Aerospace Engineering

Graduate Program

Department-Specific Requirements

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1 General

The following requirements should be followed by ALL Master's Students in the Aerospace Engineering department at Cal Poly. Modifications will be considered only in exceptional circumstances case-by-case by the graduate coordinator with the student and their thesis advisor.

These requirements are in addition to any University defined requirements as outlined in the Cal Poly Graduate Education Handbook.

1.1 Program Learning Objectives for the MS Aerospace Engineering

1. Competency in advanced mathematics, science, and aerospace engineering knowledge.
2. Ability to apply advanced mathematics, science, and aerospace engineering knowledge to an independent project.
3. Make a specific contribution to a field that is relevant to aerospace professionals.
4. Ability to convey effectively engineering ideas and results both orally and in writing.
5. Awareness of professional and ethical responsibility.
6. Awareness of global, contemporary issues related to aerospace engineering and society at large.
7. Awareness of rapid advancement of modern technology and ability for life-long learning.

1.2 Student Expectations

1.2.1 The student shall be enrolled for at least two semesters as a graduate student in the aerospace engineering department.

1.2.2 The student shall complete a thesis proposal, thesis seminar, and thesis defense

1.2.3 The student should attend a minimum of 80% of thesis seminars in any semester they are enrolled with graduate standing at Cal Poly (not just semesters they are enrolled in thesis units) unless a class conflict occurs.

1.2.4 The student will make every reasonable effort to complete the master's thesis within the timeline agreed upon with their advisor and will notify the advisor as soon as possible in the event circumstances require changes to the initial plan.

1.2.5 The students shall make themselves available to help the department teach labs and classes as TAs or ISAs as needed, unless not feasible under current circumstances.

1.3 Administrative Requirements

All graduate students are responsible for the timely completion of their required paperwork. All forms must be downloaded from Graduate Education Website at the time of completion to ensure the latest version is used. Specific steps can be found here:

1.3.1 A **Working Formal Study Plan (WFSP) and Advancement to Candidacy** must be submitted by week 5 of the semester that the student has graduate standing at Cal Poly.

1.3.2 Should the anticipated graduation semester change throughout the degree, a **Change of Degree Completion** form must be submitted to graduate education and the registrar before or during the originally agreed upon term of completion. The form is on the graduate education webpage and will route automatically to the correct places. Discuss with your advisor an updated suitable graduation date before submitting. A maximum of **two** extensions will be granted by the department.

1.3.3 **Application for Graduation** must be submitted one semester prior to the semester you expect to graduate. This excludes the summer semester, so if planning on graduating in Fall the application for graduation form must be completed in Spring.

1.3.4 The **Final Formal Study Plan (FFSP)** must be submitted in the first three weeks of the semester you will graduate. This form must be completed electronically, then printed for signatures.

1.3.5 On completion of the culminating experience (thesis defense) the **Master's Thesis Approval Form** must be completed and submitted on or before the Friday at 4 pm at the end of week 13 of the semester. This must be signed by all members of the committee. Your thesis edits from your committee must be completed by this date/time as well.

1.3.6 Pay for and upload the thesis (click here for the links and details: *Masters Thesis Forms)* Get a receipt and email to: thesis@calpoly.edu

1.4 Applying to the blended program

The blended program application is normally completed in the semester as the student begins their final year of coursework for their undergraduate degree.

At the beginning of the fall semester, a detailed email is sent to all students that includes the application link, instructions, and details on each professor's ideas for masters thesis topics. Prior to this application, the student must keep their grades up (see the first requirement) and be thinking of professors with whom they would like to work. However, there are no specific class the student needs to take nor research that needs to be completed.

Main Requirements:
-Must have a thesis advisor (determined through the AERO application process
-Must have > 3.0 in your last 90 units (quarter) or last 60 units (semester)
-Must have completed lower division GEs and GWR during the semester of application
-Must have less than 190 units completed of BS and MS degree applicable units at the start of the spring semester. This does not include in-progress units.

1.5 Applying as an external applicant

The application process for external candidates is handled entirely through the Cal State Apply (https://www.calstate.edu/apply) system. Please see the link for the application process.

2 Courses

The student shall enroll in courses appropriate to their degree as specified by the Cal Poly catalog at the time the student is enrolled. The students should discuss elective courses with their advisor and if desired, the Graduate Coordinator when choosing enrollment. The table shows the breakdown of courses by level and number. Students enrolled in the blended program may double-count up to 3 semester units (4 quarter units) from their undergraduate curriculum.

With advisor approval, a course outside the College of Engineering and the College of Math and Science may be used to satisfy part of the requirement for 6 units of 4000- or 5000-level courses.

Select one from the following:	Units
AERO 5507 (Computational Aerodynamics) AERO 5534 (Aerospace Structural Dynamics Analysis) AERO 5540 (Advanced Ground to Space Transportation) AERO 5549 (Systems Engineering Applications) AERO 5560 (Advanced Spacecraft Dynamics and Control)	3
Advisor Approved Electives	
Any other 5000-level AERO courses	9
Any 4000-5000 level courses from the Orfalea College of Business, College of Engineering, or Bailey College of Science and Mathematics	6
Mathematics	
MATH 5651 (Numerical Analysis)	3
MATH 5691 (Applied Mathematics for Engineers)	3
Culminating Experience	
AERO 5599 (Thesis)	6
TOTAL	30

2.1 Thesis Units and Grading

2.1.1 Students are required to take 6 thesis units taken over at least 2 semesters while enrolled as a graduate student in the Cal Poly Aerospace program. Thesis units should be taken in the semester thesis work is being done, in proportion to the work.

2.1.2 Thesis units CANNOT be taken during the summer semester. Students should consider this when planning their timeline for graduate school.

2.1.3 During the first semester thesis units are taken, students need to enroll in at least 1 and maximum of 3 units. The thesis proposal and literature review shall be done this semester. A grade will be awarded based on the proposal, literature review, and general progress, as well as committee input.

2.1.4 After the proposal is completed, a seminar can be scheduled.

2.1.5 During the semester the defense is conducted; at least 1 and a maximum of 3 units shall be taken. The total thesis units attempted to date shall be 6.

2.1.5.1 *If the advisor believes the student will not be able to finish that semester, the student shall not be allowed to enroll in the last required thesis units that semester*

A grade will be awarded based on the defense and written thesis

2.1.6 Should any of the expected tasks not be completed during any semester, the student should be marked with an 'I' for incomplete, with a deadline for completion of the task arranged between the student and thesis advisor prior to the grade being released. **The student will not be allowed to enroll in future thesis units until the incomplete contract is satisfied.**

2.1.7 If the student falls below a 'B' grade for AERO 5599 (Thesis) for any semester, the student should be marked with an 'I' for incomplete, with a set of revised tasks negotiated between the student and thesis advisor to be completed prior to a deadline also negotiated between the student and thesis advisor.

2.1.8 For extreme cases when a student is faring very poorly based on advisors' opinion, the graduate coordinator will arrange a meeting with the student and advisor to understand the issues and seek a way forward with a timeline attached to progress.

3 Thesis Committee

3.1 Committee Selection

3.1.1 The committee is chosen by the student and the thesis advisor, and shall meet the following requirements

3.1.1.1 The committee shall consist of at least four members.
3.1.1.2 The committee chair shall be a tenured or tenure-track Cal Poly Aerospace faculty
3.1.1.3 At least two committee members shall be tenured or tenure-track Cal Poly Aerospace faculty. One of these two members will also be the committee chair.
3.1.1.4 At least three committee members shall have a Ph.D. in an appropriate field
3.1.1.5 At least one committee member must come from outside the Cal Poly Aerospace department and be approved by the committee chair.

3.2 Committee Expectations

3.2.1 The committee members should be available for consultation and questions from the student as allowable within reasonable availability.

3.2.2 The committee member shall attend, either in person or via teleconferencing, the proposal and defense.

3.2.2.1 The committee member should use the provided forms to provide feedback to the student and advisor during the proposal and defense.

3.2.3 The committee member shall read the written thesis and provide feedback to the student and advisor before or during the defense.

3.2.4 Any committee member may choose to step down from the panel at any time. The student is responsible for finding a suitable replacement, ideally at least two weeks before the defense.

4 Thesis Advisor

4.1 Advisor Expectations

4.1.1 The advisor will provide recommendations for courses if requested by the student.

4.1.2 The advisor will provide guidance and feedback on thesis direction and progress.

4.1.3 The advisor will work with the student to ensure the thesis progress is on track.

4.1.4 The advisor will ensure required thesis components are completed in a timely manner and set up incomplete contracts when they are not.

4.2 Thesis Funding

4.2.1 The advisor is responsible for helping the students secure funding for any thesis research costs. Should funds for thesis costs not be secured through attempts of the student, the advisor must provide funds. The student is not to pay for any thesis costs from their own pocket.

4.2.1.1 This does not extend to general expenses such as printing or salaries.

5 Thesis

5.1 Literature Review and Proposal

5.1.1 At the start of the semester the proposal is to be scheduled (before add/drop date), the student and thesis advisor confirms enrollment in at least 1 but no more than 3 thesis units.

5.1.2 The thesis committee should be confirmed at least 2 weeks prior to the desired proposal date.

5.1.3 The student and committee members determine a mutually agreeable time for the proposal.

5.1.3.1 *Suggested duration is at least 50 minutes*
5.1.3.2 *It is permissible for committee members to attend via teleconferencing or videoconferencing.*
5.1.3.3 *If scheduling a single time for the proposal is not possible, it is permissible for the student to schedule multiple proposals. However, all committee members must receive the same proposal. This is not the preferred method for a defense.*

5.1.4 A draft literature review is sent to the thesis advisor at least 10 days prior to the proposal date.

5.1.4.1 The advisor should provide feedback on the literature review for the student to revise and resubmit

5.1.5 PRIOR TO the proposal date, the student shall send the graduate coordinator an email with

i. Title of proposal (working thesis title)
ii. Committee member names
iii. Date of Proposal

The graduate coordinator will keep this data for statistical/historical analysis.

5.1.6 The student presents their **proposal** to ALL committee members.

*5.1.6.1 Refer to **Master's Thesis Proposal Feedback form** for expectations and content requirements*
5.1.6.2 The student is responsible for providing the proposal feedback form to ALL committee members (including external members and those attending via teleconferencing) before the proposal.
5.1.6.3 Committee members provide general feedback to the student during the proposal through comments and questions
5.1.6.4 Committee members provide feedback and scores to the thesis advisor through the provided proposal feedback forms

5.1.7 After the proposal is complete, the committee completes the grading form and gives them to the advisor.

5.1.8 At the end of the semester, the advisor combines the literature review, proposal, and general scores and assigns a grade for the semester.

5.2 Seminar

5.2.1 The semester the student is completing the seminar, the student and thesis advisor confirms enrollment in at least 1 but no more than 3 thesis units. There is a minimum of 6 weeks required between the proposal and the seminar. Also, there is a minimum of 6 weeks required between the seminar and the defense

5.2.2 The student contacts the graduate coordinator to schedule the seminar.

5.2.2.1 Places fill up quick so get in early.

5.2.2.2 A flyer detailing the seminar date, location, and topic (in an abstract) should be sent to the graduate coordinator one week before the seminar. If the graduate coordinator does not get the flyer, the student gives up their seminar slot.

5.2.3 The student presents their seminar and receives feedback on the forms provided from other students in attendance.

*5.2.3.1 Refer to **Master's Thesis Seminar Feedback Form** for expectations.*

5.2.4 The student and thesis advisor debrief and discuss feedback received in the context of moving forward with the thesis

5.3 Written Thesis and Defense

5.3.1 At the start of the semester the defense is to be scheduled, the student and thesis advisor confirm that all 6 thesis units will be completed by the end of the semester.

5.3.2 AT LEAST 4 weeks before the desired defense date the student sends a **polished thesis draft** to the thesis advisor. The thesis advisor provides feedback to the student for corrections.

5.3.2.1 ***Thesis formatting guidelines and templates*** *are available through the Graduate Education office. There is a LaTeX template available through your advisor and Overleaf. Please contact your advisor or the graduate coordinator for information. LaTeX is the preferred method for writing the thesis for the AERO department.*

5.3.3 On receipt of corrections, a mutually agreeable time for the defense is determined between the student and committee members. The maximum permissible time is 120 minutes. Plan to talk about the thesis for 45-60 minutes and leave the remaining time for questions.

5.3.3.1 It is permissible for committee members to virtually attend the defense through teleconferencing or videoconferencing.

5.3.4 The student makes the corrections and sends the **revised thesis** to the committee members, AT LEAST 2 weeks prior to the defense date. This revised thesis should represent a version the student feels is complete and ready for final publication. Committee members have an obligation to reject scheduling of the defense if the thesis is still an obvious draft or incomplete.

5.3.5 PRIOR TO the defense, the student sends the graduate coordinator an email with

i. Title of thesis
ii. Updated committee member names – if relevant
iii. Date of defense

The graduate coordinator will keep this data for statistical/historical analysis.

5.3.6 The committee members provide feedback on the written thesis, either prior to the defense or within 24 hours after the defense.

5.3.7 The student presents their thesis to ALL committee members at the thesis defense.

5.3.7.1 Refer to ***Master's Thesis Defense Feedback form*** *for expectations and content requirements*
5.3.7.2 The student is responsible for providing defense feedback forms to ALL committee members (including external members) prior to the defense starting.
5.3.7.3 Committee members provide general feedback to the student during the defense through comments and questions and ask questions to gauge if thesis level and understanding of student is sufficient for the award of a Cal Poly Master's degree.
5.3.7.4 Immediately after the defense, the committee discusses (in the absence of the student) the suitability of the thesis, required additions and changes, and if the student should be awarded the degree.
5.3.7.5 Committee members provide feedback and scores to the thesis advisor through the provided defense feedback forms

5.3.8 The student incorporates the committee feedback into the **final thesis by the deadline imposed by graduate education.**

5.3.8.1 If acceptable by the committee, the thesis advisor is responsible for checking the thesis edits and approving the final version (preferred)
5.3.8.2 If required by the committee, this is checked by all committee members prior to final thesis approval

5.3.9 After receiving final approval from the thesis advisor, the student must

5.3.9.1 Upload the final thesis version to library digital archive
5.3.9.2 Submit a signed completion form to graduate education
5.3.9.3 Pay the digital archive deposit fee

5.3.10 The grade assigned to the thesis units for the defense semester are based entirely on the thesis defense and submission, determined through collating committee and advisor scores.

5.3.11 Defended in the summer semester is not advisable for many reasons.

5.3.11.1 If a student misses the Spring Deadlines and has completed all their units, they can register for extended education credit for the fall and defend at the beginning of the semester. Please contact the graduate coordinator for more information on this process and where to obtain the necessary forms.

5.4 Conference Papers and Department Funding for Travel

The Aerospace Engineering department often has funding available for graduate students to travel to conferences to present papers on their research. CENG and Graduate Education also have funding opportunities that should be explored. Once your paper is accepted, you can request support for travel to the conferences through the AERO department. To do so:

i. Write a 1-paragraph description of the conference, location, mode of travel, and your paper topic.
ii. Send the description to your advisor for approval.
iii. If your advisor approves, they will send it to the department chair.
iv. After submitting your description, initiate an AERO Travel Pre-Authorization from the Aerospace Engineering department webpage (https://aero.calpoly.edu/student-resources/).
v. At the department chair's discretion, and subject to funds availability, the chair will approve or decline your travel request.

6 Sample Timeline s

6.1 1 year timeline

Fall	Fall/Spring	Spring	Spring	Spring
- Proposal by week 8 - Literature Review days 10 prior to proposal	- Seminar no closer than 6 weeks to the proposal or defense	- Thesis to faculty advisor 4 weeks before the defense	- Thesis to committee 2 weeks before the defense	- Defense must be completed and thesis turned in by 4 pm Week 13

	- Can be late fall or early spring			

6.2 1.5 year timeline

Starting in the Fall:

Fall 1	**Spring**	**Fall 2**	**Fall 2**	**Fall 2**
- Proposal and Literature Review	- Seminar	- Thesis to faculty advisor 4 weeks before the defense	- Thesis to committee 2 weeks before the defense	- Defense must be completed and thesis turned in by 4 pm Week 13

Graduation: you are able to "walk" in graduation in the spring even if you haven't defended.

Starting before the Fall:

Spring/Summer	**Spring**	**Fall/Spring**	**Spring**	**Spring**	**Spring**
- Literature Review	- Proposal by week 8	- Seminar no closer than 6 weeks to the proposal or defense - Can be late fall or early spring	- Thesis to faculty advisor 4 weeks before the defense	- Thesis to committee 2 weeks before the defense	- Defense must be completed and thesis turned in by 4 pm Week 13

6.3 2 year timeline

Fall 1	**Spring 1**	**Fall 2**	**Spring 2**	**Spring 2**	**Spring 2**
- Meet with advisor	- Proposal and Literature Review	- Seminar	- Thesis to faculty advisor 4 weeks before the defense	- Thesis to committee 2 weeks before the defense	- Defense must be completed and thesis turned in by 4 pm Week 13