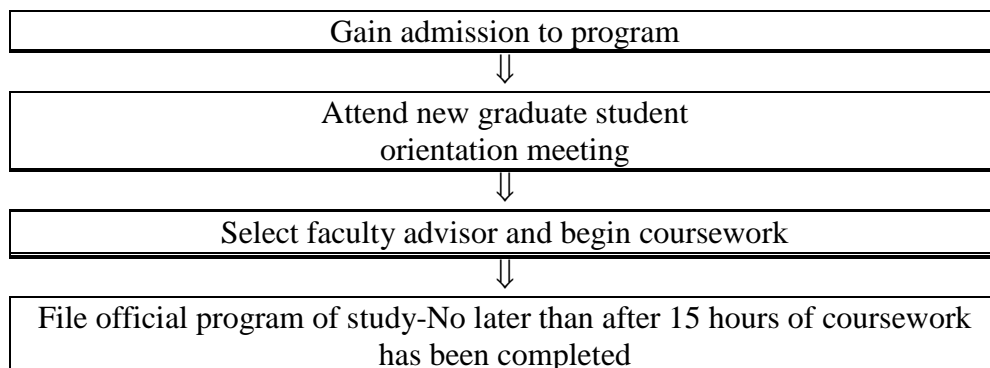
All research assistants (RAs) are required to attend a safety orientation class outlining University, Fulton Schools and School safety guidelines and regulations. This orientation class is typically held at the beginning of each fall semester. You will be notified about the date and time of the orientation class. Students who refuse to maintain a safe working environment are subject to withdrawal from the graduate program.

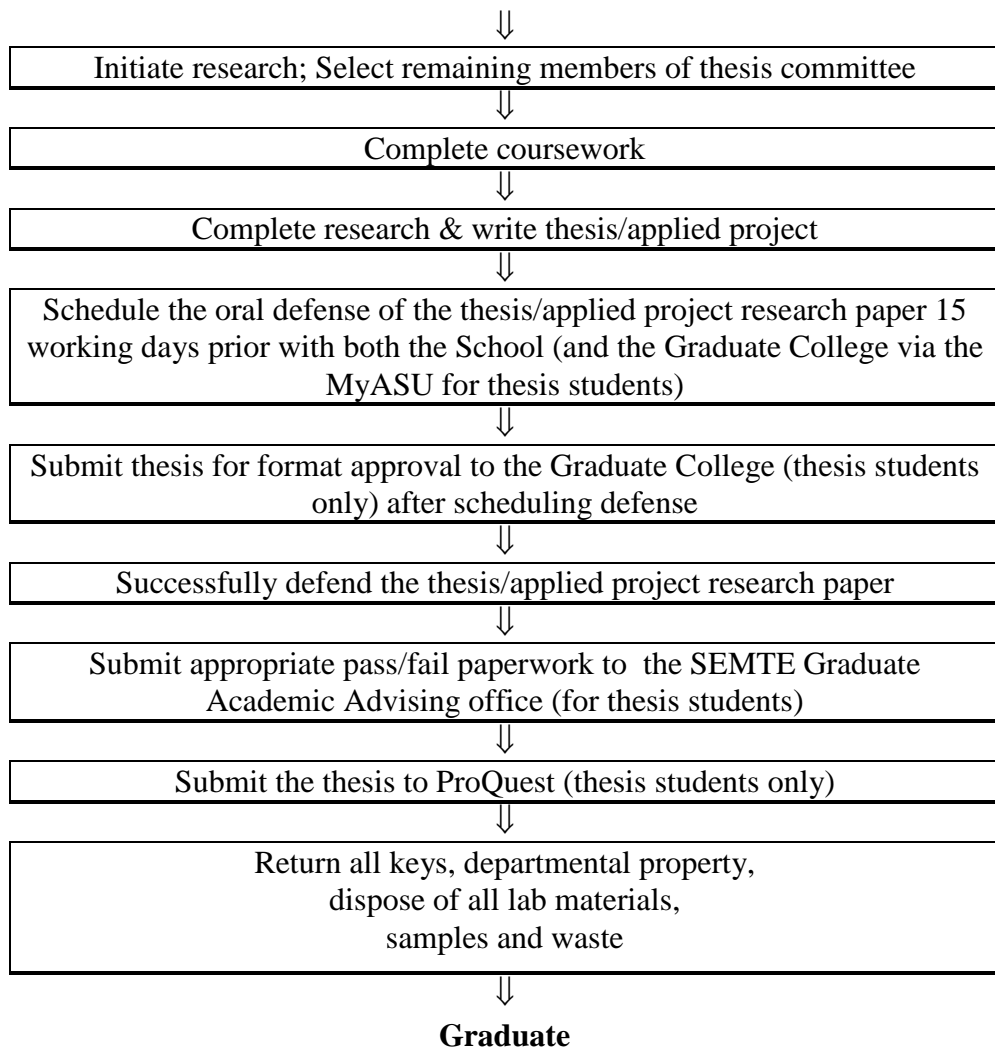
Per the Graduate College, registration in nine credits is considered a full-time load for graduate students. Students who are a part of the Ira A. Fulton Schools for Engineering are restricted to 12 credits per semester. However, special exceptions may be allowed to register for more than 12credits with faculty advisor approval.

### **Path to the Master's Degree**

The flowchart below summarizes the chronological steps that must be followed in this process.

#### PATH TO THE MASTER'S DEGREE





## Thesis vs. Non-Thesis Tracks

There are two options for the MS degree in Chemical Engineering: the thesis track option, which combines coursework (on advanced topics in the student's field of specialization) with in-depth research, and the non-thesis track, which is designed primarily for all MS students. **All MS students in ChE are admitted by default in the non-thesis track; students who desire to pursue the thesis track option should be approved by his/her research faculty advisor and submit a request in the iPOS to change to the thesis track.** Although non-thesis students are required to complete an applied project at the conclusion of their coursework, the research done for this paper is not at the same level as that required for a thesis. Additional coursework is required in place of the thesis.

The selection of a suitable research topic is of paramount importance to a successful graduate program. Students who are interested in the thesis track option are urged to select a faculty advisor and topic early in their program of study, generally in the beginning of the first semester in residence. To accomplish this, the student visits with faculty members and then selects an advisor and thesis topic that match the student's goals and interests. The program does not guarantee that a student will be selected to work on a specific project offered by a given faculty member. The student is also responsible for enlisting faculty to serve as members on the student's supervisory committee. Faculty interests can be found on the website at: [https://graduate.asu.edu/graduate\\_faculty](https://graduate.asu.edu/graduate_faculty).

The faculty thesis advisor works closely with the student to help plan the student's overall program and to coordinate coursework and research activities. Generally, the advisor helps the student select other members of the supervisory committee. Frequent contact between the student and the faculty advisor is necessary to accurately define the research project. Original work is desirable in pursuing the thesis-track degree, and one or more research publications or presentations are anticipated to result from the research project.

To satisfy the research requirement for the Master of Science, thesis track option degree, the student is expected to present a thesis, which is defended in an oral examination. The thesis should be of high quality, giving evidence that the program provided an introduction to original research. Students should obtain copies of *The Format Manual* (which is a guide for the preparation of master's theses) from the Graduate College at <http://graduate.asu.edu/formatmanual>. **The final copy of the thesis or its equivalent is reviewed by the student's supervisory committee and submitted to the Graduate College for format evaluation at least 10 working days prior to the scheduled thesis defense.** Each student writing a thesis must register for and complete a total of 6 semester hours of thesis credit (CHE 599) listed on the iPOS. These 6 semester hours of thesis are directed to a common research problem. Students can optionally take an additional 3 hours of research credit (CHE 592) to be used towards the iPOS. Credit taken to fulfill the thesis/research enrollment requirement must appear on the iPOS. Students must be enrolled for at least 1 hour of credit that appears on the program of study or 1 hour of appropriate graduate level credit (i.e. CHE 595: Continuing Registration) during the semester or summer session in which they defend the thesis and/or are considered a graduate. If a defense occurs in the time between the semesters or summer sessions, students are required to register for the next semester.

The oral defense of a master's thesis must be scheduled at least 15 working days prior to the agreed upon defense date by adhering to the steps outlined below. Master's thesis defenses are public and open to all members of the university community. The oral defense engages the supervisory committee and the candidate in a critical discussion of the research and findings of the study. Moreover, the defense attempts to relate the content of the thesis to the major field. The presentation of the thesis defense in an open forum fosters a broader awareness of the state of graduate research at the university, promotes a wider scholarly dialogue among disciplines, and recognizes publicly the scholarly contributions of the candidate. The graduate coordinator notifies students/faculty within the department about thesis defenses. Members of the university community are also invited to thesis defenses through announcements published on the website. The supervisory committee conducts a final part of its examination in closed session. The deliberation and final vote are always conducted in closed session.

Throughout the program of study, each student is encouraged to actively participate in efforts to acquire funding in support of the faculty advisor's research program. The student should assist his/her faculty advisor in the preparation of grant proposals and/or progress reports to funding agencies.

All students admitted with regular or provisional status are required to establish a graduate supervisory committee during their first semester of residence. This committee is responsible for the guidance and the direction of the student's graduate program. The supervisory committee for the thesis track is comprised of a minimum of three members, including a chair. Generally, the chair of the supervisory committee is the M.S. student's faculty advisor. The committee is responsible for approving the M.S. thesis track student's research proposal and the title of the master's thesis, and for conducting the final defense of the master's thesis.

M.S., non-thesis track students with applied projects should discuss potential committee members with the graduate program chair during course advisement at the end of their second semester of residence and form a committee. The chair of the committee will provide minimal technical guidance on the applied project, but will provide input on the suitability of potential projects for satisfying the requirements for the M.S., non-thesis degree.

In addition to the coursework and thesis requirements, all students are required to complete the Chemical Engineering seminar requirements. All full-time MS Chemical Engineering master's degree students must successfully complete the seminar course for three semesters in residence.

Students in the M.S, non-thesis track program must produce and defend a technical paper, often referred to as an applied project. Such papers are generally 15-20 pages in length (double spaced plus figures), and are based upon original work. The supervisory committee for the non-thesis track is comprised of two members. Students should consult with their supervisory committee regarding the proper format of this paper. In the semester that the student plans to graduate, s/he should establish a suitable time with the committee to defend the research paper and register for the required 3 credits of CHE 593 with their faculty advisor. Please note that unlike a thesis, a research paper does not need to obtain format approval nor does it need to be submitted to Graduate College for format review. It is an internal document only, however must be orally defended. Please review Appendix I for guidelines concerning the format of the Applied Project.

## **Thesis Track**

### 1. Chemical Engineering Core Requirements

Students are required to take **(15)** semester hours of graduate level Chemical Engineering courses, exclusive of seminar (CHE 591), deficiency courses, Research/Thesis (CHE 592/599), and Reading and Conference (CHE 590). Of these (15) hours, three courses (9 hours) must be the following:

- CHE 533 (3): Transport Processes I
- CHE 543 (3): Thermodynamics of Chemical Systems
- CHE 544 (3): Chemical Reactor Engineering

### 2. Technical Electives

Master's candidates must select a minimum of **(9)** hours of graduate-level elective courses (beyond the required 15 hours of CHE core requirements) if they take **(6)** hours of research and thesis. **(6)** hours of technical electives are required if the student elects to take **(9)** hours of research and thesis. At least one technical elective course **(3)** hours) must be taken from outside of Chemical Engineering.

\*\*400-level courses in departments outside of Chemical Engineering are considered appropriate technical electives unless the course content significantly matches that of 300-level or lower courses in Engineering. For instance, STP 420 does not qualify as a valid technical elective because it is similar to ECE 383. Any questions on course validity for the technical elective requirement should be addressed to the student's committee chair and/or the Graduate Coordinator.

\*\*CHE 590 (Reading and Conference) may be taken as a technical elective only once (for a maximum of 3 credits).

### 3. Research/Thesis

Each student must register for a combined total of **6** semester hours thesis (CHE 599). Students may list for 3 hours of Research (CHE 592) if they wish, but it is not required.

### 4. Seminar

All full-time Chemical Engineering graduate students are required to successfully complete the seminar course (CHE 591) every semester in residence. Only **(3)** hours of seminar apply toward the MS degree, regardless of how many times it is taken.

**Total:** 33 credits

\*\*Please see Appendix for a checksheet

## **Non-Thesis Track**

All students who are admitted into the MS program are assumed to be non-thesis students unless they choose a faculty advisor and receive approval for the thesis research.

### 1. Chemical Engineering Core Requirements

Students are required to take **(15)** semester hours of graduate level Chemical Engineering courses, exclusive of seminar (CHE 591), deficiency courses, Research/Thesis (CHE 592/599), and Reading and Conference (CHE 590). Of these (15) hours, three courses (9 hours) must be the following:

- CHE 533 (3): Transport Processes I
- CHE 543 (3): Thermodynamics of Chemical Systems
- CHE 544 (3): Chemical Reactor Engineering

### 2. Technical Electives

Master's candidates must select a minimum of **(9)** hours of graduate-level elective courses (beyond the required 21 hours of CHE core requirements) At least one technical elective course **(3 hours)** must be taken from outside of Chemical Engineering.

\*\*400-level courses in departments outside of Chemical Engineering are considered appropriate technical electives unless the course content significantly matches that of 300-level or lower courses in Engineering. For instance, STP 420 does not qualify as a valid technical elective because it is similar to ECE 383. Any questions on course validity for the technical elective requirement should be addressed to the student's faculty advisor.

\*\*CHE 590 (Reading and Conference) may be taken as a technical elective only once (for a maximum of 3 credits).

### 3. Applied Project (CHE 593)

Each student must register for a total of **3** semester hours applied project (CHE 593) and should take during the last semester of graduation.

**Total: 33 credits**

Non-thesis students are not required to take the (3) credit hours of seminar, but they can if they choose to. However, they must replace these (3) hours with an additional technical elective if they do not take seminar.

\*\*Please see Appendix for a checksheet



## APPENDIX I

### GUIDELINES FOR THE ORAL DEFENSE OF THE MASTER'S THESIS

After the student has completed his/her research, s/he is required to orally defend the master's thesis in an open and public forum. The Graduate College requires that the oral defense of the master's thesis be publically announced to ensure that the university community is invited to attend. The oral defense of the student's master's thesis is a formal occasion and the student should treat it as such by dressing appropriately (i.e. business attire) and scheduling the meeting for an appropriate seminar room. It is the responsibility of the student to arrange a time mutually convenient for all committee members, for all audiovisual aids, and to schedule the room location. The student should follow the process outlined by the Graduate College and SEMTE Graduate Academic Advising to schedule the final thesis defense.

At the beginning of the examination, the student's research advisor will introduce the student and the topic of the research to the general audience. The student is then expected to present a brief seminar outlining the results of his/her research. The presentation should be limited to 30 minutes. Following the presentation by the student, the general audience is invited to ask questions. The general audience is then excused and the student's supervisory committee continues to question the student in depth regarding the research findings. The student should be prepared to defend the research methodology used in the study and the results obtained. The oral defense of the thesis is limited to a period of three hours. If necessary, however, the proceedings may be adjourned and rescheduled for a mutually convenient date within one week.

Only one adjournment is permissible. When the committee completes its questioning, the student is asked to leave the room. The supervisory committee then discusses whether or not the student successfully defended his/her research and whether or not the completed thesis is acceptable. The results are transmitted to the SEMTE Graduate Academic Advising office on the Report for Master's Thesis/Practicum Defense form following the approval of the Head of the Academic Unit. Immediately after the defense, the student takes the form to the SEMTE Graduate Academic Advising office for academic unit processing. After the form has been processed at the academic unit level, the SEMTE Graduate Academic Advising office will forward the *Report for Master's Thesis/Practicum Defense* form to the Graduate College.

#### ***LEVEL OF PASS OR FAIL***

**Pass: No revisions.** At the conclusion of the defense, 1) the committee chair should indicate "pass," and 2) all committee members should report the examination results at the bottom of the form as pass and sign the form.3) Provide the *Report for Master's Thesis/Practicum Defense* form to the SEMTE Graduate Academic Advising office for processing and then the form will progress to the Graduate College

**Pass: Only minor format corrections need to be made (e.g., typographical errors, pagination).** At the conclusion of the defense, 1) the committee chair should indicate, "pass" and briefly describe needed revisions, and 2) all committee members should report the examination results at the bottom of the form and sign the form 3) Provide the *Report for Master's*

*Thesis/Practicum Defense* form to the SEMTE Graduate Academic Advising office for processing and then the form will progress to the Graduate College

**Pass with minor revisions: Significant format/editorial corrections and/or minor substantive changes need to be made (e.g., rewrite some text, correct grammatical errors).**

At the conclusion of the defense, 1) the committee chair should indicate, "pass with minor revisions," and briefly describe revisions, and 2) the committee members should report the examination results at the bottom of the form and sign the form. 3) The student should then bring the original signed *Report for Master's Thesis/Practicum Defense* form to the SEMTE Graduate Academic Advising office. This office will take a copy and forward it to the Graduate College within the required allotted time. 4) The *Report for Master's Thesis/Practicum Defense* form will then be returned to the student until his/her revisions are completed and approved. 5) Once revisions are completed, and the original signed *Report for Master's Thesis/Practicum Defense* form has been signed by the Chair in section E, that the revisions are completed and approved, the original signed *Report for Master's Thesis/Practicum Defense* form should again be brought to the SEMTE Graduate Academic Advising office. This office will make sure that Graduate College receives the *Report for Master's Thesis/Practicum Defense* form within the required allotted time.

*Note: Once revisions are completed and approved, the student defense document must go back to [gradformat@asu.edu](mailto:gradformat@asu.edu) for review.*

Student should pay attention to the deadlines for graduation on the Graduate College website: <http://graduate.asu.edu/graddeadlines.html>

**Pass with major revisions: Significant substantive changes need to be made (e.g., chapter rewrite).**

At the conclusion of the defense, 1) the committee chair should indicate, "pass with major revisions," and briefly describe revisions, and 2) the committee members should report the examination results at the bottom of the form and sign the form. 3) The student should then bring the original signed *Report for Master's Thesis/Practicum Defense* form to the SEMTE Graduate Academic Advising office. This office will take a copy and forward it to the Graduate College within the required allotted time. 4) The *Report for Master's Thesis/Practicum Defense* form will then be returned to the student until his/her revisions are completed and approved. 5) The student has up to one academic year in order to make all necessary revisions. The student must be enrolled in CHE 595 until all revisions are complete. 6) Once revisions are completed, and the original signed *Report for Master's Thesis/Practicum Defense* form has been signed by the Chair in section E that the revisions are completed and approved, the original signed *Report for Master's Thesis/Practicum Defense* form should again be brought to the SEMTE Graduate Academic Advising office. This office will make sure that Graduate College receives the *Report for Master's Thesis/Practicum Defense* form within the required allotted time.

*Note: Once revisions are completed and approved, the student defense document must go back to [gradformat@asu.edu](mailto:gradformat@asu.edu) for review.*

Student should pay attention to the deadlines for graduation on the Graduate College website:  
<http://graduate.asu.edu/graddeadlines.html>

**Fail: The basic design and/or overall execution of the study are flawed or the candidate's performance in the oral examination is seriously deficient.** At the conclusion of the defense, 1) the committee chairperson should indicate, "fail", and 2) all committee members should report the examination results at the bottom of the form.

If the student fails, the supervisory committee in consultation with the chair of the committee (student's research advisor) formulates recommendations for future action and recommends them to the chair of the departmental graduate student affairs committee and the chair of the department. Two recommendations are possible: **1)** a re-examination in the format of a new thesis defense may be scheduled following the completion of recommended activities and a petition to the program, School, College, and Graduate College is approved, **2)** the research may be judged unacceptable and the student removed from the graduate program. The results of the oral defense are conveyed to the student by the chair of the supervisory committee. The form will still need to come to the SEMTE Graduate Academic Advising office for academic unit processing. The Graduate College will be notified of the defense failure.

## APPENDIX II

### GUIDELINES FOR THE APPLIED PROJECT

The non-thesis track requires the preparation and submission of a final report on a research topic of the student's choice. Below are suggestions on how to select a topic for the report, and present it to the faculty.

#### Topic

Most MS students are anticipated to follow the non-thesis option. The purpose of the applied project paper is to demonstrate that the student has learned how to apply the engineering science method, including material from ASU graduate courses, in the solution of practical technical problems.

Although the Applied Project paper is not expected to be published, the paper should not contain any trade secret or proprietary information. Proprietary information may be omitted so long as the essential research method and results are clear.

#### Paper

The paper should be 15-20 pages, doubled spaced. The paper should follow the form of engineering research reports and include a title page, table of contents, one page abstract, body, references, and optional supplementary material. A suggested outline for the body of the paper is: Introduction, Methods, Results, Discussion, and Conclusions. Figures should be clearly labeled and captioned.

The main goal of the paper is to demonstrate that the student has learned something in the classes and that the student can apply (or will be able to apply) the material to interesting technical problems. If, for example, the topic is material properties, then the student should relate material performance to physical and chemical properties. Even if trial and error is used for the actual applied research, the paper should include a scientific rationale for the choices made and provide a way forward to more scientific research in the future.

#### Presentation

Students will present and defend their paper before a supervisory committee. Besides the faculty advisor for the applied project, one more faculty member is required to be on the committee. The presentation should last for 20 minutes followed by 30 minutes of questions, and 10 minutes of faculty deliberation. The presentation should summarize the paper with an emphasis on the most important results, the scientific basis of the research, and conclusions.

The final paper should be delivered to the committee at least one week before the presentation. The student arranges a mutually convenient time for the presentation with the faculty on the committee. The room should be reserved for 2 hours to allow additional time if needed. The student also is responsible for reserving a room, computer, and projector for the presentation. Students must complete and submit the SEMTE Room Reservation form (found here: [https://docs.google.com/a/asu.edu/forms/d/1grlxdpJQgaK1NE514oHFXW7S2561jtcG5pZI7HTbFF0/viewform?usp=send\\_form](https://docs.google.com/a/asu.edu/forms/d/1grlxdpJQgaK1NE514oHFXW7S2561jtcG5pZI7HTbFF0/viewform?usp=send_form)), at least 15 working days prior to the student's presentation date.

**APPENDIX III**  
**Chemical (ChE) MS Thesis Degree Checksheet**

\*Please review the ChE MS handbook for more specific information about the program breakdown: <http://engineering.asu.edu/semte/GradHandbooks.html>

The required coursework for this degree is divided into the following categories:

**15 semester hours of graduate level CHE credit (Excluding 591, 501-505, 590, and 592/599)**

CHE core courses

- |            |         |
|------------|---------|
| a. CHE 533 | 3 hours |
| b. CHE 543 | 3 hours |
| c. CHE 544 | 3 hours |

CHE \_\_\_\_\_ 3 hours

CHE \_\_\_\_\_ 3 hours

**Technical Electives/Research (graduate level)**

CHE 592 (Research)/CHE/Course outside CHE prefix \_\_\_\_\_ 3 hours

CHE or Course outside CHE prefix \_\_\_\_\_ 3 hours

Course outside CHE prefix \_\_\_\_\_ 3 hours

**Thesis**

CHE 599 6 hours

**Seminar (Must be enrolled each semester in residence – minimum 3 hours)**

CHE 591 1 hour

CHE 591 1 hour

CHE 591 1 hour

**Total Hours:**

**33 credit hours**

Revised 7/27/13

**APPENDIX IV**  
**Chemical (ChE) MS Non-Thesis Degree Checksheet**

\*Please review the ChE MS handbook for more specific information about the program breakdown: <http://engineering.asu.edu/semte/GradHandbooks.html>

The required coursework for this degree is divided into the following categories:

**15 semester hours of graduate level CHE credit (Excluding 591, 501-505, 590, and 592/599)**

CHE core courses

- |            |         |
|------------|---------|
| a. CHE 533 | 3 hours |
| b. CHE 543 | 3 hours |
| c. CHE 544 | 3 hours |

CHE \_\_\_\_\_ 3 hours

CHE \_\_\_\_\_ 3 hours

**Technical Electives/Research (graduate level)**

CHE 591\*/CHE/Course outside CHE prefix \_\_\_\_\_ 3 hours

(CHE 591 is a 1 credit seminar taken over 3 semesters)

CHE 592 (Research)/CHE/Course outside CHE prefix \_\_\_\_\_ 3 hours

CHE or Course outside CHE prefix \_\_\_\_\_ 3 hours

CHE or Course outside CHE prefix \_\_\_\_\_ 3 hours

Course outside CHE prefix \_\_\_\_\_ 3 hours

CHE 593\* (Applied Project) 3 hours

\*Requires committee of at least 2 ChE Faculty; or if in the CHE 593 course, then committee consists solely of the Graduate Program Chair instructor.

**Total Hours:**

**33 credit hours**

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## APPENDIX V

### Contact Information

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