Systems Engineering Program

GRADUATE STUDENT HANDBOOK
# Table of Contents

**Introduction** .................................................................................................................. 3
**Admission Requirements** .................................................................................................. 4
**Application Process Overview** .......................................................................................... 5

**Graduate School and Systems Engineering Standards and Procedures**
- Scholastic Standards ............................................................................................................. 6
- Graduate Procedures and Required Paperwork ................................................................. 7
- Continuous Registration ..................................................................................................... 8
- Program Time Limit ............................................................................................................ 8

**Graduate Certificate Program** ............................................................................................ 10

**Master of Engineering Program**
- Program of Study ............................................................................................................. 11
- Program Course Requirements .......................................................................................... 11
- Timeline of Important Steps to M.E. .................................................................................. 12
- Important Steps in Detail
  - Advisor ......................................................................................................................... 12
  - GS6 Form .................................................................................................................... 12
  - GS25 Form .................................................................................................................. 12
- Transfer Credit .................................................................................................................. 12

**Master of Science Program**
- Program of Study ............................................................................................................. 14
- Program Course Requirements .......................................................................................... 14
- Timeline of Important Steps to M.S. .................................................................................. 16
- Important Steps in Detail
  - Advisor and Advisory Committee ............................................................................... 16
  - GS6 Form .................................................................................................................... 17
  - ENGR 695 (Plan B) and 699 (Plan A) ........................................................................... 17
  - GS25 Form .................................................................................................................. 18
  - Examinations .............................................................................................................. 18
  - Thesis Submission ...................................................................................................... 18
- Transfer Credit .................................................................................................................. 18
- M.S. Plan A Thesis Guidelines ........................................................................................... 19

**Doctor of Philosophy Program**
- Program of Study ............................................................................................................. 20
- Program Course Requirements .......................................................................................... 20
- Timeline of Important Steps to Ph.D. ............................................................................... 22
- Important Steps in Detail
  - Advisor and Advisory Committee ............................................................................... 23
  - Ph.D. Qualifying Process ............................................................................................. 23
  - ENGR 799A ............................................................................................................... 23
  - Annual Evaluation Process ............................................................................................ 24
  - GS6 Form .................................................................................................................... 24
  - Ph.D. Preliminary Examination ..................................................................................... 24
  - GS25 Form .................................................................................................................. 25
  - Ph.D. Final Examination/Dissertation Defense ............................................................. 25
  - Dissertation Submission ............................................................................................... 25
- Transfer Credit .................................................................................................................. 25

**Graduate Student Responsibilities** ..................................................................................... 27
**Graduate Student Appeals Procedure** ............................................................................... 27
**Graduate Student Representation** ..................................................................................... 27

**Appendix A: Systems Engineering PhD Process**
This manual has been prepared to acquaint you with the policies and regulations that govern the graduate
degrees and certificate 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 do 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. The Graduate Certificate was added as an option for both degree-seeking and non-degree seeking students in late 2016. This handbook provides guidance for prospective and current graduate students in Systems Engineering. The list of Systems Engineering faculty and their research interests should be consulted when seeking an M.S. thesis or Ph.D. dissertation research advisor (located at https://www.engr.colostate.edu/se/faculty/).

<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>Graduate Certificate</td>
<td>Certificate</td>
<td>SYEF-CT</td>
<td>Systems Engineering Practice</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYEF-DD-CT</td>
<td>Systems Engineering Practice (Distance)</td>
<td></td>
</tr>
<tr>
<td>Master of Engineering (M.E.)</td>
<td>Plan C</td>
<td>ENGR-SYEZ-ME</td>
<td>Engineering (Systems Engineering Specialization)</td>
<td>SYEZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENGR-DSYZ-ME</td>
<td>Engineering (Systems Engineering Specialization - Distance)</td>
<td>DSYZ</td>
</tr>
<tr>
<td>Master of Science (M.S.)</td>
<td>Plan A -Thesis OR Plan B - Project</td>
<td>SYSE-MS</td>
<td>Systems Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYSE-DD-MS</td>
<td>Systems Engineering (Distance)</td>
<td>N/A</td>
</tr>
<tr>
<td>Doctor of Philosophy (Ph.D.)</td>
<td>Ph.D.</td>
<td>SYSE-PHD</td>
<td>PhD Systems Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYSE-DD-PHD</td>
<td>PhD Systems Engineering (Distance)</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.

Our Graduate Certificate program requires:
- A completed four-year bachelor’s degree from a regionally-accredited institution
- Certificate applicants are strongly recommended to have:
  - B.S. degree in engineering, mathematics, business, life sciences, or natural sciences
  - A cumulative 3.0 GPA
  - Completed a basic statistics course and Calculus I

Our degree programs require:
- Four-year B.S. from a regionally-accredited institution with a GPA of at least 3.0
- Calculus I (MATH 160 or equivalent) – some course options within our degrees may have higher math prerequisites
- Basic Statistics (STAT 301 or equivalent)
- GRE test scores are required only if none of your previous degrees were conferred by an institution in the U.S.

Master of Engineering (M.E.)
- B.S. degree in engineering, mathematics, business, or a technical science discipline

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

Doctor of Philosophy (Ph.D.)
- B.S. degree in engineering, mathematics, or a technical science discipline
- If B.S. is not in engineering, a master’s in engineering is strongly recommended
- The applicant must secure a faculty advisor before being considered for admission.
Application Process Overview

To learn more about our program please visit: https://www.engr.colostate.edu/se/

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** (located at https://www.engr.colostate.edu/se/future-student/). 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 Certificate, 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 the Application Packet on website):

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.**

* Items required only for degree programs; if you are applying for the certificate do not include these.

Further questions?
Contact: sys_engr_info@engr.colostate.edu
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). A “C-” is not acceptable.

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. A “B-” is not acceptable.

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](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**

Near the beginning of the semester in which the student plans to graduate, a GS25 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. Please leave Section 3
(Departmental Requirements) blank. 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 it is the student’s
graduating semester.

Students may fulfill this requirement by registering for any graduate credit-bearing course or Continuous
Registration (CR), which is non-credit-bearing and carries a $150 fee. 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 subject CR.

Students may register for CR instead of credit-bearing coursework for the following reasons:
1. They will not be working on their degree requirements, but will be leaving the University temporarily
   for professional or personal reasons (mission service, medical or parental leave, work, etc.).
2. They are done with all credit-bearing course requirements and are applying to graduate that
   semester (applies to summer, fall, and spring semesters).
3. They are done with all credit-bearing course requirements and will be actively working on degree
   requirements, but do not require the use of University resources. (Students utilizing CSU facilities
to conduct their research must not enroll in CR; they must enroll in the appropriate number of
research, thesis, or dissertation credits.)

Students enrolled in CR have access to library and campus computing services; they pay a mandatory
University Technology Fee. On-campus students may choose to purchase CSU student health insurance
and/or access CSU Health Network for an additional fee.

New policy starting Fall 2017 semester:
Students are limited to a maximum of 10 semesters total of CR
• Students in their 1st, 4th, and 8th semesters of CR are required to submit a student plan to their
   Advisors for review by their Advisory Committees. The plans should state their intention and
   progress toward degree completion with academic expectations and timelines.
• A registration hold will be placed on a student with more than 10 semesters of CR. This may be
   petitioned. The petition must include the student plan.
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. If you are applying a 30-credit master’s degree to the Ph.D., this master’s degree can be older than 10 years.
The Graduate Certificate in Systems Engineering Practice provides an introduction to the systems engineering discipline and hands-on experience applying systems thinking to real-world problems. It is available to both degree-seeking and non-degree-seeking students.

You can expect the Certificate program to take one to two years if you are a part-time student (1-2 classes per semester) and as little as one four-month semester if you wish to take all 12 credits at once. Summer courses are not offered.

When students enrolled in the Systems Engineering Practice Certificate complete their final required course, they will be awarded the certificate, which appears on their transcript. Students must be enrolled in the certificate program the semester in which they complete course requirements; a student cannot be back-awarded a certificate.

**Program Course Requirements**

- ENGR 501 (3 cr.) Foundations of Systems Engineering
- ENGR 530 (3 cr.) Overview of Systems Engineering Processes
- ENGR 531 (3 cr.) Engineering Risk Analysis
- One from:
  - ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
  - CIS 600 (3 cr.) Information Technology and Project Management
  - CIS 670 (3 cr.) Advanced IT Project Management

**Transfer Credit**

No transfer credits or course substitutions are permitted for Graduate Certificates.
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 one to two years as a full-time student (9+ credits per semester) and four to five years if you are a part-time student (3-6 credits per semester). Summer courses are not required, but are offered on a very limited basis. A thesis is not required to complete the degree, but you can complete a significant capstone project (ENGR 597).

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 (3 cr.) Foundations of Systems Engineering
- ENGR 530 (3 cr.) Overview of Systems Engineering Processes
- ENGR 531 (3 cr.) Engineering Risk Analysis

One from:
- ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
- CIS 600 (3 cr.) Information Technology and Project Management
- CIS 670 (3 cr.) Advanced IT Project Management

**Courses In-Depth – Select 9 credits**
- ENGR 510 (3 cr.) Engineering Optimization: Method/Application
- ENGR 520 (3 cr.) Engineering Decision Support/Expert Systems
- ENGR 532 (3 cr.) Dynamics of Complex Engineering Systems
- ENGR/ECE 565 (3 cr.) Electrical Power Engineering
- ENGR/ECE 566 (3 cr.) Energy Conversion for Electrical Power Systems
- ENGR 567 (3 cr.) Systems Engineering Architecture
- ENGR 569 (3 cr.) Cybersecurity Awareness for Systems Engineers
- ENGR 570 (3 cr.) Coupled Electromechanical Systems
- ENGR 571 (3 cr.) Analytics in Systems Engineering
- ENGR 602 (3 cr.) Systems Requirements Engineering
- ENGR 603 (3 cr.) Introduction to Systems Test and Evaluation
- ENGR 667 (3 cr.) Advanced Model-Based Systems Engineering
- MECH 513 (3 cr.) Simulation Modeling and Experimentation
- CIS 610 (3 cr.) Software Development Methodology

**Electives – Select 6 credits**
Courses consistent with the student’s program of study and professional goals. A suggested elective list is available on the Systems Engineering website; any courses not on the list must be approved by the SE Program. Please contact sys_engr_info@engr.colostate.edu for questions.
Group Study – 3 credits
ENGR 597 (3 cr.) Group Study (must have project faculty advisor before enrolling)
OR another course from the In-Depth section

*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 three 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 10-12 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. Credits may be accepted for transfer provided all Graduate School requirements are met, including:

- The credit was earned at a regionally-accredited institution (credit earned at institutions outside of the U.S. may require additional documentation)
- The course(s) must have a B or higher earned (‘B-’ is not accepted)
• It must be a ‘regular’ course (meaning it cannot be a seminar, special topic, independent study, research credit, or similar)
• It must not have been used toward any previous awarded degree
• It must be 500-level equivalent or higher
• It must be approved by your faculty advisor and the S.E. Program as relevant to your program of study
• There is a 10-year time requirement on individual courses counting toward any graduate degree. If a transfer course will be at least 10 years old at the time the student applies to graduate, it may not count toward your degree.

Students petitioning for acceptance of transfer credit must submit a syllabus of the course(s) taken to the S.E. program advisor and an official transcript showing the course(s) must be on-file when the GS6 is submitted so that an effective evaluation can be made. Please note that grades in courses accepted for transfer will not be included in calculation of the grade point average.
Master of Science
https://www.engr.colostate.edu/se/ms/

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 one to two years as a full-time student (9+ credits per semester) and four to five years if you are a part-time student (3-6 credits per semester). Summer courses are not required, but are offered on a very 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**

**Systems Engineering Courses - 15 credits***

Select 5 courses from the following:

- ENGR 501 (3 cr.) Foundations of Systems Engineering
- ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
  - or CIS 600 (3 cr.) Information Technology and Project Management
  - or CIS 670 (3 cr.) Advanced IT Project Management
- ENGR 530 (3 cr.) Overview of Systems Engineering Processes
- ENGR 531 (3 cr.) Engineering Risk Analysis
- ENGR 510 (3 cr.) Engineering Optimization: Method/Application
- ENGR 520 (3 cr.) Engineering Decision Support/Expert Systems
- ENGR 532 (3 cr.) Dynamics of Complex Engineering Systems
- ENGR/ECE 565 (3 cr.) Electrical Power Engineering
- ENGR/ECE 566 (3 cr.) Energy Conversion for Electrical Power Systems
- ENGR 567 (3 cr.) Systems Engineering Architecture
- ENGR 569 (3 cr.) Cybersecurity Awareness for Systems Engineers
- ENGR 570 (3 cr.) Coupled Electromechanical Systems
- ENGR 571 (3 cr.) Analytics in Systems Engineering
- ENGR 602 (3 cr.) Systems Requirements Engineering
- ENGR 603 (3 cr.) Introduction to Systems Test and Evaluation
- ENGR 667 (3 cr.) Advanced Model-Based Systems Engineering
- MECH 513 (3 cr.) Simulation Modeling and Experimentation

**Technical Electives - 6 credits***

Courses consistent with the student’s program of study and professional goals. A suggested elective list is available on the Systems Engineering website; any courses not on the list must be
approved by the SE Program. Please contact sys_engr_info@engr.colostate.edu for questions.

**Research - 9 credits**
ENGR 699: Thesis

**Plan B – Project Option**

**Systems Engineering Courses - 15 credits***
Select 5 courses from the following:
- ENGR 501 (3 cr.) Foundations of Systems Engineering
- ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
  * or CIS 600 (3 cr.) Information Technology and Project Management
  * or CIS 670 (3 cr.) Advanced IT Project Management
- ENGR 530 (3 cr.) Overview of Systems Engineering Processes
- ENGR 531 (3 cr.) Engineering Risk Analysis
- ENGR 510 (3 cr.) Engineering Optimization: Method/Application
- ENGR 520 (3 cr.) Engineering Decision Support/Expert Systems
- ENGR 532 (3 cr.) Dynamics of Complex Engineering Systems
- ENGR/ECE 565 (3 cr.) Electrical Power Engineering
- ENGR/ECE 566 (3 cr.) Energy Conversion for Electrical Power Systems
- ENGR 567 (3 cr.) Systems Engineering Architecture
- ENGR 569 (3 cr.) Cybersecurity Awareness for Systems Engineers
- ENGR 570 (3 cr.) Coupled Electromechanical Systems
- ENGR 571 (3 cr.) Analytics in Systems Engineering
- ENGR 602 (3 cr.) Systems Requirements Engineering
- ENGR 603 (3 cr.) Introduction to Systems Test and Evaluation
- ENGR 667 (3 cr.) Advanced Model-Based Systems Engineering
- MECH 513 (3 cr.) Simulation Modeling and Experimentation

**Technical Electives - 12 credits***
Courses consistent with the student’s program of study and professional goals. A suggested elective list is available on the Systems Engineering website; any courses not on the list must be approved by the SE Program. Please contact sys_engr_info@engr.colostate.edu for questions.

**Project - 3 credits**
ENGR 695 (3 cr.) Independent Study (must have project faculty advisor before enrolling)

*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>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure Faculty Advisor</td>
<td>Before Program Start</td>
<td></td>
</tr>
<tr>
<td>Secure Advisory Committee</td>
<td>Before Filing GS6</td>
<td></td>
</tr>
<tr>
<td>File GS6 (program of study &amp; committee selection)</td>
<td>Before registration of fourth regular semester</td>
<td></td>
</tr>
<tr>
<td>Discussions and progress reports with faculty advisor</td>
<td>Frequency determined between student and advisor</td>
<td></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 three weeks of the intended graduation term</td>
<td></td>
</tr>
<tr>
<td>Final Thesis Exam</td>
<td>See published deadlines; schedule with committee at least two weeks in advance</td>
<td></td>
</tr>
<tr>
<td>File GS24 (report of final exam)</td>
<td>Within 2 days of Thesis Exam Results</td>
<td></td>
</tr>
<tr>
<td>Submit thesis online</td>
<td>See published deadlines on graduate school website</td>
<td></td>
</tr>
<tr>
<td>Pay student account balance</td>
<td>Before leaving campus</td>
<td></td>
</tr>
<tr>
<td>Graduation</td>
<td>Ceremonies in Fall and Spring only</td>
<td></td>
</tr>
<tr>
<td>Receive Diploma</td>
<td>Mailed 10-12 weeks after end of term</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plan B</th>
<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>
<td></td>
</tr>
<tr>
<td>Discuss and progress reports with faculty advisor</td>
<td>Frequency determined between student and advisor</td>
<td></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 three weeks of the intended graduation term</td>
<td></td>
</tr>
<tr>
<td>Final Evaluation</td>
<td>See published deadlines; during graduation semester</td>
<td></td>
</tr>
<tr>
<td>File GS24 (report of final exam)</td>
<td>Within 2 days of Final Evaluation Results</td>
<td></td>
</tr>
<tr>
<td>Submit thesis online</td>
<td>See published deadlines on graduate school website</td>
<td></td>
</tr>
<tr>
<td>Pay student account balance</td>
<td>Before leaving campus</td>
<td></td>
</tr>
<tr>
<td>Graduation</td>
<td>Ceremonies in Fall and Spring only</td>
<td></td>
</tr>
<tr>
<td>Receive Diploma</td>
<td>Mailed 10-12 weeks after end of term</td>
<td></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/](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: https://www.engr.colostate.edu/se/faculty/.

An M.S. advisory committee consists of at least three faculty members. This committee is formalized by completion of the GS6 form as outlined below. Industrial participation is encouraged if appropriate; however, only formal committee members 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 that meets the following criteria:
   - They must hold academic faculty rank as a professor, associate professor, or assistant professor of any appointment type within the department or program granting the degree
   - They must be on the list of Systems Engineering Associated Faculty;

2. One or more additional members from the list of Systems Engineering Associated Faculty;

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
   - They must not be on the list of Systems Engineering Associated Faculty

4. (Optional) Additional members from any department may be added.

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.

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.

**ENGR 695 (Plan B) and 699 (Plan A)**

ENGR 695 is a 3-credit project course required for all MS Plan B students, typically in their last semester. MS Plan B students must secure a faculty project advisor to guide them in this course. ENGR 699 are credits MS Plan A students use to work on their thesis requirement with the faculty advisor they secured prior to program admission. Registration for and grading of ENGR 695 and 699 credits is based upon agreement between the student and their faculty research advisor. For ENGR 699, the number of credits to take each semester may be determined using guidance located in the Graduate and Professional Bulletin:

For thesis, dissertation, research, and independent study graduate courses, the number of student credit hours earned will be determined using a base rate of 48 hours of student effort per credit hour. The faculty advisor, or other department official, shall estimate the total number of hours of student effort required over the length of the semester. This effort shall include consultation with the advisor, as well as library, laboratory, field, or studio work. The total number of hours shall be divided by 48 and the resultant quotient (rounded off to a whole number) shall define the number of credits to be awarded.

To register for 695 or 699 credits, the student must discuss with their faculty advisor their plan, including the expectations and deliverables for the semester. Written permission from the advisor (or the student forwarding advisor permission with advisor Cc’d) is required only for the first semester’s registration. The
program then allows subsequent registration (in the case of ENGR 699 credits) with the expectation that student and advisor are in regular communication. The faculty advisor assigns a grade (satisfactory or unsatisfactory) for the credits each semester, so it is important for the student to ensure they are working closely with their advisor.

**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.

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. It is the student’s responsibility to coordinate a time/place with his/her committee members.

Contact sys_engr_info@engr.colostate.edu for logistical information. Exams may be open-attendance for the University community and announcement of all exams is made on the Systems Engineering website.

**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. Credits may be accepted in transfer provided all Graduate School requirements are met, including:

- The credit was earned at a regionally-accredited institution (credit earned at institutions outside of the U.S. may require additional documentation)
- The course(s) must have a B or higher earned (‘B-’ is not accepted)
- It must be a ‘regular’ course (meaning it cannot be a seminar, special topic, independent study,
research credit, or similar)

- It must not have been used toward any previous awarded degree
- It must be 500-level equivalent or higher
- It must be approved by your faculty advisor and the S.E. Program as relevant to your program of study
- There is a 10-year time requirement on individual courses counting toward any graduate degree. If a transfer course will be at least 10 years old at the time the student applies to graduate, it may not count toward your degree.

Students petitioning for acceptance of transfer credit must submit a syllabus of the course(s) taken to the S.E. program advisor and an official transcript showing the course(s) must be on-file when the GS6 is submitted so that an effective evaluation can be made. Please note that 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

https://www.engr.colostate.edu/se/phd/

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.

Please see Appendix A for more detailed information on the purpose and goals of the Ph.D. process, preliminary exam, and final exams.

Program of Study

If an appropriate technical master’s 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. If your master’s degree is from an institution outside of the U.S., additional documentation may be required.
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 32 credits must be earned at Colorado State University after admission to a doctoral program. A minimum of 21 semester credits is required beyond the M.S. level. Courses at the 400 level and below will not be accepted towards the 42-credit Ph.D.

Students who have not yet received a master’s degree may be admitted to the 72-credit Ph.D. program and 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

42 Credit Ph.D.

**Systems Engineering Courses - 18 credits**

Choose 6 courses from the following:

- ENGR 501 (3 cr.) Foundations of Systems Engineering
- ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
  - or CIS 600 (3 cr.) Information Technology and Project Management
  - or CIS 670 (3 cr.) Advanced IT Project Management
- ENGR 530 (3 cr.) Overview of Systems Engineering Processes
- ENGR 531 (3 cr.) Engineering Risk Analysis
- ENGR 510 (3 cr.) Engineering Optimization: Method/Application
- ENGR 520 (3 cr.) Engineering Decision Support/Expert Systems
- ENGR 532 (3 cr.) Dynamics of Complex Engineering Systems
- ENGR/ECE 565 (3 cr.) Electrical Power Engineering
- ENGR/ECE 566 (3 cr.) Energy Conversion for Electrical Power Systems
- ENGR 567 (3 cr.) Systems Engineering Architecture
- ENGR 569 (3 cr.) Cybersecurity Awareness for Systems Engineers
- ENGR 570 (3 cr.) Coupled Electromechanical Systems
- ENGR 571 (3 cr.) Analytics in Systems Engineering
- ENGR 602 (3 cr.) Systems Requirements Engineering
- ENGR 603 (3 cr.) Introduction to Systems Test and Evaluation (cont.)
ENGR 667 (3 cr.) Advanced Model-Based Systems Engineering
MECH 513 (3 cr.) Simulation Modeling and Experimentation

Research - 24 credits
ENGR 799A Dissertation: PhD
- Please note the 42-credit Ph.D. option does not include space for electives -

72 Credit Ph.D.

Systems Engineering Courses - 21 credits*
Choose 7 courses from the following:
ENGR 501 (3 cr.) Foundations of Systems Engineering
ENGR 502 (3 cr.) Project and Program Management (previously MECH 501)
  or CIS 600 (3 cr.) Information Technology and Project Management
  or CIS 670 (3 cr.) Advanced IT Project Management
ENGR 530 (3 cr.) Overview of Systems Engineering Processes
ENGR 531 (3 cr.) Engineering Risk Analysis
ENGR 510 (3 cr.) Engineering Optimization: Method/Application
ENGR 520 (3 cr.) Engineering Decision Support/Expert Systems
ENGR 532 (3 cr.) Dynamics of Complex Engineering Systems
ENGR/ECE 565 (3 cr.) Electrical Power Engineering
ENGR/ECE 566 (3 cr.) Energy Conversion for Electrical Power Systems
ENGR 567 (3 cr.) Systems Engineering Architecture
ENGR 569 (3 cr.) Cybersecurity Awareness for Systems Engineers
ENGR 570 (3 cr.) Coupled Electromechanical Systems
ENGR 571 (3 cr.) Analytics in Systems Engineering
ENGR 602 (3 cr.) Systems Requirements Engineering
ENGR 603 (3 cr.) Introduction to Systems Test and Evaluation
ENGR 667 (3 cr.) Advanced Model-Based Systems Engineering
MECH 513 (3 cr.) Simulation Modeling and Experimentation

Technical Electives - 18 credits*
Courses consistent with the student’s program of study and professional goals. A suggested elective list is available on the Systems Engineering website; any courses not on the list must be approved by the SE Program. Please contact sys_engr_info@engr.colostate.edu for questions.

Research - 33 credits
ENGR 799A Dissertation: PhD

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

For both the 42-credit option and the 72-credit option, three credit hours of ENGR 795 (Independent Study) may be used towards the total of dissertation credits OR as one 3-credit course. If you have had your 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 proceedings, then you may be eligible for Independent Study credit. You must be first author on at least one of the papers accepted. Please work with your faculty advisor when planning publications to meet this requirement. To register for these credits, you will complete an ENGR 795 Independent Study form, with faculty advisor approval, and submit to the Systems Engineering Program.
### 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 application to Ph.D. program is reviewed</td>
</tr>
<tr>
<td>Complete qualifying process (coursework done with B or higher)</td>
<td>Suggested within 2-3 years of start date</td>
</tr>
<tr>
<td>Begin work on research/dissertation (ENGR 799A)</td>
<td>Whenever advisor and student are ready; coursework does not have to be done prior to ENGR 799A credits</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 1st year and 4th regular semester</td>
</tr>
<tr>
<td>Preliminary Exams</td>
<td>2 terms prior to final exam; Schedule with committee at least 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 three 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 committee at least 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 with GS30 and Survey of Earned Doctorate</td>
<td>After final exam; 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 10-12 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: https://www.engr.colostate.edu/se/faculty/.
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 formal committee members 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 that meets the following criteria:
   a. They must hold academic faculty rank as a professor, associate professor, or assistant professor of any appointment type within the department or program granting the degree
   b. They must 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:
   a. They must hold a regular, special, transitional, joint, or emeritus/emerita faculty appointment at CSU in a department other than that of the advisor
   b. 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 (“B-” and below not accepted). If a student does not achieve this grade, they will be given one opportunity to repeat the course.

ENGR 799A
Work done toward the dissertation is to be done under 799A credits. Registration for and grading of these credits is based upon agreement between the student and faculty advisor. There is no SE requirement that coursework credits must be complete prior to ENGR 799A registration, as this is at the faculty advisor’s discretion. The number of credits to take each semester may be determined using guidance located in the Graduate and Professional Bulletin:

For thesis, dissertation, research, and independent study graduate courses, the number of student credit hours earned will be determined using a base rate of 48 hours of student effort per credit hour. The faculty advisor, or other department official, shall estimate the total number of hours of student effort required over the length of the semester. This effort shall include consultation with the advisor, as well as library, laboratory, field, or studio work. The total number of hours shall be divided by 48 and the resultant quotient (rounded off to a whole number) shall define the number of credits to be awarded.

The number of listed ENGR 799A credits on the degree curriculum are a minimum. Students who complete
the minimum listed but are not finished with their dissertation are still expected to continue registering for an appropriate amount of dissertation credits each semester until they are done.

To register for the first semester of 799A credits, a PhD student must discuss with their faculty advisor their plan, including how many credits to begin with and the expectations and deliverables for the semester. Written permission from the advisor (or the student forwarding advisor permission with advisor Cc’d) is required only for the first semester’s registration. The program then allows subsequent registration with the expectation that student and advisor are in regular communication. The faculty advisor assigns a grade (satisfactory or unsatisfactory) for the credits each semester, so it is important for the student to ensure they are working closely with their advisor.

**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.

*Please note that if you are submitting a master's degree or transfer courses from an institution outside of the U.S., additional documentation may be required.*

**Ph.D. Preliminary Examination**

This exam will provide the student’s PhD committee an opportunity to examine his/her planned research activity, determine the student’s knowledge of the fundamental scientific and engineering principles involved with their dissertation topic, and to determine the adequacy of the current research plan to develop a satisfactory dissertation. The Preliminary Exam must be taken at least two semesters before the Final Exam/Dissertation Defense, and is generally taken after the student has completed some ENGR 799A credits and has a grasp of their intended project. The student has a maximum of two opportunities to pass the preliminary exam.

Please see Appendix A for more detailed information on the purpose and goals of the PhD process, preliminary exam, and final exams.

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. It is the student’s responsibility to coordinate a time/place with his/her committee members. Please contact sys engr info@engr.colostate.edu for questions or help with logistical information. Announcement of all exams is made on the Systems Engineering website.

Students should work with their faculty advisor and committee members to understand the deliverables required. The student must at a minimum provide a written report or presentation of background, significance and theoretical basis of the planned research, the experimental design, and any preliminary data. All deliverables required by the faculty advisor and committee should be sent to the full committee no less than 10 business days before the student’s Preliminary Examination. The exam will involve a 30-45 minute presentation by the student, followed by an oral examination from 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. It is the student’s responsibility to ensure this paperwork is completed on time.

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
The Ph.D. dissertation is a major effort in which the doctoral candidate undertakes a program of work that will result in a significant contribution to the student’s major field of study. This exam is the final evaluation of the student’s research activity and must be taken at least two semesters after the Preliminary Exam. The dissertation and any other supporting materials (if required by advisor or committee) must be submitted to the full advisory committee no less than 10 business days before the defense date.

All examinations are held on the Colorado State University campus or via appropriate video-conferencing (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. It is the student’s responsibility to coordinate a time/place with his/her committee members. Please contact sys_engr_info@engr.colostate.edu for questions or help with logistical information. Exams may be open-attendance for the University community and announcement of all exams is made on the Systems Engineering website.

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. It is the student’s responsibility to ensure this paperwork is completed on time.

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 GS30 (steps for the SED can be found on the Graduate School website). 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
A minimum of 32 credits must be earned at CSU after admission to the 42-credit doctoral program (for those with an applicable master’s degree) or a minimum of 62 credits must be earned at CSU after admission to the 72-credit doctoral program (for those without an applicable master’s degree).
For Ph.D. students, up to 10 credits in courses earned after the date on which the master's degree was awarded may be accepted in transfer provided all Graduate School requirements are met, including:

- The credit was earned at a regionally-accredited institution (credit earned at institutions outside of the U.S. may require additional documentation)
- The course(s) must have a B or higher earned (‘B-‘ is not accepted)
- It must be a ‘regular’ course (meaning it cannot be a seminar, special topic, independent study, research credit, or similar)
- It must not have been used toward any previous awarded degree
- It must be 500-level equivalent or higher
- It must be approved by your faculty advisor and the S.E. Program as relevant to your program of study
- There is a 10-year time requirement on individual courses counting toward any graduate degree. If a transfer course will be at least 10 years old at the time the student applies to graduate, it may not count toward your degree.

Students petitioning for acceptance of transfer credit must submit a syllabus of the course(s) taken to the S.E. program advisor and an official transcript showing the course(s) must be on-file when the GS6 is submitted so that an effective evaluation can be made. Please note that 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. In the event that an advisor resigns from that position, it is the student's responsibility to obtain a replacement.

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.

CSU Student Conduct Code

The Student Conduct Code (https://resolutioncenter.colostate.edu/conduct-code/) exists to notify students, faculty, and staff of the specific expectations Colorado State University holds related to student behavior and the rights and responsibilities that accompany being a student and participating in student clubs or organizations.

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

Systems Engineering PhD Process

The goals and content of the PhD process in Systems Engineering

Thomas H. Bradley, Associate Professor of Mechanical Engineering,
Associate Director of Systems Engineering

Systems Engineering (SysEng) is a discipline of Engineering which develops an inter-disciplinary and systems-level viewpoint to enable the research and design of large-scale, complex, socio-technical systems. SysEng scholarship requires interdisciplinary training in disciplines as diverse as engineering, management, organizational sociology, behavioral economics, information theory, statistics, and computing. A core strength of the SysEng program at CSU is that it is implemented as an interdisciplinary graduate program where faculty from various disciplines and departments advise SysEng graduate students towards a SysEng graduate degree. This document seeks to develop and communicate a common understanding of the goals of each aspect of the SysEng PhD graduate program so that faculty and students can work to achieve these goals.

Graduate research training for the PhD in SysEng consists of three primary activities: (1) coursework, (2) completion of the preliminary examination, and (3) completion of the dissertation. Each of these student-led activities should be advised and monitored by the faculty advisor and the dissertation advising committee.

Each fall semester before Dec. 1, every PhD student must meet with their faculty advisor and have a discussion regarding their progress over the last year (this is the PhD Student Annual Evaluation). Following each discussion, the student will submit the completed Annual Evaluation form to the Systems Engineering program as part of a progression portfolio.

(1) Qualifying Process (Coursework):

The goals of the coursework activity are to develop the student’s skillset in SysEngr, to develop the student’s analytical, evaluation, and creative mindset, and to instill a Systems Thinking capability. Mastering the SysEng body of knowledge involves mastering subjects with various multi-disciplinary content.

In CSU’s SE curriculum, the student is expected to develop deep expertise in technical and mathematical subjects (defined in the INCOSE SE Handbook as technical processes), as well as in qualitative analysis and soft-skills (defined in the INCOSE SE Handbook as project, enterprise, and agreement processes). While foundational SysEngr courses are broad in disciplinary scope, later courses build the depth and quality of the student’s skillset in core SysEng disciplines. Throughout the curriculum, the courses emphasize aspects of Systems Thinking including feedback, design, emergence, mental models, uncertainty, learning systems and more.

PhD students are required to earn no less than a grade of “B” in their coursework to pass the Qualifying Process (B- and below are not accepted toward the degree). If a student does not earn at least a B, they will be given one opportunity to repeat the course.

(2) Completion of the Preliminary Examination:

The next stage of research education at the PhD graduate level is preparation for and completion of the preliminary examination. Preparation for this examination includes advising tasks that would include
development of in-depth learning and recall (for example, publication of literature review, verification of previous work), but also one-on-one and group mentorship (for example, research advising, lab group meetings, conference attendance), and the development of students’ intrinsic motivation for research tasks (for example, publication, and presentation at conferences). The form of the preliminary examination (whether presented in a dissertation draft form, presentation form, NSF-type proposal form, etc.) is up to the advisor. The objective of the preliminary examination is to evaluate the student’s research readiness in terms of:

- **Student’s depth of knowledge within the specifics of their research topic.** Students should document and defend their understanding of the fundamentals and context of the field in which their research is sited. In engineering research, the research effort must be referenced to the current actors, processes, and engineering practice in human-designed systems.

- **The scholarly value and intellectual rigor of their research objectives, research questions, and proposed findings.** Students must demonstrate philosophically disciplined and logical thinking in their development of the research topic. The components of the research topic must be logically connected, and the hypothesized outcomes of the research effort must be complementary to the development of new knowledge.

- **The scope and timeline of the proposed research effort.** The student must demonstrate their understanding of their research process by presenting their work-to-date, proposed tasks, resource requirements (including data, funding, equipment, support personnel), and timeline. During the period of the examination, the committee and student should come to a shared understanding of the remaining and required content for the dissertation. This should lead to a consensus on the scope, task content, remaining tasks, and proposed timeline.

(3) **Completion and defense of the dissertation:**
In preparation to defend the dissertation, the student should compose a dissertation document (aligned with the formatting of the CSU Graduate College, and the content guidelines of the advisor), and a defense presentation. The goals of the completion and defense of the dissertation is that the student:

- **Demonstrate a great breadth and depth of knowledge in their field of research.** The student must again describe their research context, and must be able to defend their processes and conclusions in the context of new developments or reasoned challenges from within or outside their field.

- **Demonstrate a philosophically consistent and logical approach to the development of new knowledge.** The student should describe the model of knowledge generation (scientific method, hypothesis testing, observation, critique, etc.) that they have used to develop the new knowledge asserted in their dissertation. This method of knowledge generation should be consistent and justified throughout a particular research effort.

- **Demonstrate a significant and recognized scholarly achievement.** The student must justify the results of the dissertation research effort as a significant and recognized unit of scholarship. The dissertation research effort must represent a significant contribution to the field, and should be recognized by the dissertation advisory committee as an increment in new knowledge. Although the justification can take different forms for dissertations that include controlled information, in general, the student must author, guide through peer review, and publish the research results of the dissertation multiple times as they move through the dissertation research process.

- **Demonstrate the utility and continued value of this knowledge to the field of Systems Engineering.** Research in Systems Engineering seeks to inform and advance the practice of Systems Engineering. The value of the research results of a dissertation must be placed into the context of the practice.

**Concluding Statement**
The program will place these goals and activities for the PhD in SysEng into the website and graduate handbook for faculty, student, and public discourse and revision.