# Table of Contents

1. **Introduction** ........................................................................................................................................ 3
2. **Admission Requirements** ..................................................................................................................... 4
3. **Application Process Overview** .................................................................................................................. 5
4. **Graduate School and Systems Engineering Standards and Procedures** .................................................. 6
   - Scholastic Standards ............................................................................................................................ 6
   - Graduate Procedures and Required Paperwork ..................................................................................... 7
   - Continuous Registration ....................................................................................................................... 8
   - Program Time Limit ............................................................................................................................ 8
5. **Master of Engineering Program** .............................................................................................................. 9
   - Program of Study ................................................................................................................................. 9
6. **Master of Science Program** .................................................................................................................. 11
   - Program of Study ............................................................................................................................... 11
7. **Doctor of Philosophy Program** .............................................................................................................. 17
   - Program of Study ............................................................................................................................... 17
8. **Important Steps in Detail** ...................................................................................................................... 10
   - Advisor ................................................................................................................................................ 10
   - GS6 Form ............................................................................................................................................. 10
   - GS25 Form .......................................................................................................................................... 10
   - Transfer Credit .................................................................................................................................... 10
9. **M.S. Plan A Thesis Guidelines** ................................................................................................................ 15
10. **Thesis Submission** .............................................................................................................................. 15
11. **Examinations** ........................................................................................................................................ 14
12. **GS6 Form** .......................................................................................................................................... 14
13. **Advisory Committee** ........................................................................................................................... 14
14. **Examinations** ........................................................................................................................................ 14
15. **Thesis Submission** ................................................................................................................................ 15
16. **Transfer Credit** ..................................................................................................................................... 15
17. **M.S. Plan A Thesis Guidelines** ................................................................................................................ 15
18. **Doctor of Philosophy Program** .............................................................................................................. 18
19. **Ph.D. Qualifying Process** ...................................................................................................................... 20
20. **Annual Evaluation Process** .................................................................................................................... 20
21. **GS6 Form** .......................................................................................................................................... 20
22. **Ph.D. Preliminary Examination** ............................................................................................................. 21
23. **GS25 Form** .......................................................................................................................................... 21
24. **Ph.D. Final Examination/Dissertation Defense** .................................................................................... 21
25. **Dissertation Submission** ...................................................................................................................... 22
26. **Transfer Credit** ..................................................................................................................................... 22
27. **Graduate Student Responsibilities** ......................................................................................................... 23
28. **Graduate Student Appeals Procedure** ..................................................................................................... 23
29. **Graduate Student Representation** ........................................................................................................... 23
30. **Appendix A: Program Degree Requirements** ......................................................................................... 23
31. **Appendix B: Application Packet**
This manual has been prepared to acquaint you with the policies and regulations that govern the graduate degrees in the Systems Engineering program. This document should be read in conjunction with the current Graduate and Professional Bulletin of Colorado State University. It has been written to emphasize certain information contained in the Bulletin and to outline specific program policies and procedures. These requirements supplement, but not supersede, all statements in the Colorado State University Graduate and Professional Bulletin.

See: http://graduateschool.colostate.edu/faculty-staff/bulletin.aspx

Additionally, a quick-reference timeline toward your degree can be found at: http://graduateschool.colostate.edu/current-students/steps-to-your-degree.aspx

All Graduate School forms and applications for enrolled students can be found at: http://www.graduateschool.colostate.edu/current-students/forms/index.aspx

All Graduate School deadlines and important dates can be found at: http://graduateschool.colostate.edu/policies-and-procedures/deadline-dates/
Introduction
The Colorado State University (CSU) Systems Engineering program and curriculum was created based on significant national and local industry input. Through an extensive industry survey conducted in 2007, over 600 responses helped identify the need for Systems Engineering and specifically what areas of focus should be addressed in a Systems Engineering program. CSU’s Systems Engineering program began in 2008 with the initial offering of a Master of Engineering (M.E.) with a specialization in Systems Engineering. The M.E. is offered on campus and at a distance.

Since 2008, new courses have been offered every academic year and student enrollment has continued to increase. In 2010, the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in Systems Engineering were offered on-campus. Beginning August 2012, both of these degree programs began to also be offered at a distance. This handbook provides guidance for prospective and current graduate students in Systems Engineering. Appendix A, listing the Systems Engineering faculty and their research interests, should be consulted when seeking an M.S. thesis or Ph.D. dissertation research advisor.

Program offerings:
1. Master of Engineering (M.E.)
2. Master of Science (M.S.)
3. Doctor of Philosophy (Ph.D.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Graduate School Classification</th>
<th>Program Code</th>
<th>Major</th>
<th>Specialization Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Engineering (M.E.)</td>
<td>Plan C</td>
<td>ENGR-DSYZ-ME</td>
<td>Engineering (Systems Engineering Specialization - Distance)</td>
<td>SYEZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENGR-SYEZ-ME</td>
<td>Engineering (Systems Engineering Specialization)</td>
<td>SYEZ</td>
</tr>
<tr>
<td>Master of Science (M.S.)</td>
<td>Plan A - Thesis</td>
<td>SYSE-DD-MS</td>
<td>Systems Engineering (Distance)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Plan B - Project</td>
<td>SYSE-MS</td>
<td>Systems Engineering</td>
<td></td>
</tr>
<tr>
<td>Doctor of Philosophy (Ph.D.)</td>
<td>Ph.D.</td>
<td>SYSE-DD-PHD</td>
<td>PhD Systems Engineering (Distance)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYSE-PHD</td>
<td>PhD Systems Engineering</td>
<td></td>
</tr>
</tbody>
</table>

All programs are offered at a distance and on-campus.
Admission Requirements

Competencies listed below may be demonstrated via coursework or if there is adequate professional, technical experience, via a career path.

For admission into the program the responsibility lies on the student to show that he/she has the foundation that is needed for the Systems Engineering program. For example, the resumé, letters of recommendation and statement of purpose could all provide evidence of analytical/technical competencies learned if the transcripts do not reflect a direct correlation to an analytical skill set.

Per University policy a student can enroll in introductory courses in Systems Engineering without being formally admitted into the program. However, successful completion and/or above average performance in these courses does not ensure admission into the program.

The qualifications for the programs are as follows:

The following degree programs require at a minimum:

- Four-year B.S. with a GPA of at least 3.0
- Calculus III (MATH 261 Calculus for Physical Scientists III or equivalent)
- Basic Statistics (STAT 301 or equivalent)
- GRE test scores are required if your Bachelor's degree and (if applicable) Master's degree was conferred by an institution outside of the U.S.

Master of Engineering (M.E.)
- B.S. degree from a regionally-accredited institution in engineering, business, life sciences, or natural sciences

Master of Science (M.S.)
- B.S. degree from a regionally-accredited institution in engineering, mathematics, or a science discipline
- For Plan A, a faculty advisor must be secured by the applicant before admittance. Plan B does not require an advisor prior to admittance

Doctor of Philosophy (Ph.D.)
- B.S. degree from a regionally-accredited institution in engineering, mathematics, or a science discipline
- The applicant must secure a faculty advisor before admittance
Application Process Overview

To learn more about our program please visit:
http://www.online.colostate.edu/degrees/systems-engineering/

If you meet the minimum requirements and are interested in being considered for a Systems Engineering On-campus or Distance program please review the following:

General Admissions Steps

Below is a brief overview of the admissions process. Detailed and necessary instructions for each step are found in our Application Packet (Appendix B). Failure to follow specified directions in the Application Packet may lead to an incomplete and/or rejected application.

A. If you are applying for the M.S. Plan A (thesis) or the Ph.D., first secure a faculty advisor. Your Research Interest Summary should be prepared before contact is made with potential faculty advisors. Some students choose to not fill out the Graduate School application and pay the fee until they have found a faculty member that has agreed to be their advisor; this is acceptable.

B. If you are applying for the M.E. or M.S. Plan B (project), or have already secured a faculty advisor for M.S. Plan A or the Ph.D., fill out the Graduate School application: http://gradadmissions.colostate.edu/apply

C. Concurrent to your Graduate School application, please submit the following materials (details and addresses found in Appendix B):
   1. One official transcript from every post-secondary institution attended (transcripts from CSU are not required)
   2. Current resumé or CV
   3. Three letters of recommendation
   4. A statement of purpose (speaking to your fit with CSU’s Systems Engineering program; this is different from a M.S. Plan A or Ph.D. applicant’s Research Interest Summary)
   5. International students and students who earned a degree from a non-U.S. institution must also include both of the following:
      a. GRE scores (exempt only if applicant has recently earned a degree from a U.S. institution)
      b. TOEFL and/or IELTS scores (exempt only if the primary official language of applicant’s home country is English or if he or she has recently earned a degree from a U.S. institution)

Contact the International Programs Office for more information.

For consideration Steps A-C (numbers 1-5) must be completed in full.

See the Systems Engineering Application Packet (Appendix B) for our detailed admissions process.

Further questions?
Contact: sys_engr_info@engr.colostate.edu
Graduate School and Systems Engineering Standards and Procedures

Scholastic Standards
By Graduate School regulations, students must maintain good academic standing by meeting two requirements, which are discussed in detail below:

- Maintain a cumulative GPA of at least a 3.0 and
- Maintain satisfactory progress within their department or program

GPA
Students must demonstrate acceptable performance in course work after being admitted to the graduate program, which requires a cumulative grade point average of at least 3.0 be maintained for each of the following four groups of courses:

1. Regular courses taken for a traditional grade and numbered 300 or above (regular courses have numbers ending with 00 through 79). Regular course work is defined as courses other than independent or group studies, research courses, open seminars, thesis/dissertation credits, study abroad, U.S. travel, supervised college teaching, student teaching, practicum, internship, field placement, unique title courses offered through the Division of Educational Outreach, and any courses graded pass/fail, and

2. All regular and non-regular courses graded traditionally and numbered 300 and above, and

3. All traditionally graded courses numbered 300 and above listed on the graduate program of study (see the GS6 Program of Study section), and

4. All regular and non-regular courses graded traditionally and numbered 300 and above that are listed on the graduate program of study.

Please note that any course taken prior to admission into the program does not count toward the above GPAs, per Graduate School policy. 300-level courses cannot be used to satisfy degree requirements for graduate degrees.

Failure to maintain GPA requirements results in being placed on academic probation. New regularly admitted students will not be placed on probation until they have completed 12 credits or two semesters of graduate work, whichever comes first. The probationary period extends for one semester beyond the one in which this status is acquired. Students on probation are subject to dismissal by the academic program or the Dean of the Graduate School at the end of the probationary semester unless good academic standing has been regained. This requires adequate improvement in cumulative grade point averages (3.00) and/or satisfactory progress as determined by the student’s graduate advisory committee.

For all Master of Engineering and Master of Science students: in addition to the above requirements, you must earn a “C” or better in all coursework for it to apply to a Systems Engineering degree (see Graduate and Professional Bulletin E.1.3).

For PhD students: in addition to the above requirements, in order to pass the “Qualifying Process” you must pass all courses with a “B” or higher.

Satisfactory Progress
Per Graduate School policy, good academic standing also requires satisfactory progress in the overall graduate program. When a student’s graduate advisory committee or an appropriate program graduate committee finds that a student is not making satisfactory progress toward the degree due to factors other than grade point average, and that satisfactory progress cannot be anticipated, a plan should be created and the following steps should be taken:

1. Inform the student of the concerns, create a progress plan with the student, develop a timeline and inform the student of the potential consequences (dismissal) if the progress is not satisfactory.

2. The committee should keep in contact with the student to give feedback during the progress plan timeline and document such contacts and their outcomes.
3. At the end of the timeline, if progress is not adequate, the committee may recommend dismissal from the program. The recommendation goes to the Program Director and the Dean of the Graduate School and should include documentation on the steps taken with justification for this action.

Systems Engineering encourages students to make steady progress toward their academic goals and wants to ensure students reach graduation in a timely manner. A Systems Engineering student who meets one of the following conditions will be contacted to set up a progress plan and timeline:

- The student has successfully completed (earned “C” or above/“S”) less than 9 credits toward a Systems Engineering degree in two calendar years
- The student has received two or more “unsatisfactory” annual progress reports from their Ph.D. advisor (applies to Ph.D. students only)

Graduate Procedures and Required Paperwork

The following documents are distributed and regulated by the Graduate School, additional forms and information for enrolled students can be found at: http://www.graduateschool.colostate.edu/current-students/forms/index.aspx

GS6 Program of Study

The Program of Study (GS6) must be filed with the Graduate School before the time of the fourth regular semester (fall and spring) registration. If the GS6 is not submitted by this time, the student will have a registration hold placed on their account until the GS6 has been received by the Graduate School. The purpose of the GS6 is to ensure the graduate student is working toward well-defined goals approved by his/her advisory committee while meeting program and Graduate School standards. The Graduate School reviews each GS6 and determines whether or not the program of study conforms to University policy. Problems are reported to the student and program so that they can be corrected. Assistance in completing the GS6 form is available on the Graduate School website.

Changes in the Program of Study Coursework

After the approval of the GS6, changes to the Program of Study are recorded on the GS Form 25 which is filed during the semester of graduation and prior to the published deadline (approximately 6 weeks after the beginning of the semester). For more information about the GS25 see below section.

Courses listed on the GS6 that have been taken and for which a grade has been received (A through F, I, S or U) may not be removed from the Program of Study. All courses listed on the GS6 must have been passed with a C or higher to qualify for graduation. Any coursework changes on the GS25 must be approved by the student’s faculty advisor (if applicable) and the program advisor. Failure to do so may result in courses not being used toward degree requirements.

Changes in Advisor and Advisory Committee

After the GS6 has been approved, permanent committee replacements are arranged by filing a GS form 9A. Signatures are required for any member(s) dropped from the committee; additionally, advisor/co-advisor changes require the signatures(s) of the individual(s) added. This form also requires the signatures of the student, faculty advisor, Systems Engineering representation, and graduate school representative.

Whenever a member will be absent for an important function of the committee, or when a member will be absent for a semester or more, a replacement will be designated by the Program Director with concurrence of the faculty member being replaced. The Program Director shall designate any eligible replacement by letter to the Graduate School indicating the time period during which the replacement shall serve. At the expiration of the designated time period, the original member shall resume membership.

GS25 Application for Graduation

Before the end of the sixth week of the semester in which the student plans to graduate, a GS25 and GS25A
must be filed with the Graduate School. Any changes to the original GS6 (courses added or dropped) are to be made on this form and approved by the student’s faculty advisor and the program advisor. The Application for Graduation can be accessed at http://www.graduateschool.colostate.edu/current-students/forms/index.aspx

Please note that the Program Deadline for receipt of the form is 10 business days PRIOR to the Graduate School deadline. Refer to the Graduate School website at http://www.graduateschool.colostate.edu for a complete listing of Graduation Requirements and Deadline Dates.

Changes in the GS25
If you do not graduate in the semester you intended, you will fill out the online “Reapplication for Graduation” by the graduation application deadline of the next semester in which you plan to graduate. This does not generate a new GS25, and there is no paper form required for the reapplication.

If you need to change courses after you have submitted a GS25, you will use the GS52.

Enrollment Requirements in Graduation Semester
Graduate degree candidates must be either enrolled for at least one credit or must register for “CR,” Continuous Registration, (see below for an explanation of “CR”) during the term (fall, spring, or summer) in which they file for graduation. Students who fail to register for CR or a credit-bearing course in the semester in which they apply to graduate will not be allowed to graduate that semester and will be required to apply for readmission ($150.00), register for CR ($150.00), and reapply for graduation.

Continuous Registration (“CR”)
All graduate students at Colorado State University are required to be continuously registered in the fall and spring semesters throughout their degree programs. This policy applies from the time of the first enrollment through the graduation term. Registration is also required during the summer term if University resources are used or it is the student’s graduating semester. Students may fulfill this requirement by registering for any graduate credit-bearing course. As an alternative, students may opt for Continuous Registration (CR) status. Registration for CR status is accomplished in the same way as registration for courses. The course reference numbers (CRN) for Continuous Registration appears in the class schedule under the symbol CR.

CR students are assessed a fee to cover their use of certain University resources. CR students have access to the Library, computer, and research laboratories, or other University facilities as determined appropriate by their advisors or as generally available with payment of part-time student fee.

Program Time Limit
There is a ten-year time limit for completion of the master’s or doctoral degrees. Courses to be applied toward fulfilling the requirements for the master’s and doctoral degrees, including any which may have been transferred from another institution, must have been registered for and completed within the ten years immediately preceding the date of completion of requirements for the degrees.
Master of Engineering
Specialization in Systems Engineering

Our Master of Engineering program produces graduates who can design and manage complex multidisciplinary engineering systems with a rigorous systems engineering approach. The applied focus in courses builds skills that can be utilized immediately in current projects and prepares students for future career opportunities.

You can expect the Master of Engineering program to take four to five years if you are a part-time student (1-2 classes per semester). Summer courses are not required, but are offered on a limited basis. A thesis is not required to complete the degree, but you can complete a significant capstone project. This project is completed through ENGR 597 which is driven by an agreement between the advisor and the student.

Systems Engineering is a specialization of the College of Engineering Master of Engineering degree, therefore the Systems Engineering title only appears on the student’s transcript and not on the final diploma.

Program of Study
1) Minimum of 30 semester credits of graduate work in approved course of study
2) Minimum of 24 credits semester credits earned at Colorado State (21 while in graduate program).
3) No more than two courses at the 400 level taken at Colorado State University are permitted. No more than two 500 (graduate) level courses may be transferred from another accredited University.

Courses are intended to be taken in progression; core courses first, then courses in depth (choose 3 from a list of Systems courses), followed by electives and culminating in the Group Study.

Program Course Requirements

Core Courses – 12 credits
- ENGR 501: Foundations of Systems Engineering
- ENGR 530: Overview of Systems Engineering Processes
- ENGR 531: Engineering Risk Analysis
One from:
- CIS 600: Information Technology and Project Management
- CIS 670: Advanced IT Project Management
- MECH 501: Engineering Project Management and Program Management

Courses in Depth – Select 9 credits*
- ENGR 510: Engineering Optimization: Method/Application
- ENGR 520: Engineering Decision Support/Expert Systems
- ENGR 532: Dynamics of Complex Engineering Systems
- ENGR/ECE 565: Electrical Power Engineering
- ENGR 567: Systems Engineering Architecture
- CIS 610: Software Development Methodology
- MECH 513: Simulation Modeling and Experimentation

Electives – Select 6 credits*
400 level or above regular course credits consistent with the student’s program of study.

Group Study – 3 credits
- ENGR 597: Group Study (must have project faculty advisor before enrolling)
  OR another elective 500 level or above

*Courses in new subjects may be offered on an experimental basis, and can apply to the degree.
Timeline of Important Steps to M.E.

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>File GS6 (program of study &amp; committee selection)</td>
<td>Before registration of fourth regular semester</td>
</tr>
<tr>
<td>File GS25 (application to graduate) *reapply online if don’t graduate during expected term</td>
<td>See published deadlines on graduate school website; generally in the first six weeks of the intended graduation term</td>
</tr>
<tr>
<td>Pay student account balance</td>
<td>Before leaving campus</td>
</tr>
<tr>
<td>Graduation</td>
<td>Ceremonies in Fall and Spring only</td>
</tr>
<tr>
<td>Receive Diploma</td>
<td>Mailed 6-8 weeks after end of term</td>
</tr>
</tbody>
</table>

Important Steps in Detail

You may access instructions and forms on the Graduate School website: http://graduateschool.colostate.edu/policies-and-procedures/forms/

Advisor

For the M.E. program, 1 advisor is required. The Systems Engineering Program Director, Ron Sega, should be listed as the advisor on the GS6 form. This form must be filed with the Graduate School as outlined below.

GS6 Form

The GS6 is intended to draft all courses (taken, in-progress, or expected) that will fulfill program requirements and to finalize the student’s advisory committee. It is required before registration for the fourth regular semester in the program. Students will work with the Systems Engineering graduate advisor to lay out a proposed plan of study and list of committee members before submitting the GS6 to the Graduate School. For more information, please see section “GS6” under the “Graduate School Standards” section above.

GS25 Form

The GS25 Application for Graduation must be submitted to the Graduate School in the first six weeks of the semester in which you plan to graduate. You must be enrolled in credit-bearing courses or CR during your graduation semester. For more information, please see section "GS25" under the “Graduate School Standards” section above.

Transfer Credit

For the Master of Engineering degree, a minimum of 24 credits must be earned at Colorado State University, 21 of which must be earned after admission to the Graduate School. No more than 6 credits from an institution other than Colorado State may be applied toward the M.E. degree.

Students petitioning the advisory committee to transfer credits from another institution must attach a description of the courses taken (course content, text, grade) to their GS Form 6 so that an effective evaluation can be made. Courses will only be considered for transfer if they are at the equivalent of the 500 level or above and have an earned grade of B or higher. Individual credits used to fulfill requirements for previously earned degrees or credits earned at institutions not accredited by one of the major regional accrediting agencies are not acceptable for transfer. The only exception to accreditation is that the program may petition the Graduate School to have graduate level courses earned from a foreign institution accepted as transfer credit. Grades in courses accepted for transfer will not be included in calculation of the grade point average.
Master of Science

Graduates of our Master of Science program will be capable of designing and managing complex multidisciplinary engineering systems, with a rigorous systems engineering approach. The research component of the thesis- and project-based M.S. programs equip students with cutting edge skills in specific focus areas, preparing them for future career opportunities.

You can expect the Master of Science program to take four to five years if you are a part-time student (1-2 classes per semester). Summer courses are not required, but are offered on a limited basis.

Program of Study

Master of Science

Plan A requires a thesis and completion of a minimum of 30 credits. Of this 30, 21 credits must be in regular course work other than independent study or research. No more than 6 credits are allowed at the 400 level. The remaining credits must be 500 level or above. This plan involves a final examination as described below (see the “Final Examination” section).

Plan B requires 27 credits of regular courses (other than independent study) and 3 credits of independent study with the submission of a report. No more than 6 credits are allowed at the 400 level. The remaining credits must be 500 level or above. This plan involves a final examination as described below (see the “Final Examination” section).

Student who enter as Plan B students have the option to change to Plan A if, during their time in the program, they find a faculty member that agrees to be their thesis faculty advisor.

Program Course Requirements

Plan A – Thesis Required

Core Requirements - 15 credits*

Select 5 courses from the following:

- CIS 600: Information Technology and Project Management
- CIS 670: Advanced IT Project Management
- MECH 501: Engineering Project Management and Program Management
- ENGR 501: Foundations of Systems Engineering
- ENGR 530: Overview of Systems Engineering Processes
- ENGR 531: Engineering Risk Analysis
- ENGR 532: Dynamics of Complex Engineering Systems
- ENGR/ECE 565: Electrical Power Engineering
- ENGR/ECE 566: Energy Conversion for Electrical Power Systems
- ENGR 567: Systems Engineering Architecture
- ENGR 510: Engineering Optimization: Method/Application
- ENGR 520: Engineering Decision Support/Expert Systems
- MECH 513: Simulation Modeling and Experimentation

Technical Electives - 6 credits*

The Systems Engineering program does not have a set list of electives for any of our degrees. Please work with the Systems Engineering program and/or your faculty advisor to determine which electives will meet your academic and professional goals. Electives can be any Systems Engineering course listed above or must be approved by the Systems Engineering program. A maximum of 6 credit hours at the 400 level are permitted to apply to an M.S. degree. The remaining credits must be at the 500 level or above.

Research - 9 credits

ENGR 699: Thesis
Plan B – Project Option

Core Requirements - 15 credits*
Select 5 courses from the following:
- CIS 600: Information Technology and Project Management
- CIS 670: Advanced IT Project Management
- MECH 501: Engineering Project Management and Program Management
- ENGR 501: Foundations of Systems Engineering
- ENGR 530: Overview of Systems Engineering Processes
- ENGR 531: Engineering Risk Analysis
- ENGR 532: Dynamics of Complex Engineering Systems
- ENGR/ECE 565: Electrical Power Engineering
- ENGR/ECE 566: Energy Conversion for Electrical Power Systems
- ENGR 567: Systems Engineering Architecture
- ENGR 510: Engineering Optimization: Method/Application
- ENGR 520: Engineering Decision Support/Expert Systems
- MECH 513: Simulation Modeling and Experimentation

Technical Electives - 12 credits*
The Systems Engineering program does not have a set list of electives for any of our degrees. Please work with the Systems Engineering program and/or your faculty advisor to determine which electives will meet your academic and professional goals. Electives can be any Systems Engineering course listed above or must be approved by the Systems Engineering program. A maximum of 6 credit hours at the 400 level are permitted to apply to an M.S. degree. The remaining credits must be at the 500 level or above.

Project - 3 credits
- ENGR 695: Independent Study (must have project faculty advisor before enrolling)
  OR another elective 500 level or above

*Courses in new subjects may be offered on an experimental basis, and can apply to the degree.
### Timeline of Important Steps to M.S.

<table>
<thead>
<tr>
<th>Plan A</th>
<th>Plan B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What</strong></td>
<td><strong>When</strong></td>
</tr>
<tr>
<td>Secure Faculty Advisor</td>
<td>Before Program Start</td>
</tr>
<tr>
<td>Secure Advisory Committee</td>
<td>Before Filing GS6</td>
</tr>
<tr>
<td>File GS6 (program of study &amp; committee selection)</td>
<td>Before registration of fourth regular semester</td>
</tr>
<tr>
<td>Discussions and progress reports with faculty advisor</td>
<td>Frequency determined between student and advisor</td>
</tr>
<tr>
<td>Final Thesis Exam</td>
<td>See published deadlines; schedule with advisor at least two weeks in advance</td>
</tr>
<tr>
<td>File GS25 (application to graduate) *reapply online if don’t graduate during expected term</td>
<td>See published deadlines on graduate school website; generally in the first six weeks of the intended graduation term</td>
</tr>
<tr>
<td>File GS24 (report of final exam)</td>
<td>Within 2 days of Thesis Exam Results</td>
</tr>
<tr>
<td>Submit thesis online</td>
<td>See published deadlines on graduate school website</td>
</tr>
<tr>
<td>Pay student account balance</td>
<td>Before leaving campus</td>
</tr>
<tr>
<td>Graduation</td>
<td>Ceremonies in Fall and Spring only</td>
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<tr>
<td>Receive Diploma</td>
<td>Mailed 6-8 weeks after end of term</td>
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</table>

### Important Steps in Detail

You may access instructions and forms on the Graduate School website: [http://graduateschool.colostate.edu/policies-and-procedures/forms/](http://graduateschool.colostate.edu/policies-and-procedures/forms/)

**Advisor and Advisory Committee**

An M.S. Plan A student must have a primary faculty advisor before beginning the program; Plan B students have a predetermined committee provided for them. The Plan A advisor must hold academic faculty rank.
as a professor, associate professor, or assistant professor of any appointment type within the Systems Engineering program. Faculty considered to be within the program are those found on the Associated Faculty List, found at: http://www.online.colostate.edu/degrees/systems-engineering/faculty.dot.

An M.S. advisory committee consists of at least three faculty members:
1. The faculty advisor who serves as chairperson of the committee and who must hold academic faculty rank as a professor, associate professor, or assistant professor and be on the list of Systems Engineering Associated Faculty;
2. One or more additional members from any department;
3. One outside member that meets the following criteria:
   - They must hold a regular, special, transitional, joint, or emeritus/emerita faculty appointment at CSU in a department other than that of the advisor. If the advisor holds the appointment in the College of Engineering, and not a specific department, the outside member must be from a department outside of the College of Engineering.
   - They must not be on the list of Systems Engineering Associated Faculty

Because the outside member should serve as an impartial external evaluator on the committee, it is best to avoid situations where the outside member has association with the advisor’s department (i.e. joint appointments). If potential conflicts of interest arise, they should be disclosed to the Dean of the Graduate School as soon as possible.

The committee is formalized by completion of GS Form 6. This form must be filed with the Graduate School as outlined below.

M.S. Plan A students are responsible for locating and gaining committee member approval before listing them on their GS6. Many Plan A students work with their faculty advisor to plan this committee.

M.S. Plan B students will list the following committee on their GS6:
Advisor: Ron Sega
Committee Member: Thomas Bradley
Outside Committee Member: Anthony Marchese

GS6 Form
The GS6 is intended to draft all courses (taken, in-progress, or expected) that will fulfill program requirements and to finalize the student’s advisory committee. It is required before registration for the fourth regular semester in the program. Students will work with the Systems Engineering graduate advisor to lay out a proposed plan of study and list of committee members before submitting the GS6 to the Graduate School. For more information, please see section “GS6” under the “Graduate School Standards” section above.

GS25 Form
The GS25 Application for Graduation must be submitted to the Graduate School in the first six weeks of the semester in which you plan to graduate. You must be enrolled in credit-bearing courses or CR during your graduation semester. For more information, please see section “GS25” under the “Graduate School Standards” section above.

Examinations

Plan A: The examination will be an oral defense of the M.S. thesis.

This is the final evaluation of the student’s research activity; see below for M.S. Thesis Guidelines. The thesis must be submitted to the student’s committee no less than 14 days before the defense date.

In addition, research presentations at national and international conferences can be used to assess student learning and professional development.
The report of the results of the final examination must be submitted to the Graduate School on GS Form 24 by the student within two working days of knowing the results of the exam.

All examinations are held on the Colorado State University campus or via appropriate video-teleconferencing (vtc) equipment and software. The exam should be scheduled ideally one month, but no less than two weeks, before the exam is to be held. Contact sys_engr_info@engr.colostate.edu for logistical information. It is the student's responsibility to coordinate a time/place with his/her committee members.

Plan B (with Independent Study):
Students in the Plan B option will work with the program to fulfill the requirements of their final examination. Upon completion of the final examination it is the student's responsibility to submit the GS Form 24 (Report of Final Examination Results) to the Graduate School. This form must be received in the Graduate School within two working days after the examination results are known.

Thesis Submission (Plan A only)
The GS30 Thesis/Dissertation Submission Form is signed by the members of your committee when your thesis is approved and ready for electronic submission. Forms must be submitted to the Graduate School by the deadline date of the semester that you intend to complete your degree requirements.

Once your thesis is approved you will submit it electronically to ProQuest/UMI. Please see Graduate School website for details. Note that you must follow Graduate School formatting requirements and gain approval before your final thesis is submitted. Leave time for the thesis format to be approved by the Graduate School before the final submission deadline listed.

Transfer Credit
For the Master of Science degree, a minimum of 24 credits must be earned at Colorado State University, 21 of which must be earned after admission to the Graduate School. No more than 6 credits from an institution other than Colorado State may be applied toward the M.S. degree. Students petitioning the advisory committee to transfer credits from another institution must attach a description of the courses taken (course content, text, grade) to their GS Form 6 so that an effective evaluation can be made.

Courses will only be considered for transfer if they are at the equivalent of the 500 level or above and have an earned grade of B or higher. Individual credits used to fulfill requirements for previously earned degrees or credits earned at institutions not accredited by one of the major regional accrediting agencies are not acceptable for transfer. The only exception to accreditation is that the program may petition the Graduate School to have graduate level courses earned from a foreign institution accepted as transfer credit. Grades in courses accepted for transfer will not be included in calculation of the grade point average.

M.S. Plan A Thesis Guidelines
SE adopted the following Master’s Thesis format to facilitate a concise, clear, well-written document that is more easily transformed into a publishable manuscript. In addition, all master’s degree students should consult the CSU Graduate School's Thesis and Dissertation Formatting Guide for thesis development.

The thesis should contain the following sections:
1. Title page, copyright page, abstract, and table of contents per the Graduate School’s Thesis and Dissertation Formatting Guide
2. Introduction. This section should include a presentation of referenced literature necessary to support the rationale, purpose, and understanding of the study. Do not provide an exhaustive, historical review of the literature.
3. Experimental Section. This section should concisely and clearly explain the methods and materials used so that others can repeat your work. If an explanation of detailed operating procedures or
processes is required to explain the method, provide those details in an Appendix at the end of the thesis.

4. Results. The results should be presented, and as necessary, with tables, illustrations, and/or graphs. The style and format of tables, illustrations, and graphs should adhere to the Graduate School Thesis and Dissertation Formatting Guide. Consideration should also be given to the format suggested by the journal to which the manuscript will be submitted.

5. Discussion. This section should address whether or not the study results supported the hypothesis and why. A comparison of the study results to other published studies, supporting or negating, should be presented as well as how the results contribute to the body of knowledge. The student’s interpretation/opinion regarding the results can be presented in this section. Last, a detailed presentation of the study strengths and limitations should be included.

6. Conclusions and Future Work. Concisely state the conclusions based on the study results/discussion. Identify future work that should be accomplished to further address the area of study.

7. References. The citation and bibliography format should follow the format suggested by the journal to which the manuscript will be submitted, provided that this format also adheres to the Graduate School Thesis and Dissertation Formatting Guide. When in doubt, always follow the Graduate School Thesis and Dissertation Formatting Guide.

8. Appendices. Include any appendices necessary to detail methods/materials used (e.g., procedures and questionnaires).
Doctor of Philosophy

The Ph.D. prepares students to become leaders in systems engineering. Throughout the program, students produce significant academic and industry contributions in terms of original research to the field, driving advancements and leading to improvements in energy efficiency, environmental impact, cybersecurity, and economic growth, among other areas of application for systems engineering.

Program of Study

If an appropriate Master of Science or Master of Engineering degree has been successfully completed there is the possibility that up to 30 hours of that degree could be counted toward the 72 credit hour requirement for the Ph.D. The process to determine if your Master's can count toward the Ph.D. is as follows:

1. Your faculty advisor must agree that your Master's is considered applicable to your Systems Engineering Ph.D. program of study.
2. If your advisor agrees, you will submit the Master's degree as part of your Program of Study (GS6) in the second or third semester of classes at CSU. The GS6 is required to be submitted to the Graduate School before you can register for your fourth semester.
3. The Graduate School has final say if the master's degree credits are transferrable. Upon the approval of your GS6 Program of Study, up to 30 credits from your master's degree will be finalized into your degree plan.

For the 42-credit option, a minimum of 36 credits must be earned at Colorado State University (32 of which must be earned after admission to the Graduate School). A minimum of 42 semester credits is required beyond the M.S. level. 18 of these credits are in regular graduate course work and 24 are in dissertation/research. Courses at the 400 level and below will not be accepted towards the 42-credit Ph.D. The 18 credits of regular courses can be in any technical area which is approved by the Program subject to the Course Requirements section below.

Students who have not yet received a Master's degree may be admitted as 72 hour Ph.D. candidates upon approval of a member of the Systems Engineering faculty willing to serve as such student’s academic sponsor.

Students pursuing a 72 credit Ph.D. program will be required to meet the “Program of Study” requirements for both the Ph.D. and M.S. programs. This includes 39 credits of regular graduate course work other than independent study and research. No more than 6 of these credits are allowed at the 400 level. The remaining 33 credits are in dissertation/research.

Program Course Requirements

72 Credit Ph.D.

Core Requirements - 21 credits*
Choose 7 courses from the following:

- CIS 600: Information Technology and Project Management
- CIS 670: Advanced IT Project Management
- MECH 501: Engineering Project Management and Program Management
- ENGR 501: Foundations of Systems Engineering
- ENGR 530: Overview of Systems Engineering Processes
- ENGR 531: Engineering Risk Analysis
- ENGR 532: Dynamics of Complex Engineering Systems
- ECE/ENGR 565: Electrical Power Engineering
- ECE/ENGR 566: Energy Conversion for Electrical Power Systems
- ENGR 567: Systems Engineering Architecture
- ENGR/ECE 568: Electrical Energy Generation Systems
- ENGR/ECE 621: Energy Storage for Electrical Power Systems
ENGR/ECE 622: Energy Networks
ENGR 510: Engineering Optimization: Method/Application
ENGR 520: Engineering Decision Support/Expert Systems
MECH 513: Simulation Modeling and Experimentation

**Technical Electives - 18 credits**
The Systems Engineering program does not have a set list of electives for any of our degrees. Please work with the Systems Engineering program and/or your faculty advisor to determine which electives will meet your academic and professional goals. Electives can be any Systems Engineering course listed above or must be approved by the Systems Engineering program.

A maximum of 6 credit hours at the 400 level are permitted. The remaining credits must be at the 500 level or above.

**Research - 33 credits**
ENGR 799: Dissertation

**42 Credit Ph.D.**

**Core Requirements - 18 credits**
Choose 6 courses from the following:
- CIS 600: Information Technology and Project Management
- CIS 670: Advanced IT Project Management
- MECH 501: Engineering Project Management and Program Management
- ENGR 501: Foundations of Systems Engineering
- ENGR 530: Overview of Systems Engineering Processes
- ENGR 531: Engineering Risk Analysis
- ENGR 532: Dynamics of Complex Engineering Systems
- ECE/ENGR 565: Electrical Power Engineering
- ECE/ENGR 566: Energy Conversion for Electrical Power Systems
- ENGR 567: Systems Engineering Architecture
- ENGR/ECE 568: Electrical Energy Generation Systems
- ENGR/ECE 621: Energy Storage for Electrical Power Systems
- ENGR/ECE 622: Energy Networks
- ENGR 510: Engineering Optimization: Method/Application
- ENGR 520: Engineering Decision Support/Expert Systems
- MECH 513: Simulation Modeling and Experimentation

**Research - 24 credits**
ENGR 799: Dissertation

*Courses in new subjects may be offered on an experimental basis, and can apply to the degree.

3 credit hours of ENGR 795 (Independent Study) may be granted to students who have had their Ph.D. research, which was performed while enrolled at CSU, accepted for publication (completely or with minor revisions) in at least two peer-reviewed journal or conference publications. ENGR 795 can count toward 3 credits of dissertation requirements OR as one course. To request this credit, students fill out a request form (can be obtained from program), write a proposal listing citations and validating documentation, and have the form approved by the student’s Ph.D. advisor.
## Timeline of Important Steps to Ph.D.

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure Faculty Advisor</td>
<td>Before Program Start</td>
</tr>
<tr>
<td>Complete qualifying process</td>
<td>Suggested within first two years of start date</td>
</tr>
<tr>
<td>Discussions and progress reports with faculty advisor/committee</td>
<td>Annual Evaluation each fall semester, more frequent discussion is encouraged</td>
</tr>
<tr>
<td>Secure Advisory Committee</td>
<td>Before filing your GS6</td>
</tr>
<tr>
<td>File GS6 (program of study &amp; committee selection)</td>
<td>Between end of 1\textsuperscript{st} year and 4\textsuperscript{th} regular semester</td>
</tr>
<tr>
<td>Preliminary Exams</td>
<td>2 terms prior to final exam; Schedule with advisor 2 weeks in advance</td>
</tr>
<tr>
<td>File GS16 (report of prelim results) with the Graduate School</td>
<td>Within 2 working days of prelim exam</td>
</tr>
<tr>
<td>File GS25 (application to graduate) *reapply online if don’t graduate during expected term</td>
<td>See published deadlines on graduate school website; generally in the first six weeks of the intended graduation term</td>
</tr>
<tr>
<td>Submit dissertation to committee</td>
<td>2 weeks before final exam</td>
</tr>
<tr>
<td>Final oral exam</td>
<td>See published deadlines; Schedule with Advisor 2 weeks in advance</td>
</tr>
<tr>
<td>File GS24 (report of final exam)</td>
<td>Within 2 working days of final exam</td>
</tr>
<tr>
<td>Submit final dissertation online</td>
<td>See published deadlines on graduate school website</td>
</tr>
<tr>
<td>Pay publishing fee (if applicable)</td>
<td>When submitting thesis/dissertation</td>
</tr>
<tr>
<td>Pay student account balance</td>
<td>Before leaving campus</td>
</tr>
<tr>
<td>Graduation</td>
<td>Ceremonies in Fall and Spring only</td>
</tr>
<tr>
<td>Receive diploma</td>
<td>Mailed 6-8 weeks after end of term</td>
</tr>
</tbody>
</table>
Important Steps in Detail

You may access instructions and forms on the Graduate School website:
http://graduateschool.colostate.edu/policies-and-procedures/forms/

Advisor and Advisory Committee

A Ph.D. student must have a primary faculty advisor before beginning the program. The advisor must hold academic faculty rank as a professor, associate professor, or assistant professor of any appointment type within the Systems Engineering program. Faculty considered to be within the program are those found on the Associated Faculty List, found at:
http://www.online.colostate.edu/degrees/systems-engineering/faculty.dot.

Faculty not currently on the list may be added if a student has found an advisor not previously associated with Systems Engineering who agrees to advise a Systems Engineering student.

A Ph.D. graduate committee consists of at least four academic faculty members. This committee is formalized by completion of the GS6 form as outlined below. The makeup of a graduate committee must be agreed to by the potential members themselves, and it is the student’s responsibility to secure these agreements before submitting their GS6. It is recommended that a student’s committee have several members with expertise in his/her proposed research field. Industrial participation is encouraged if appropriate; however, only academic faculty may vote at the final examination.

The committee is comprised of the following members:

1. The faculty advisor who serves as chairperson of the committee and who must hold academic faculty rank as a professor, associate professor, or assistant professor and be on the list of Systems Engineering Associated Faculty;
2. One or more additional members from the department;
3. Any non-departmental faculty member who may be appropriate; and
4. One outside member that meets the following criteria:
   • They must hold a regular, special, transitional, joint, or emeritus/emerita faculty appointment at CSU in a department other than that of the advisor. If the advisor holds the appointment in the College of Engineering, and not a specific department, the outside member must be from a department outside of the College of Engineering.
   • They must not be on the list of Systems Engineering Associated Faculty

Because the outside member should serve as an impartial external evaluator on the committee, it is best to avoid situations where the outside member has association with the advisor’s department (i.e. joint appointments). If potential conflicts of interest arise, they should be disclosed to the Dean of the Graduate School as soon as possible.

You may review the Graduate and Professional Bulletin for more information:
http://catalog.colostate.edu/general-catalog/graduate-bulletin/graduate-study/procedures-requirements-all-degrees/#advisory-system

Ph.D. Qualifying Process

Every Ph.D. student must pass all course requirements with a “B” or higher. If a student does not achieve this grade, they will be given one opportunity to repeat the course.

Annual Evaluation Process

Each fall, every PhD student must complete an Annual Evaluation form and meet with their faculty advisor to have a discussion regarding their progress over the last year and goals for the future. Following each discussion, the student will submit the completed Annual Evaluation form to the Systems Engineering Program as part of their progression portfolio. Students who do not submit this evaluation by the December 1 deadline each year will have a registration hold placed on their account until it is submitted.

GS6 Form

The GS6 is intended to draft all courses (taken, in-progress, or expected) that will fulfill program requirements and to finalize the student’s advisory committee. It is required before registration for the fourth
regular semester in the program. Ph.D. students should work with their faculty advisors to lay out a proposed Program of Study. Students and their advisors will coordinate with the Systems Engineering program advisor to formalize the GS6 Program of Study, ensure that Systems Engineering program requirements are being met, and verify appropriate committee members are listed before the GS6 is submitted to the Graduate School. It is the student’s responsibility to ensure faculty members agree to serve on their committee before submitting their GS6. For more information, please see section “GS6” under the “Graduate School Standards” section above.

**Ph.D. Preliminary Examination**

This exam will provide the student’s PhD committee an opportunity to examine his/her planned research activity and determine the student’s knowledge of the fundamental scientific and engineering principles involved with their dissertation topic. The Preliminary Exam must be taken at least two regular semesters before the Final Exam/Dissertation Defense.

The student is required to provide a written report of background, significance and theoretical basis of the planned research, the experimental design, and any preliminary data. This report should be sent to the PhD committee no less than 10 days before the student’s Preliminary Examination.

The exam will involve a 30-45 minute presentation by the Doctoral Candidate, followed by an oral examination of the student’s PhD committee.

Based on the examination results, the student’s committee will recommend one of the following courses of action:

(A) That he/she be endorsed as a Ph.D. candidate,
(B) That he/she submit to another preliminary examination no sooner than 2 months and no later than 12 months after the first exam, or
(C) That he/she withdraw from the Ph.D. program.

A report of the results of the preliminary examination (GS16) must be submitted to the Graduate School by the student within two working days of knowing the results of the exam.

**GS25 Form**

The GS25 Application for Graduation must be submitted to the Graduate School in the first six weeks of the semester in which you plan to graduate. You must be enrolled in credit-bearing courses or CR during your graduation semester. For more information, please see section “GS25” under the “Graduate School Standards” section above.

**Ph.D. Final Examination/Dissertation Defense**

This is the final evaluation of the student’s research activity and must be taken at least two regular semesters after the Preliminary Exam. The dissertation must be submitted to the student’s committee no less than 14 days before the defense date.

In addition, the following metrics will also be used to assess student learning and professional development:

- Research presentations at national and international conferences.
- Evaluation scores from the preliminary exam that includes scoring on the following sections: background, significance and theoretical basis of the planned research, the experimental design, and any preliminary data.

The report of the results of the final examination (GS24) must be submitted to the Graduate School by the student within two working days of knowing the results of the exam.

All examinations are held on the Colorado State University campus or via appropriate video-teleconferencing (vtc) equipment and software. The exam should be scheduled ideally **one month**, but no less than two weeks, before the exam is to be held.
Dissertation Submission
The GS30 Thesis/Dissertation Submission Form is signed by the members of your committee when your dissertation is approved and ready for electronic submission. Ph.D. students must also submit a Survey of Earned Doctorates (SED) Certificate with the GS 30. Forms must be submitted to the Graduate School by the deadline date of the semester that you intend to complete your degree requirements.

Once your dissertation is approved you will submit it electronically to ProQuest/UMI. Please see Graduate School website for details. Note that you must follow Graduate School formatting requirements and gain approval before your final dissertation is submitted. Leave time for the dissertation format to be approved by the Graduate School before the final submission deadline listed.

Transfer Credit
For Ph.D. students, up to six credits may be accepted for transfer if recommended by the student’s graduate committee. Students petitioning for acceptance of transfer credit must submit descriptions of the courses taken (content, text, and grade) to the program graduate committee with their GS6. Courses will only be considered for transfer if they are at the equivalent of the 500 level or above and have an earned grade of B or higher.

Individual credits used to fulfill requirements for previously earned degrees or credits earned at institutions not accredited by one of the major regional accrediting agencies are not acceptable for transfer. The only exception to accreditation is that the program may petition the Graduate School to have graduate level courses earned from a foreign institution accepted as transfer credit. Grades in courses accepted for transfer will not be included in calculation of the grade point average.
Graduate Student Responsibilities

Graduate students are responsible for knowing any special expectations and requirements of their program and are expected to remain in good academic standing by making satisfactory degree progress and must at all times have an advisor.

Students judged to be making unsatisfactory progress toward a degree or whose work is not of the quality expected by the student’s advisor and/or graduate committee may be recommended for academic probation or immediate dismissal from the graduate program (see “Scholastic Standards” in the Graduate and Professional Bulletin) and/or termination of assistantship (see “Assistantships” in the Graduate and Professional Bulletin).

The Dean of the Graduate School will be informed of students who are making unsatisfactory progress.

With regard to meeting graduate school deadlines, ultimate responsibility for a graduate student’s program lies with the student. The graduate student’s advisor, committee, the graduate school office, and the Systems Engineering program office are all available to help and advise. Several deadlines are critical; for example, failure to file the GS Form 6 before the end of the third semester will prevent the student from registering for further courses. Each semester the Graduate School publishes a list of deadlines which must be met in order to graduate during that term. It is also important that the graduate student provide his/her committee with ample time (at least 2 weeks) to read the student’s thesis or dissertation before the final examination.

Graduate Student Appeals Procedure

Graduate students may appeal decisions concerning unsatisfactory performance on graduate preliminary or final examinations, academic probation for reasons of unsatisfactory progress toward the degree other than insufficient grade point average, termination of an assistantship for reasons of unsatisfactory performance, or dismissal from the graduate program.

- The Dean of the Graduate School and the Judicial Affairs Officer shall examine the appeal and determine whether the actions are disciplinary or academic.
- If deemed to be disciplinary, the Dean of the Graduate School shall refer the complainant to the University Discipline Process.
- If deemed to be an academic matter other than a grading decision, the Dean of the Graduate School shall implement the Appeals Procedures as outlined below:
  - A review panel, composed of two faculty members and a graduate student, will be appointed;
  - The Review Panel will consider the case in detail;
  - The Panel will make appropriate recommendations to the Dean of the Graduate School;
  - The Dean of the Graduate School and the dean of the college involved shall jointly review the case;
  - Following consultation with the Provost/Academic Vice President, the Dean of the Graduate school shall make the final decision.

Graduate Student Representation

The Graduate Student Council represents and advocates for Colorado State University graduate and professional students within CSU and beyond. The goal of the council is to improve the experience of graduate education at CSU, through:

- Representing graduate and professional students within the Associated Students of CSU (ASCSU), the campus-wide student government,
- Representing graduate and professional students on committees of Faculty Council, boards overseeing student fee areas, and other university committees,
- Advocating for the concerns of graduate and professional students beyond the university, to the state legislature and other bodies,
- Spending fee money allocated to the Graduate Student Council by ASCSU and other entities for the benefit of graduate students,
• Building relationships with university administrators to advocate for changes to policies, procedures, and programs that benefit graduate and professional students,

• **Bringing students from diverse graduate and professional programs together** for the purposes of networking, collaboration, and advocacy on issues of common concern.

How to become involved:

• **Attend the next GSC regular meeting** – they usually meet once each month during the semester, on the first Monday.

• Represent the department or program - being a representative for a department doesn't require a heavy time commitment -- just attending monthly GSC meetings and being generally available as a conduit for students in this program to communicate with the GSC. **Are we represented?**

• **Represent graduate and professional students on a university committee** - committees on which grad students get a vote do everything from approve academic standards to deciding how student fee money is spent; serve as a representative or alternate to a committee that interests you.

• Join one of the GSC’s email discussion groups where students are working together on issues affecting grad students:
  • **Academics discussion group**
  • **Health Insurance discussion group**
  • **Legislative lobbying discussion group**
  • **Email your suggestions to the GSC President**
# Appendix A

## Degree Sheets

### Master of Engineering Requirements (30 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 501</td>
<td>Foundations of Systems Engineering</td>
</tr>
<tr>
<td>ENGR 530</td>
<td>Overview of Systems Engineering Processes</td>
</tr>
<tr>
<td>ENGR 531</td>
<td>Engineering Risk Analysis</td>
</tr>
<tr>
<td><strong>CIS 600</strong></td>
<td>Information Technology and Project Management</td>
</tr>
<tr>
<td><strong>CIS 670</strong></td>
<td>Advanced IT Project Management</td>
</tr>
<tr>
<td><strong>MECH 501</strong></td>
<td>Engineering Project Management and Program Management</td>
</tr>
</tbody>
</table>

**Pick 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 510</td>
<td>Engineering Optimization: Methods and Applications</td>
</tr>
<tr>
<td>ENGR 520</td>
<td>Engineering Decision Support/Expert Systems</td>
</tr>
<tr>
<td>ENGR 532</td>
<td>Dynamics of Complex Engineering Systems</td>
</tr>
</tbody>
</table>

**Pick 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 610</td>
<td>Software Development Methodology</td>
</tr>
<tr>
<td>MECH 513</td>
<td>Simulation Modeling and Experimentation</td>
</tr>
<tr>
<td>ENGR/ECE 565</td>
<td>Electrical Power Engineering</td>
</tr>
<tr>
<td>ENGR 567</td>
<td>Systems Engineering Architecture</td>
</tr>
</tbody>
</table>

**Elective (400-level or above)**

- Elective (400-level or above) – *Maximum of 6 credits at 400-level can apply to degree*
- ENGR 597 Group Study - Capstone (OR another elective)

### Master of Science Requirements (30 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGR 501</strong></td>
<td>Foundations of Systems Engineering</td>
</tr>
<tr>
<td><strong>ENGR 510</strong></td>
<td>Engineering Optimization: Methods and Applications</td>
</tr>
<tr>
<td><strong>ENGR 520</strong></td>
<td>Engineering Decision Support/Expert Systems</td>
</tr>
<tr>
<td><strong>ENGR 530</strong></td>
<td>Overview of Systems Engineering Processes</td>
</tr>
<tr>
<td><strong>ENGR 531</strong></td>
<td>Engineering Risk Analysis</td>
</tr>
<tr>
<td><strong>ENGR 532</strong></td>
<td>Dynamics of Complex Engineering Systems</td>
</tr>
<tr>
<td><strong>CIS 600</strong></td>
<td>Information Technology and Project Management</td>
</tr>
<tr>
<td><strong>CIS 670</strong></td>
<td>Advanced IT Project Management</td>
</tr>
<tr>
<td><strong>MECH 501</strong></td>
<td>Engineering Project Management and Program Management</td>
</tr>
</tbody>
</table>

**Pick 5**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 513</td>
<td>Simulation Modeling and Experimentation</td>
</tr>
<tr>
<td>ENGR/ECE 565</td>
<td>Electrical Power Engineering</td>
</tr>
<tr>
<td>ENGR/ECE 566</td>
<td>Energy Conversion for Electrical Power Systems</td>
</tr>
<tr>
<td>ENGR 567</td>
<td>Systems Engineering Architecture</td>
</tr>
</tbody>
</table>

**Plan A**

- Elective (400-level or above) – *Maximum of 6 credits at 400-level can apply to degree*
- ENGR 699 (9 cr) Thesis
- Elective (400-level or above)

**Plan B**

- Elective (500-level or above)
- Elective (500-level or above)
- ENGR 695 Independent Study (OR another elective)

* Suggested four core courses (choose CIS 600 or CIS 670 or MECH 501)
Doctor of Philosophy Requirements (72 credits)

- ENGR 501* Foundations of Systems Engineering
- ENGR 510 Engineering Optimization: Methods and Applications
- ENGR 520 Engineering Decision Support/Expert Systems
- ENGR 530* Overview of Systems Engineering Processes
- ENGR 531* Engineering Risk Analysis
- ENGR 532 Dynamics of Complex Engineering Systems
- **CIS 600 or** Information Technology and Project Management
- **CIS 670 or** Advanced IT Project Management
- **MECH 501** Engineering Project Management and Program Management
- MECH 513 Simulation Modeling and Experimentation
- ENGR/ECE 565 Electrical Power Engineering
- ENGR/ECE 566 Energy Conversion for Electrical Power Systems
- ENGR 567 Systems Engineering Architecture
- ENGR/ECE 568 Electrical Energy Generation Systems
- ENGR/ECE 621 Energy Storage for Electrical Power Systems
- ENGR/ECE 622 Energy Networks and Power Distribution Grids

Pick 7

- Elective (400-level or above)
- Elective (400-level or above) – Maximum of 6 credits at 400-level can apply to degree
- Elective (500-level or above)
- Elective (500-level or above)
- Elective (500-level or above)
- ENGR 799 (33 cr) Dissertation†

PhD Requirements (42 credits with applicable 30-credit Master's degree)

- ENGR 501* Foundations of Systems Engineering
- ENGR 510 Engineering Optimization: Methods and Applications
- ENGR 520 Engineering Decision Support/Expert Systems
- ENGR 530* Overview of Systems Engineering Processes
- ENGR 531* Engineering Risk Analysis
- ENGR 532 Dynamics of Complex Engineering Systems
- **CIS 600 or** Information Technology and Project Management
- **CIS 670 or** Advanced IT Project Management
- **MECH 501** Engineering Project Management and Program Management
- MECH 513 Simulation Modeling and Experimentation
- ENGR/ECE 565 Electrical Power Engineering
- ENGR/ECE 566 Energy Conversion for Electrical Power Systems
- ENGR 567 Systems Engineering Architecture
- ENGR/ECE 568 Electrical Energy Generation Systems
- ENGR/ECE 621 Energy Storage for Electrical Power Systems
- ENGR/ECE 622 Energy Networks and Power Distribution Grids
- ENGR 799 (24 cr) Dissertation†

* Suggested four core courses (choose CIS 600 or CIS 670 or MECH 501)
† ENGR 795 (3 cr) can count as one course or toward the dissertation requirement.
Dear Applicant,

We are pleased to learn of your interest in Colorado State University’s Systems Engineering degree programs. We offer a Certificate in S.E. Practice, Master of Engineering (M.E.), Master of Science (M.S.), and a Doctor of Philosophy (Ph.D.) degree. The M.E. includes a capstone project. There are two options for students pursuing the M.S. - a thesis or project. Additionally, there are two options for students pursuing the Ph.D. depending on prior master degrees. Please carefully read all of the materials in the packet and fully follow the instructions and deadlines when applying.

Students are admitted to the program twice per year. For the fall semester, the deadline to submit all materials is July 1. For the spring semester, the deadline is November 1. Upon receipt of all application materials, your application is reviewed by the admissions committee; this can take up to four weeks. Once a recommendation has been made by the program to the Graduate School, it can take three to four weeks before you receive official notification of the Graduate School’s admission decision.

Common mistakes to avoid in the application process:

1. Not reading all materials prior to beginning the application process. Failure to follow specified directions may lead to an incomplete and/or rejected application.
2. Not leaving enough time to have all required materials at CSU before the deadline arrives.
3. Not checking written materials for errors.
5. Not checking your application status to see that all materials are in prior to the deadline.
6. Not securing a faculty advisor prior to applying (for M.S. Plan A and Ph.D. programs)

We look forward to receiving your application materials and wish you well in your professional development.

Sincerely,
The Colorado State University Systems Engineering Program
Contents

Systems Engineering Program Options ........................................................................................................... 3
Minimum Application Qualifications .............................................................................................................. 4
Criteria for Admission ................................................................................................................................. 5
Systems Engineering Detailed Application Checklist ...................................................................................... 6
Securing a Faculty Advisor ............................................................................................................................. 8
Delivery of Coursework ............................................................................................................................... 10
Coursework Prior to Applying ......................................................................................................................... 11
Systems Engineering Program Options

Systems Engineering offers one certificate and three degrees with various options:

**Graduate Certificate in Systems Engineering Practice**
- Requires 12 credits of Systems Engineering core courses, all of which must be earned at Colorado State University. There are no course waivers or substitutions for certificates.

**Master of Engineering (M.E.)**
- The M.E. can include a capstone project. The topic of the capstone project is determined by the student and the faculty advisor.
- No independent study, research, internship, supervised college teaching, or practicum credits may be credited toward the degree.
- Requires 30 credits
  - Minimum of 24 credits must be earned at Colorado State University, 21 of which must be at the 500-level and earned after formal admission to the University.

**Master of Science (M.S.)**
- There are two options for students pursuing the M.S.:
  - M.S. Plan A (9 credit hours of thesis work required)
  - M.S. Plan B (3 credit hours of project work)
- Requires 30 hours
  - Minimum of 24 credits must be earned at Colorado State University, 21 of which must be at the 500-level and earned after formal admission to the University.

**Doctor of Philosophy (Ph.D.)**
- 72-credit program option:
  - Designed for students who do not already have a Master of Science degree and only hold a bachelor’s degree.
  - Up to six credits earned at an accredited college or university may be accepted for transfer if approved by the student’s advisory committee, the program, and the Graduate School.
  - A minimum of 66 credits must be earned at CSU and a minimum of 62 credits must be earned at CSU after admission to a doctoral program. No more than 6 credits numbered at the 400 level can apply to this degree.
- 42-credit program option:
  - Designed for students who already have an applicable master's degree. Up to 30 credits of the master's degree may count toward the Ph.D.
  - The master’s degree can be in a variety of areas including engineering, mathematics, or science. Students with a bachelor’s degree in engineering and a master’s degree in business are also eligible for this option.
  - Up to six credits in courses earned after the date on which the master’s degree was awarded may be accepted in transfer if approved by the student’s advisory committee, the program, and the Graduate School.
  - A minimum of 36 credits must be earned at CSU and a minimum of 32 credits must be earned at CSU after admission to a doctoral program. These 42 credits beyond the master’s degree must be earned in courses numbered 500 or above.
Minimum Application Qualifications

The minimum application requirements listed below demonstrate the types of competencies that are required for the Systems Engineering program. These competencies can be learned though coursework or career path if there is adequate professional and technical experience. Please note that meeting the minimum program standards does not ensure admission to the program.

= required

<table>
<thead>
<tr>
<th></th>
<th>Certificate in S.E. Practice</th>
<th>M.E.</th>
<th>M.S. - Plan A, thesis</th>
<th>M.S. - Plan B, project</th>
<th>Ph.D.</th>
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<tbody>
<tr>
<td>Four-year Bachelor of Science from a regionally accredited institution in engineering, mathematics, or a science discipline with a GPA of at least 3.0</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Three semesters of calculus: Calculus I, Calculus II, &amp; Calculus III</td>
<td>recommended</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Basic statistics course</td>
<td>recommended</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>GRE test scores are required if all previous degrees were conferred by an institution outside of the U.S.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Secure a faculty advisor prior to completing application. For information on how to secure a faculty advisor please go to the section, “Securing a Faculty Advisor.”</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>
Criteria for Admission

We look at each applicant in a holistic manner – what is the student’s educational and professional background? Given the full view of their background, we ask ourselves, do we feel the students have the competencies to succeed in the program?

The minimum qualifications are listed to get to a “competency level” not to check off the box that a course etc. has been taken. These competencies can be learned through coursework or career path if there is adequate professional and technical experience.

For potential admission into the program, the applicant should show that he/she has the competency level that is required to excel in the Systems Engineering program. For example, directly addressing any perceived shortcomings in the statement of purpose and resume could provide evidence of an acceptable level of analytical/technical competency if the transcripts do not reflect a direct correlation to an analytical skill set.

Applicants could enroll in introductory courses in Systems Engineering and “test the waters” to see if they have the skill set to succeed. If they excel in the introductory coursework, then they could use this as evidence of their capabilities for consideration if they choose to apply for formal admission. Successful completion of initial coursework does not guarantee admission, but would help during the evaluation of the application (see “Coursework Prior to Applying,” pg. 11).

M.S. Plan A and Ph.D. students: Securing a faculty advisor is paramount before an application can be reviewed. If you are unable to secure a faculty advisor, your application is considered incomplete, and is not reviewed. While some students are admissible, they do not always find faculty advisors who have the expertise in their areas of interest or who have the time to serve as advisors. Please see the section, “Securing a Faculty Advisor” (pg. 8) for additional information.

In our Program’s competitive admission situation, applicants are judged not only on the basic criteria, but also in comparison to other applicants. Thus, meeting the basic criteria does not guarantee admission.
Systems Engineering Detailed Application Checklist
This process is for students applying as of August 1, 2016 or later.

Please use the following checklist to be certain you have included everything in your application.

*An asterisk denotes materials required only for a degree program. If you are applying to the Certificate program, do not include these.

**Deadlines:** Your application should be submitted and everything should be received by
July 1 for fall semester admission or
November 1 for spring semester admission

**STEP 1: SECURE A FACULTY ADVISOR**
If you are applying to the M.S. Plan A or Ph.D. option, you need to secure a faculty advisor before your application will be considered complete for review. Confirmation from a faculty member that they will advise you is due by the application deadline for each semester.

This step includes the preparation of a Research Interest Summary. For detailed and necessary information on this process, please see section on “Securing a Faculty Advisor” (page 8).

☐ Send confirmation that a faculty advisor has agreed to advise you to sys_engr_info@engr.colostate.edu

If applying to the Certificate, M.E., or M.S. Plan B option, skip STEP 1 and proceed with STEP 2.

**STEP 2: BEGIN YOUR ONLINE APPLICATION**
You will create an account and can re-visit the application at any time to continue where you last left off: [http://gradadmissions.colostate.edu/apply](http://gradadmissions.colostate.edu/apply)
- When choosing a program, if you want to do it Online, select the “Distance” option

**STEP 3: SUBMIT ALL REQUIRED APPLICATION MATERIALS**

You will submit the following through the online application:

☐ Current resumé or CV

☐ *Statement of purpose* (2 pages MAXIMUM). This is meant to address the Systems Engineering Admissions Committee and why you would be a good fit for the program. If you are M.S. Plan A or Ph.D., this is different from the Research Interest Summary you will compile, but some of the same information may be used. Topics may include, but are not limited to:
  - Your relevant professional/academic background and skills
  - Why you are interested in Systems Engineering – provide specific areas of interest and application
  - Why you are interested in CSU’s program and what you can contribute to CSU

You will need to have the following sent separately:

☐ One official transcript from every post-secondary institution attended (transcripts from CSU are not required).
  - To submit official transcripts, contact your previous institutions to request they submit official transcripts to Colorado State University (use institution code 4075). If a mailing address is required, use the one located on page 7.
*Three letters of recommendation* from faculty, supervisors, etc. who can speak to your skills accurately and in detail. You will add names of recommenders through the online application and they will be emailed with instructions to upload the letter. Letters directly from applicants will not be accepted. **It is your responsibility to connect with your recommenders and ensure the recommendations are submitted by the appropriate deadline.**

**GRE Scores:** GRE test scores are required only if all previous degrees were conferred by an institution outside of the U.S. Submit official GRE General Test scores through the Educational Testing Service (select institution code: 4075, leave the department code blank). Scores are typically received by the University 4-6 weeks after your testing date.
- All three sections — verbal, quantitative, and analytical — must be submitted. Photocopies are not accepted.

**TOFEL and/or IELTS scores:** Students are exempted from the TOEFL or IELTS requirement if the primary official language of their country is English or if they have recently earned a degree from a U.S. university. It generally takes 3-6 weeks for ETS to send the scores to CSU, so allow plenty of time. Photocopies will not be accepted.

**Test of English as a Foreign Language (TOEFL)**
Submit official scores through the Educational Testing Service (select institution code: 4075, leave the department code blank). The minimum score is 80 on the internet-based test (550 on paper-based).

**International English Language Testing System (IELTS)**
IELTS official score printouts should be sent to the Admissions office: 1062 Campus Delivery, Fort Collins, CO 80523-1062 or email admissions@colostate.edu. The minimum score is 6.5.

<table>
<thead>
<tr>
<th>Physical mailing address for any additional materials</th>
<th>Graduate Admissions</th>
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<tbody>
<tr>
<td></td>
<td>Colorado State University – Office of Admissions</td>
</tr>
<tr>
<td></td>
<td>1062 Campus Delivery</td>
</tr>
<tr>
<td></td>
<td>Fort Collins, CO 80523-1062</td>
</tr>
</tbody>
</table>

**STEP 4: SUBMIT YOUR ONLINE APPLICATION**

Pay the non-refundable Graduate School Application fee (only payable after application is submitted)

**STEP 5: CHECK THE STATUS OF YOUR APPLICATION TO ENSURE YOU MEET YOUR DEADLINE**
Please visit [http://gradadmissions.colostate.edu/apply/status](http://gradadmissions.colostate.edu/apply/status) at any time to check that your application checklist is complete. The Systems Engineering program will not provide updates on materials you are still missing.

You are responsible for ensuring all materials are received by the deadline.

*For Ph.D. or M.S. Plan A*: If your application status shows a complete application, but you have not sent confirmation of a faculty advisor, your application will still be considered incomplete.
Securing a Faculty Advisor

A faculty advisor must be secured before an application to the M.S. Plan A or Ph.D. program is considered complete for review.

1. Start by reading the Systems Engineering faculty bios, which can be found here: http://www.online.colostate.edu/degrees/systems-engineering-phd/faculty.dot
   - Your faculty advisor can be a faculty member from any department on campus. Faculty listed at the above link have current association with the Systems Engineering program, but you may seek other advisors across different disciplines if they would match well with your research interests.

2. Prepare your Research Interest Summary (2 pages MAXIMUM). This is intended to give a brief overview of your research goals and interests so potential faculty advisors can quickly assess your fit with their areas of expertise. The better you can articulate what it is you hope to accomplish, the better your chances of securing a faculty advisor. Include the following sections in this summary:
   a. Specific areas of research interest
      - What “value-added” do you see in pursuing an MS/PhD for you, your company, industry, etc.?
      - What data set(s) would be critical for your thesis/dissertation?
      - Who would be the key contacts/contributors to a “needs analysis” (this may have already been established via other work in your organization).
      - Can include “key words” section
   b. How these areas of interest fit at CSU
      - Who at CSU is doing research in these areas right now?
      - How would your work fit into potential faculty advisors' areas of expertise?
   c. Professional or educational experience relevant to the above interests
      - Highlights from your resumé
      - How do you anticipate your research will be funded? Do you have support from your employer, other resources, or are you depending on financial support from CSU to conduct your research?

3. Distribute your Research Interest Summary. You have two ways to do this (can choose one or both):
   a. Send a generalized Research Interest Summary to the Systems Engineering program (sys_ engr_info@ engr.colostate.edu). Please note:
      - We collect these for a group review once per application period (generally 2-3 months before the application deadline), so this provides one way to get your name and information in front of faculty members.
      - There is no guarantee a faculty member will match with your research interests or agree to be your advisor.
b. Reach out directly to faculty members by phone or email. Please note:

- It may be a good idea to customize your Research Interest Summary for each individual faculty member to whom you reach out so you draw clear parallels between your interests and their research.
- Some faculty members may not respond if you have not made a clear and convincing case as to why you would be a qualified advisee that fits well with that individual faculty member.
- Some faculty are too busy to respond to individual student inquiries, and wait until the group review process each application period.
- Some faculty members may be at capacity with advisees and unable to take on another one.
- Some faculty, especially those not currently associated with Systems Engineering, may opt not to advise students outside of their department.

4. Let Systems Engineering Admissions know who your advisor is. If a faculty member agrees to advise you, forward proof of agreement on to sys_engr_info@engr.colotate.edu OR send an email to the above email address and CC your advisor confirming who has agreed to advise you. Until this last step is done (must be received by application due date for the semester), your application will be considered incomplete.

Please remember, finding a faculty advisor is often the longest and most difficult part of the application process, so we encourage you to begin this process well in advance of the application deadline. This is a competitive process: our M.S. Plan A and Ph.D. programs are highly sought-after and we have limited capacity for new students each application period. Additionally, some applicant research interests fall outside of the expertise areas offered by CSU’s faculty and may not be a good fit for our program.

Students who are accepted into the M.E. or M.S. Plan B option may switch to the M.S. Plan A upon finding a faculty advisor.
Delivery of Coursework

Course delivery options allow you to study when and where it works best for you, whether that is streaming the lecture from your computer while it’s happening live on campus or watching a recorded version at a time more convenient for you. You also have the opportunity to attend a selection of courses in person at the Fort Collins campus or our Denver South location, embedded within industry.

Courses that are delivered online use our learning management system called Canvas. The system allows you to watch recorded, campus-based lectures, engage in course content and communicate with peers online. Online courses are asynchronous, allowing you to study at the time that best fits your schedule.

In your courses you will:

- View recorded campus-based lectures online
- Download and review lecture notes
- Complete assigned and optional readings
- Communicate and exchange ideas with instructors and fellow students through chat rooms, threaded discussions, and email (online courses)
- Complete individual projects and collaborate on group projects
- Study for and complete exams
- Write course-related papers

Although the format of this degree offers flexibility, it still requires the same amount of work and time as an on-campus graduate program. Depending on your learning and studying style, expect to spend nine to twelve hours per week on a three-credit course. This will vary depending on your learning and studying style.

There is no on-campus requirement for any of the Systems Engineering programs. However, for the M.S. (Plan A) and Ph.D. options, faculty may want to meet with students via Skype or in person if schedules allow. The logistics of this should be discussed with your faculty advisor. For Ph.D. students, the preliminary examination involves a presentation and an oral examination conducted over Skype or similar technology. If schedules allow, the examination may be conducted face-to-face.

The M.E. and M.S. can be completed in as little as three years; however, most students take closer to four years to complete either of the master degree programs.

The Ph.D. is generally completed in five years, but depends on the intensity of study and previous coursework.
Coursework Prior to Applying

If you are interested in applying to any degree program, you can take one or more classes prior to formally applying to ensure that the program is a good fit for you and to show that you are capable of doing well in graduate-level work. Taking a course does not guarantee your admission to the degree program, but it is one additional factor that the admission committee will consider regarding your application.

Student interested in earning the Certificate must be admitted into the certificate program by the semester in which they finish their certificate coursework.

Students are eligible to use up to 9 credits of coursework prior to formal admissions for a Master’s program and up to 10 credits for a Ph.D. Students must have earned a B or higher in courses for them to apply to the degree.

Per Graduate School policy, grades earned in courses prior to admission do not apply to your degree GPA, which must be at least a 3.0 to graduate.