

**STANFORD  
UNIVERSITY**

---



**GUIDE TO GRADUATE STUDIES**

**IN**

**AERONAUTICS AND ASTRONAUTICS**

**2017 – 2018**

# TABLE OF CONTENTS

<b>DEPARTMENT INFORMATION</b>	<b>1</b>
<b>UNIVERSITY PUBLICATIONS AND RESOURCES</b>	<b>3</b>
<b>GENERAL ACADEMIC INFORMATION</b>	<b>5</b>
Registration Procedures	5
Registration Requirements	6
Satisfactory Progress Requirements	6
Summer Quarter Registration and Exceptions	6
Terminal Graduate Registration (TGR)	6
Reduced Tuition Quarter	7
Graduation Quarter (Final Quarter)	8
Leaves of Absence - Quarters Not Registered	8
Research and Thesis Units	8
Residency Requirements (Units per Degree)	9
Transferring Residency	9
Changes of Degree Level and/or Department	10
Completing a Degree	10
Mathematics Requirements in Aero/Astro	11
Non-Aero/Astro Common Electives	12
<b>MASTER OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS</b>	<b>13</b>
Course Requirements	13
Experimentation/ Design Requirements	15
Waivers of Requirements	16
Program Proposal for Master's Degree	16
Timeline for an Aero/Astro Master's Student	19
Degree Completion	20
Study after the Master's Degree	20
<b>MASTER OF SCIENCE IN ENGINEERING</b>	<b>21</b>
Course Requirements	21
Program Proposal for Master's Degree	21
Degree Completion	21
<b>ENGINEER'S DEGREE</b>	<b>22</b>
Course Requirements	22
Academic Requirements	22
Candidacy	23
Engineer's Thesis	23
<b>Ph.D. IN AERONAUTICS AND ASTRONAUTICS</b>	<b>24</b>
Candidacy	24
Ph.D. Requirements and Milestones	24
Ph.D. Qualifying Procedures in Aero/Astro	25
Course Requirements	28
Dissertation Reading Committee	29
University Oral Examination	29
Doctoral Dissertation	30
<b>RESEARCH AND COURSE ASSISTANTSHIPS (RAs and CAs)</b>	<b>31</b>
<b>STUDENT PAYROLL AT STANFORD</b>	<b>34</b>
<b>FUNDAMENTAL STANDARD</b>	<b>35</b>
<b>HONOR CODE</b>	<b>36</b>
<b>COMPUTER AND NETWORK USAGE POLICY</b>	<b>40</b>
<b>AERO/ASTRO DIRECTORY 2017-18</b>	<b>44</b>
<b>Stanford Academic Calendar 2017-18</b>	<b>44</b>

# DEPARTMENT INFORMATION

The administrative hub of the Aero/Astro Department is Room 202 of the Durand Building. The Student Services Specialist at the front desk, Jenny Scholes, will be able to answer many of your questions about the department and the Durand building, including access to Durand and its facilities after business hours. Jenny can also help with information about the Aero/Astro undergraduate program. Graduate academic questions and matters of student support can be addressed to Patrick Ferguson and Robin Murphy in Aero/Astro Student Services. (They deal with degree program requirements, advising, grades, assistantships and fellowships, and just about anything else!) The office of the Department Manager, Brittney Holmquist, is also in Durand 202.

Professor Charbel Farhat, the Department Chair, has authority over all department functions, including academic matters, but he delegates many of the day-to-day responsibilities to specific faculty or staff members. For items requiring "chairman approval" or "department approval," students generally should talk first with Patrick or Robin, in Aero/Astro Student Services.

Your advisor will serve as the first resource for consultation and advice about your academic program, and you should meet with him/her frequently during the year, but feel free to contact any of the people mentioned above for additional information.

## Facilities

The Aero/Astro computer lab, which is currently under construction, houses our general study area, Ph.D. dissertation collection, and computer cluster. The computers are primarily for use in Aero/Astro courses, but provide access to all the University's networked computing resources and the Internet as well. The Engineering Library in the Huang Engineering Center has the University library holdings in engineering, reserve readings and videotapes for classes, and a computer cluster. Additional computer clusters with a wide variety of hardware and software are located throughout the University, including dorms and libraries, and are linked together over SUNet.

**There are Aero/Astro mailboxes in the hallway opposite Durand 250. Student mail is put in the slot corresponding to the first letter of your last name; you should check there regularly.**

Departmental office space for Ph.D. students is assigned within their research labs by their research advisor. Course assistants may use the small conversation rooms in Durand Building (for office hours, etc.). In addition, course assistants may contact Robin Murphy to schedule a room for weekly problem sessions.

## Email

Email is the primary method for department announcements and individual notifications. Check your email regularly. You must setup your Stanford email account (free account) which is established when you request your SUNet ID – see <http://www.stanford.edu/group/itss/services/sunetid>

Aero/Astro Student Services maintains a private distribution list, [aa-academic@lists.stanford.edu](mailto:aa-academic@lists.stanford.edu), for academic reminders and other major informational mailings. We will add your '@stanford.edu' email address during your first week here.

There is also an optional Aero/Astro student email list, [aa-students@lists.stanford.edu](mailto:aa-students@lists.stanford.edu). This is primarily for students to share news and upcoming events. Only accounts which are on the list can send messages to it. We will add your '@stanford.edu' email address during your first week here.

To unsubscribe go to <https://mailman.stanford.edu/mailman/listinfo/aa-students>. This same method of "subscribe/unsubscribe" will be used by many other lists at Stanford.

## Student Directory Information

Aero/Astro does not maintain its own student directory. Instead, we rely on the AXESS system, in which students review and update their own official directory information, such as local and permanent addresses, email, phone numbers, etc. Please keep this info up-to-date. AXESS is also the source of the information for Stanfordwho service and the Stanford Directory, a volume published each January.

If you wish to keep some or all of your information confidential, AXESS lets you mark items "private" so that only authorized people can see. Please use this privacy function rather than withholding information.

The Stanford student branch of the American Institute of Aeronautics and Astronautics (AIAA) holds various activities throughout the school year. Stanford's AIAA activities are open to all students in the department (and those in other departments who are interested in Aero/Astro). Membership in AIAA is optional, although student memberships are available and include many non-Stanford benefits. For announcements of events, there is an AIAA email distribution list, [aiaa-stanford@lists.stanford.edu](mailto:aiaa-stanford@lists.stanford.edu). We will add your '@stanford.edu' email address during your first week here. To unsubscribe go to <https://mailman.stanford.edu/mailman/listinfo/aiaa-stanford>.

The branch supports a Young Astronauts program in the local schools, which relies on enthusiastic graduate student volunteers to interest young students in science and engineering. To subscribe to the email distribution list, [young-astronauts@lists.stanford.edu](mailto:young-astronauts@lists.stanford.edu), go to <https://mailman.stanford.edu/mailman/listinfo/young-astronauts>.

### **Aero/Astro Labs: Research Safety Notes**

Many research labs and facilities utilize hazardous materials or equipment. Please do not visit a lab without first checking on hazards. [You don't just "pop in" at a lab where lasers are used, for instance!] If you are going to participate in research at a lab, you should first receive specific training on its hazards, safety equipment, and emergency procedures. Jenny Scholes in Durand room 202 can guide you through the process of gaining lab access.

We make every effort to identify hazards and to keep our facilities safe and secure. If you notice situations which need to be corrected, please let us know immediately.

Also, if any injury or accident does occur, please let the Department office know right away. We will then be able to help, if necessary; and we'll be able to handle whatever reporting procedures are required by law or University policy.

Health and Safety specialist: Jennifer Mattler, [jmattler@stanford.edu](mailto:jmattler@stanford.edu)

**EMERGENCY** (from a campus phone): **9-911** fire, police, ambulance, etc

# UNIVERSITY PUBLICATIONS AND RESOURCES

There are several sources of information, about Stanford in general and graduate student life, which will be very helpful to you if you know and consult them during your time here. All the publications below are online; some are in print, too, but the Web will be more current, and will offer links to other related sites of interest. Among the first documents to browse and to bookmark:

**Stanford Bulletin:** <http://www.stanford.edu/dept/registrar/bulletin>

Department-by-department listings of programs, courses, and degree requirements as well as University policies regarding academic life, degree requirements, etc. Published online in early-August. Note that many departments put a draft Bulletin on their Web pages, but faculty add, move, and cancel courses during the year - even "official" isn't final!

**Explore Courses:** <http://explorecourses.stanford.edu/>

Lists days/time and location as well as instructor, units, etc. for the quarter's courses. For each course, check for pre-registration requirements, grading limitations, etc. The online version is updated nightly with room/time changes, etc.

**Graduate Academic Policies and Procedures (GAP):** <http://gap.stanford.edu/>

University policies, requirements, and resources for Stanford graduate students in all schools, departments, and programs.

**Registrar's Office:** <http://studentaffairs.stanford.edu/registrar>

Important reference for academic policy information. Also, University forms for graduate degree progress and enrollment are listed under Publications and Forms, <http://www.stanford.edu/dept/registrar/shared/publications.htm>

**Research Policy Handbook:** <http://rph.stanford.edu/>

Policies relating to research assistantships, academic freedom, shared authorship, patents, etc.

**About Computing at Stanford:** <https://uit.stanford.edu/service/computing>

Guide to campus computing systems, facilities, and support resources.

**Stanford Directory:** <http://stanfordwho.stanford.edu>

Directory info (address, phone, email) for students, faculty, and staff. Logon using your SUNetID and you'll have access to more information than the general public. A printed version of the "public" information is usually available in January, with one free copy per student. The printed Stanford Directory has information about student groups, Stanford facilities, and coupons for local businesses, in addition to the faculty/staff/student listing.

## Other Offices at Stanford

Stanford provides a wide range of professional staff and facilities. Students should look for and take advantage of these campus resources:

**Bechtel International Center (I-Center): an absolutely crucial office for international students!** Orientation programs and other support services for international students; serves as a place for cultural exchange; liaison with U.S. Departments of Labor, Justice, State, etc. Visa status and SEVIS questions, requests for renewals, practical training approvals, etc. are all handled by the I-Center. <https://bechtel.stanford.edu/>

Their site for incoming students, <https://bechtel.stanford.edu/coming-stanford>, contains critical information about maintaining valid immigration status, helpful advice about maintaining your documents, as well as very useful orientation information. Written to accompany the I-Center Orientation events in September, this guide is a very useful introduction and reference material.

**School of Engineering, Office of Student Affairs - Huang Engineering Center 135K:**

Provides a variety of services to Engineering students; often indirectly, via support to the departments within the School. **Sally Gressens**, Assistant Dean, is responsible for Graduate Policy and Financial Aid. **Noe Lozano**, Associate Dean, directs the School's Diversity Programs. **Thomas Kenny** is Senior Associate Dean for Student Affairs. **Kirsti Copeland** is the Associate Dean of Student Affairs. In addition to their primary responsibilities, any of these individuals is available to graduate students for advice and counsel in case of academic problems with a department, or for a non-departmental view of a difficult issue in your academic life. <http://soe.stanford.edu/>

**Vaden Student Health Service - 866 Campus Drive – 650-498-2336:**

Medical, counseling and psychological services and education; student health insurance. A nurse is available during office hours to answer routine medical questions in person or by phone, and advice for urgent conditions is provided 24 hours a day by an on-call physician. Health promotion information is also available, and CAPS (Counseling and Psychological Services) provides individual, couples and group psychological counseling. <https://vaden.stanford.edu/>

**Crisis Counseling at Vaden - 24 Hours, 650-723-3785:**

A CAPS on-call clinician may be contacted for urgent situations at any time, including evenings and weekends. In an emergency, a clinician will speak with you within 20 minutes. In an urgent situation, a clinician will see you the same day. In either case, the on-call clinician will assess your situation. Later, you will be offered a regular appointment with this or another clinician.

**Graduate Life Office (GLO) – 750 Escondido Rd. Suite 207 – 650-723-8222:**

The Graduate Life Office works closely with students (both on and off campus) and with student groups in a variety of welcome and on-going programs. The GLO staff also works with individual students who need information or who may be experiencing personal difficulties. Staff members are knowledgeable about, and have access to, support and resources available throughout the University. <http://www.stanford.edu/group/glo/>

**Stanford Career Education (BEAM) - 563 Salvatierra Walk – 650-723-3963:**

Career counseling, job listings, resource library, on-campus recruiting, workshops. <https://beam.stanford.edu/>

**Vice Provost for Teaching and Learning – 408 Panama Mall:**

VPTL's service mission is to help Stanford invent the future research university through teaching and learning innovation by supporting undergraduate, graduate, professional, and lifelong learning. <https://vptl.stanford.edu/>

**Office of Accessible Education (OAE) - 563 Salvatierra Walk – 650-723-1066:**

Provides information, referrals, and services for students with physical and learning disabilities. A variety of services is available for students with long-term disabilities or illnesses, as well as those with short-term disabling conditions. The OAE staff, professionals, and students are committed to providing support and services which remove the barriers to full participation in university life. Students should contact the OAE for further information and/or as the first step in a disability-related request for accommodations, auxiliary aids, or other services related to their education or life at Stanford. <http://studentaffairs.stanford.edu/oea>

# GENERAL ACADEMIC INFORMATION

## Registration Procedures

Stanford's registration process is part of AXESS, the Registrar's student information system. This web-based system alerts you of upcoming deadlines, gives instructions about meeting them, and lets you check your official records. Use AXESS to update your phone number and addresses (including email address) and apply for housing. <https://axess.stanford.edu/>

New students will need to know their student ID number as listed on the Student ID card and admission letter.

### Step 1: Payment

Stanford ePay (<http://fingate.stanford.edu/students/index.html>) notifies students on the 20<sup>th</sup> of each month when their monthly online University bill is available. Bills are due on the 15<sup>th</sup> of the following month. For graduate students, the first bill of the academic year is due October 15. Late fees are charged after this date! Your bill will show charges for tuition, ASSU fees, insurance, housing, and other charges.

Your bill should reflect anticipated aid for the quarter for tuition from fellowships or assistantships, and fellowship stipends (but not RA/CA salaries; payroll is a separate system). If it does not, check with the Aero/Astro Student Services Office to verify that your financial aid has been processed. Note: Late fees are not charged for items paid by fellowship/assistantships.

### Step 2: Courses

Before the quarter starts, you may enroll in classes when AXESS opens for enrollment. You may also attend a class before officially enrolling in the course to help you make an informed decision about whether to take a particular course. (Some courses have limited enrollment and require that you sign a class list in advance; check the listing for each course in Explore Courses for "notes" about signup lists.)

When you have decided which courses to take, use AXESS to submit your official Study List for the quarter. Please pay attention to the deadline for entering your online Study List; a late fee will be charged! Also pay attention to the "drop/add" deadlines and "withdraw" deadline - use AXESS to make any of these changes. Petitions are required for late submissions and a fee is charged!

Note: fellowships are not fully disbursed until a student is enrolled in at least 8 units, qualifying as a full-time student. Students expecting a fellowship stipend check should enroll in at least 8 units at least two weeks before the quarter starts. You can add or change courses later.

In considering what courses to take, a student should talk with his/her academic advisor about long-term plans as well as the appropriateness of particular classes. It is the student's responsibility to schedule meetings with the advisor; this should be done first during Autumn registration, and then at least once a quarter. For first-year students, many advisors suggest meeting between midterms and finals each quarter to discuss future quarters' plans. [Note: for MS students, the week after first-quarter midterms is the recommended time to complete the Master's Program Proposal.]

Questions about the content of a particular course are best addressed to the instructor of the course, while questions about the quarter, days and times of courses can often best be answered through Explore Courses. Of course, you may also come to the Aero/Astro Student Services Office with questions about your program, course requirements, or general academic advice.

### Step 3: Grades

You can check your grades on AXESS.

## Registration Requirements

All graduate students are required to register as a full-time student – either at 8-10 units (minimum full-time registration) or at full tuition, every quarter until they graduate. Exceptions are as follows:

1. Student is a regular University employee.
2. Student has an Office of Accessible Education approved academic accommodation.
3. Summer quarter only. See Summer Quarter, below.
4. Student is a Ph.D./Engineer candidate and TGR registration has been approved by the Registrar. Student enrolls in a 0-unit TGR course. See TGR, below.
5. Student qualifies for GFR (Graduate Final Registration). See GFR, below.
6. Student qualifies for Graduation Quarter. See Graduation Quarter, below.

To claim reduced tuition for reasons 1 or 2 above, you must submit a petition to the Student Services Center. [Students in the Honors Coop Program (HCP) claim reduced tuition status through their company coordinator and the SCPD staff.]

## Satisfactory Progress Requirements

Every student should be familiar with the University's requirements for minimal progress as outlined in the Graduate Academic Policies and Procedures [GAP](#). Stanford University defines academic requirements which constitute "satisfactory progress" and allow continued student status. Graduate students should maintain an overall average GPA of 3.0 (B). In addition, there are minimum unit standards each quarter: Students who are registered at maximum tuition must enroll for at least 11 units each quarter and must pass at least 8 units per term. Those registered at the 8-10 unit rate ("minimum full-time registration") must pass at least 6 units per term. Students with permission to enroll for fewer than 8 units must complete proportionate number of units, unless other requirements are specified. Students who have been granted TGR status (see TGR) enroll in a 0-unit TGR course, which puts them at full time status.

Other University requirements for satisfactory progress include timely completion of department and program requirements, such as admission to candidacy, successful completion of qualifying exams, and so on.

Students identified as not meeting the requirements for satisfactory progress are reviewed by the department on a quarterly basis. Generally, there is discussion with both the student and the advisor. Approval for continuation in the degree program is contingent on agreement by the student and department to a suitable plan to maintain satisfactory progress in subsequent quarters. The Graduate Degrees section of the Stanford Bulletin describes the University's satisfactory progress requirements, guidelines for handling problems and, if necessary, the procedures for dismissal of a student from the graduate program.

## Summer Quarter Registration and Exceptions

Summer is an academic quarter at Stanford, but it is "special" in several ways. First, fewer courses are offered than during other quarters in the University as a whole. Second, most students may enroll less-than-full-time and pay tuition on a unit basis, or choose not to enroll at all. **Note:** Students receiving any summer funds, including RAs and fellowships, must be registered. **International students may have much more restrictive registration requirements as a condition of their visas, and should check with the International Center for details.**

## Terminal Graduate Registration (TGR)

Terminal Graduate Registration (TGR) is a reduced-tuition registration status available to students who have completed residency and course requirements but not yet completed thesis-related or project work. Most students in the Aero/Astro Ph.D. or Engineer's Degree "go TGR" several quarters before graduating.

A student with TGR status registers each quarter for 0 units of TGR dissertation (or TGR project, for the Engineer degree) with the advisor's section number. The advisor then submits a grade each quarter, usually an N which signifies "continuing work, satisfactory progress" which is replaced by an S at the end of the thesis. Other possible grades are N- for "continuing work, unsatisfactory progress", and No Credit. For TGR students, University standards of minimal progress require an N grade for each quarter of the academic year. One N- is considered a warning; if it is followed by another N-, the student's registration should be placed on Hold until the problems have been identified and resolved with the advisor.



TGR status does not affect length of candidacy or deadlines for completion of degrees.

TGR status, once granted, remains in effect for the remainder of the student's degree program. The student's tuition will automatically be adjusted to TGR rates for each succeeding quarter. Granting TGR status means that the department agrees that all requirements for the degree, other than the thesis or project, have been met. It will not be possible to require additional work as a condition of graduation. Therefore, the department and advisor will follow the same procedures for approving TGR status as for clearing students to graduate.

**Ph.D. students who wish to go TGR must have:**

- been admitted to candidacy
- filed a Dissertation Reading Committee form
- received a passing grade for all units including thesis which are listed on the candidacy form (or its latest revision)
- acquired 135 units of residency. This includes the 45 units of residency required for the M.S. degree, or officially transferred from a M.S. degree at another university
- completed all other department requirements for the degree, except the dissertation and the University Oral Examination

**Engineer's degree students who wish to go TGR must have:**

- been admitted to candidacy
- completed all units including thesis which are listed on the candidacy form (or its latest revision) with a passing grade.
- acquired 90 units of residency. This includes the 45 units of residency required for the M.S. degree, or officially transferred from a M.S. degree at another university
- completed all other department requirements for the degree, except the thesis

**M.S. students** in Aero/Astro cannot go TGR because there is no thesis requirement.

**Reduced Tuition Quarter**

Graduate Final Requirement, or GFR, is a one-quarter registration status available to students who have 7 units or less remaining before they graduate (and leave the University), or before they file for TGR status. For that one quarter only, students may adjust their tuition down to the number of units (3 units minimum) required to complete their unit and residency requirements. Because they are registered at less than 8 units, students are considered part-time students during the GFR quarter, and the Registrar's office cannot certify them as full-time students for insurance, loans, visa status, etc. **Note: international students should check with the International Center well in advance to determine whether their visas permit this status.**

For most graduate students who are not yet TGR, the GFR quarter is the only time they can reduce the tuition bill to less than 8 units for Autumn, Winter, or Spring quarter.

To apply for GFR, the student should have a "Request for Graduate Tuition Adjustment" form signed by the advisor and the Aero/Astro Student Services Office, and submit it to the Student Services Center. (If necessary, submit a revised candidacy form or program proposal at the same time.) Blank forms are available at the Aero/Astro Student Services Office.

**Note:** This status can only be used once. If a student does not graduate or achieve TGR status at the end of the Graduate Final quarter, he returns to standard tuition status. Therefore, students should check carefully to make sure that all requirements will be satisfied by the units requested, and that all Incompletes will be cleared and all paperwork for graduation or TGR will be filed on time, in order to avoid large tuition bills in the following quarter(s).

## Graduation Quarter (Final Quarter)

Registration is required for the term in which a student submits a dissertation or has a degree conferred. Students who meet all the following conditions are eligible to be assessed a special tuition rate for the quarter in which they are receiving a degree. Verify eligibility below:

1. All course work, degree requirements, and residency requirements have been completed prior to the start of the requested term with the exception of the dissertation/project or thesis.
2. The graduate/professional student has only to submit the dissertation/project or master's thesis by the deadline for submission in the term designated as the Graduation Quarter, and if required, complete the University Oral Examination
3. The student has formally submitted the application to graduate via AXESS.
4. The student has filed all necessary forms regarding Graduation Quarter before the first day of the requested term chosen for the Graduation Quarter (late study list fee applies after deadline).
5. A graduate or professional student must have an active program status, which may include an approved leave of absence, in the term immediately preceding the requested Graduation Quarter (not applicable for undergraduates).
6. The student has enrolled in the appropriate course (usually 801 or 802).

Students on Graduation Quarter are registered and have the rights and privileges of registered students. There is a registration fee and students will be assessed University health insurance (unless waived) and ASSU fees.

## Leaves of Absence - Quarters Not Registered

A student who wishes to interrupt graduate study may apply for a leave of absence. The [Leave of Absence](#) form is on the Registrar's Office website or may be picked up in the Aero/Astro Student Services Office. You should obtain your advisor's signature before coming to the Aero/Astro Student Services Office for department signature. For non-US citizens, a signature from the Bechtel International Center is then required before the form can be submitted to the Registrar's Office. Leaves of Absence are normally granted for a maximum of one year. Extensions may be approved under exceptional circumstances. Students on leave who would like on-campus housing upon their return should keep in mind that the housing lottery for the following year is held in early May.

Leave of absence petitions should be fully approved and filed with the Registrar's office before the first day of the quarter to avoid tuition and insurance fees.

## Research and Thesis Units

Many graduate students in Aero/Astro are interested in becoming involved in the research, perhaps by doing work and receiving credit as a part of the MS degree. Of course, students interested in the Ph.D. or Engineer's degree are looking for substantial thesis research, and a directed research project is a significant part of the PhD qualifying exams. All of our faculty supervise directed research and are involved in thesis work. (The Dissertation Reading Committee section of this Guide discusses restrictions on principal thesis advisors.) Each faculty member will have specific expectations for students who want to work with them, and students should talk directly with the faculty about this. However, some general information and advice may help in getting started:

**What course?** AA 290, "Problems in Aero Astro", is the directed research course for graduate students - to satisfy the PhD qualifying exam requirement; or for research that may lead into a dissertation or Engineer's thesis. Any graduate student may enroll in AA 290 for 1-5 units each quarter; in the summer only, the maximum is 15 units. You may take AA 290 several times, with the same or different faculty members. (Refer to specific degree descriptions for details about how many units of research may be used to satisfy which requirements.) Students may also do research in other departments: check the Bulletin, or ask the faculty member you are working with to see what course number is appropriate for your work.

Students in the Ph.D. program who have passed qualifying exams are eligible to enroll in AA 301, Ph.D. Dissertation, for 1-15 units per quarter. (Before passing quals, enroll in AA 290.) After going TGR, Ph.D. students must enroll in AA 802 TGR Dissertation for 0 units each quarter. Students in the Engineer's degree program enroll in AA 300 Engineer's Thesis for 1-15 units per quarter; after going TGR, enroll in AA 801 TGR Project for 0 units.

**Important:** When you enroll in any research/thesis course, always select the section number which corresponds to the faculty member who will grade you. [AXESS helps you find the faculty member's section number.]

**Units:** Talk with the faculty member before the quarter starts about how many units to sign up for, and clarify the expected work and timetable for the quarter. The first "290" is usually for 3 units, with a projected workload roughly corresponding to a standard class and a research paper due at the end of the quarter. After that, the number of units each quarter varies widely. Students working on their Ph.D. or Engineer's thesis will normally enroll in 1-10 units of thesis each quarter, depending on how many units of courses they are taking. (Since most post-MS students are registered at the 8-10 unit rate, they enroll in enough research units to bring their total enrollment to 10 units each quarter.) TGR students have completed all unit requirements, and enroll for 0 units of TGR.

**Getting started:** If a topic is discussed in one of your courses or there is a research group/lab you would like to explore further, go to the faculty member's office hours to discuss it (or ask for a specific appointment). Do this **before** the quarter you want to begin research. Describe the research area, the problem, or the lecture material which particularly interests you. Ask, "Is there any possibility of working in this area with you? If so, what preparation do you expect/recommend? What should I do next?" Often, the suggested pattern will be:

1. Start attending research group meetings (by invitation only);
2. Discuss, and then do a 3-unit directed research project (AA 290);
3. If this works out well, discuss future research for units and/or for RA pay.

When asking to "do some research," students should be clear about their expectations. For instance, are you asking for short-term research, or for long-term possibilities (Ph.D. or Engineer thesis)? Are you interested in units only, or (eventually) in a paid RA position? Is this research going to be part of your Ph.D. Quals requirements? Faculty will have different projects, different time constraints, and different advice, for a student who wants one quarter of research experience before going to industry than for someone who is interested in four or five years of funded research leading to a dissertation. Also, it is perfectly okay to talk to several different faculty about various research options; just let them know you are "exploring".

### **Residency Requirements (Units per Degree)**

Each type of graduate degree offered at Stanford (e.g., M.S., Ph.D.) has a residency requirement, stated as a number of academic units required for the degree. Residency units refer to the number of units completed at Stanford plus transfer residency units (see below).

For a Master's degree, a student must have at least 45 units; for an Engineer's degree, 90 units; for a Ph.D., 135 units. Engineer's degree and Ph.D. students who complete the residency requirements may qualify for reduced tuition while working on the thesis; see the section on TGR for details.

### **Transferring Residency**

As noted above, students who receive their M.S. at Stanford must have completed at least 45 units; these are included in the residency unit total required for a (related) Ph.D. or Engineer's degree. Therefore, their Ph.D. residency requirement of 135 units is effectively 90 units in addition to the M.S.; the Engineer is 45 units in addition to the M.S.

Students who received their M.S. elsewhere may transfer up to 45 units of residency for that graduate work, which in essence makes them "even" with Stanford's M.S. students. Using an Application for Graduation Residency Credit form:

- Students list the courses taken elsewhere as a graduate student.
- Stanford allows 12 units of transferred residency for thesis work or for courses without Stanford equivalent. For anything over 12 units, the student must list a (roughly) equivalent, graduate-level course which is taught at Stanford but which the student did not take here. Advisor validates the (rough) equivalence.
- Advisor and student services administrator sign the form; the Graduate Degree Progress office reviews it and officially grants residency credit.

These courses and units do not appear on any Stanford transcript. Moreover, they do not count toward the Engineer's or Ph.D. degree course requirements, just as Stanford courses used to satisfy M.S. requirements cannot also be used to satisfy Engineer or Ph.D. requirements. They are used solely to satisfy residency requirements.

**When to file:** This form may be filed when the student applies for candidacy, or later. **Engineer's** degree students must first complete one quarter at Stanford; **Ph.D.** students must first pass the qualifying exam. **MS students** cannot transfer units from elsewhere, because the 45 units of residency required for the M.S. must all be Stanford units.

### **Changes of Degree Level and/or Department**

A multi-purpose online form/petition entitled "Graduate Program Authorization Petition" is used to apply for changes in department or degree level. If you were admitted to study for the M.S. degree and decide to continue in an Engineer or Ph.D. program, you must have this petition fully approved in the quarter prior to receiving your M.S., or else AXESS won't let you stay as a student. If you were admitted to study towards the Ph.D. and do not pass the Qualifying Exam, you must use it to change to the degree program you decide to pursue. In either case, the petition should be submitted online through AXESS at the beginning of the last quarter of the previous degree.

This petition is also used to apply to transfer to another department. Other departments generally require your current department's approval before they will review your file for admission or transfer; the online form will be routed to the Aero/Astro Student Services Office for approval.

International students will also need the approval of Bechtel International Center before changing or adding degrees. This can take time; please start early in the quarter.

### **Completing a Degree**

Stanford University officially confers degrees each academic quarter. In order to receive his/her degree, a student must officially apply to graduate before the degree conferral application deadline - see AXESS for details. (To ensure that a diploma will be ready by the June Commencement ceremony, students must apply to graduate by early April.) In addition to applying to graduate, a student must be sure that all degree requirements have been met before the end of the final quarter: this includes filing a revised program proposal or candidacy form, having all Incompletes officially changed to passing grades, etc. Come to the Aero/Astro Student Services Office early in your final quarter to review your records and be sure you meet all graduation requirements.

Degrees are conferred during the first week of the next quarter (except spring, when degrees are conferred on Commencement Sunday). The conferred degree and date of conferral will then appear on transcripts. Students who have no outstanding Stanford obligations (financial or academic) may obtain an official "certificate of completion" from the Registrar's Office after degree conferral (submit request via AXESS).

Diplomas are distributed once a year at the June Commencement. In addition, diplomas for graduate degrees are available for pickup or by mail. Indicate your preference on AXESS when you apply to graduate. At the annual Commencement ceremonies each June, the University and the Department honor all degree recipients for the past year. Several days of events culminate in a University-wide conferral ceremony, followed by the Department's awards ceremony, at which diplomas and awards are distributed, and our reception for graduates and their families. Students should look for details about these ceremonies, caps and gowns, etc. early in spring.

#### **The next step:**

Students who will continue at Stanford after receiving an advanced degree must officially change their "degree level" before registering for the next quarter (see above).

Graduates who are moving on to jobs or other graduate work are encouraged to keep in touch, not only with the department but also with Stanford Career Education (BEAM) and the Alumni Association. Your career path will be of interest to students wondering about their own futures, as well as to the faculty and staff in Aero/Astro.

**Note:** Non-U.S. citizens who want to preserve their ability to work in the U.S. should consult with the Bechtel International Center about visa paperwork requirements several months before graduation.

## Mathematics Requirements in Aero/Astro

Each Aero/Astro degree has a math requirement, for which courses on the following list are pre-approved. (Other advanced courses may also be acceptable.) Students should consult with their advisors in selecting the most appropriate classes for their field. M.S. and Engineer candidates select 2 courses (at least 6 units). Ph.D. candidates select 3 courses, with at least 6 units from courses numbered above 200. **Note:** Courses with the same "footnote" cannot be combined, e.g., both Math 113 (\*) and ME 300A (\*)

<u>Course Number</u>	<u>Course Name</u>	<u>Unit Count</u>
AA 203	Introduction to Optimal Control and Dynamic Optimization	3
AA 212	Advanced Feedback Control Design	3
AA 214A (CME 207)	Introduction to Numerical Methods for Engineering	3
AA 214B	Numerical Methods for Compressible Flows	3
AA 214C	Numerical Computation of Viscous Flow	3
AA 215A (CME 215A)	Advanced Computational Fluid Dynamics	3
AA 215B (CME 215B)	Advanced Computational Fluid Dynamics	3
AA 218	Introduction to Symmetry Analysis	3
AA 222	Introduction to Multidisciplinary Design Optimization	3 - 4
AA 228 (CS 238)	Decision Making under Uncertainty	3 - 4
AA 229 (CS 239)	Advanced Topics in Sequential Decision Making	3 - 4
AA 242B (ME 242B)	Mechanical Vibrations	3
CEE 281	Mechanics and Finite Elements	3
CME 108 (MATH 114)	Introduction to Scientific Computing	3 - 4
CME 302	Numerical Linear Algebra	3
CME 303 (MATH 220)	Partial Differential Equations of Applied Mathematics	3
CME 306 (MATH 226)	Numerical Solution of Partial Differential Equations	3
CME 307 (MS&E311)	Optimization	3
CME 308 (MATH 228)	Stochastic Methods in Engineering	3
CME 326	Numerical Methods for Initial Boundary Value Problems	3
CS 221	Artificial Intelligence: Principles and Techniques	3 - 4
CS 229	Machine Learning	3 - 4
EE 261	Fourier Transform and its Applications	3
EE 263	Introduction to Linear Dynamical Systems	3
EE 264	Digital Signal Processing	3 - 4
EE 266 (MS&E 251)	Stochastic Control	3
EE 278	Introduction to Statistical Signal Processing	3
EE 364A	Convex Optimization	3
ENGR 207B	Linear Control Systems II	3
ENGR 209A	Analysis and Control of Nonlinear Systems	3
MS&E 201	Dynamic Systems	3 - 4
MS&E 211	Linear and Nonlinear Optimization	3 - 4
MS&E 221	Stochastic Modeling	3
MS&E 311	Optimization	3
MS&E 312 (CME 334)	Advanced Methods in Numerical Optimization	3
MS&E 351	Dynamic Programming and Stochastic Control	3
* MATH 113	Linear Algebra and Matrix Theory	3
MATH 115	Functions of a Real Variable	3
MATH 120	Groups and Rings	3
# MATH 132	Partial Differential Equations II	3
MATH 2xx	All Math courses over 200 will qualify (except seminars)	
* ME 300A (CME 200)	Linear Algebra with Application to Engineering Computations	3
# ME 300B (CME 204)	Partial Differential Equations in Engineering	3
ME 300C (CME 206, AA 214A)	Introduction to Numerical Methods for Engineering	3
ME 335A	Finite Element Analysis	3
ME 335B	Finite Element Analysis	3
ME 335C	Finite Element Analysis	3
ME 408 (CME 322)	Spectral Methods in Computational Physics	3
ME 469	Computational Methods in Fluid Mechanics	3
ME 469B	Computational Methods in Fluid Mechanics	3
PHYSICS 211	Continuum Mechanics	3
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4 - 5
STATS 116	Theory of Probability (not recommended as Ph.D. math - take 110)	3 - 5
STATS 217	Introduction to Stochastic Processes	2 - 3

## **Non-Aero/Astro Common Electives**

The courses listed below are provided for reference only. Along with the Aero/Astro Student Advisory Committee, the department has compiled a list of non-Aero/Astro courses that are more frequently taken to meet the technical elective requirements for the MS, ENGR, and PhD programs. Please note that this list does not include courses already listed on the Mathematics and Design/Experimentation lists. Please review those lists as well. All technical electives, as well as the overall program, must be approved by your advisor and the Aero/Astro Candidacy Chair.

<b><u>Course Number</u></b>	<b><u>Course Name</u></b>	<b><u>Unit Count</u></b>
CME 211 (EARTHSCI 211)	Introduction to Programming for Scientists and Engineers	3
CME 212 (ENERGY 212)	Advanced Programming for Scientists and Engineers	3
CS 106X (ENGR 70X)	Programming Abstractions (Accelerated)	3 - 5
CS 223A (ME320)	Introduction to Robotics	3
EE 212	Integrated Circuit Fabrication Processes	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 368 (CS232)	Digital Image Processing	3
ENGR 240	Introduction to Micro and Nano Electromechanical Systems	3
ME 203	Design and Manufacturing	4
ME 210 (EE118)	Introduction to Mechatronics	4
ME 317 A	Design Methods: Product Definition	4
ME 317 B	Design Methods: Quality by Design	4
ME 333	Mechanics	3
ME 333A	Mechanics - Fundamentals and Lagrangian Mechanics	3
ME 333B	Mechanics - Elasticity and Inelasticity	3
ME 333C	Mechanics - Continuum Mechanics	3
ME 361	Turbulence	3
ME 362A	Physical Gas Dynamics	3
ME 371	Combustion Fundamentals	3
ME 372	Combustion Applications	3
ME 470	Uncertainty Quantification	3
PHYSICS 216	Back of the Envelope Physics	3

## **Common Seminar Courses**

AA 294	Case Studies in Aircraft Design	1
AA 295	Aerospace Structures and Materials	1
CEE 272T	SmartGrids and Advanced Power Systems Seminar	1 - 2
CEE 301 (ENERGY 301)	The Energy Seminar	1
CME 500	Departmental Seminar	1
CME 510	Linear Algebra and Optimization Seminar	1
CS 545	Information and Data Analytics Seminar	1
EE 203	The Entrepreneurial Engineer	1
EE 292I	Insanely Great Products: How do they get built?	1
ENGR 298	Seminar in Fluid Mechanics	1
ENGR 311A	Women's Perspectives	1
ENGR 313	Topics and Engineering and Science Education	1 - 2
ME 395	Seminar in Solid Mechanics	1
ME 495A	ME Seminar Series: Product Design	1
MS&E 279A	Entrepreneurial Leadership	1
MS&E 279B	Entrepreneurial Leadership	1
MS&E 472	Entrepreneurial Thought Leaders' Seminar	1

# MASTER OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS

## Course Requirements

The Master's degree program requires 45 units of course work, all of which must be completed at Stanford. The course work is divided into 4 categories: Basic Courses, Mathematics Courses, Technical Electives and Other Electives.

### Basic courses

M.S. candidates must select **eight** courses as follows:

(I) **Five** courses in the basic areas of Aeronautics and Astronautics (one each):

Area	Courses (Choose one each from all five areas)
Fluids	AA 200 (Applied Aerodynamics) AA 210 (Fund. Of Compressible Flow)
Structures	AA 240 (Analysis of Structures)
Guidance/Control	ENGR 105 (Feedback Control Design) ENGR 205 (Intro to Control Design)
Propulsion	AA 283 (Aircraft and Rocket Propulsion)
Experimentation/Design	See next page for requirements and course list

(II) Three courses, one each from **three** of the areas below:

Area	Courses (Choose one each from three different areas)
Fluids	AA 200 (Applied Aerodynamics) AA 210 (Fund. Of Compressible Flow) AA 244A (Intro. To Plasma Physics and Engineering)
Structures	AA 240B (Analysis of Structures) AA 242B (Mechanical Vibrations) AA 256 (Mechanics of Composites) AA 280 (Smart Structures)
Dynamics/Control	AA 242A (Classical Dynamics) AA 242B (Mechanical Vibrations) AA 251 (Intro to the Space Environment) AA 271 (Dynamics and Control of Spacecraft and Aircraft) AA 272C (Global Positioning Systems) AA 279A (Space Mechanics)
Other	One course selected from AA courses numbered 200 and above, excluding seminars and independent research)

Students who believe they have satisfied Basic Course requirements previously may request a waiver of one or more courses (see "Waivers and Transfer Credits" below).

## Mathematics Courses

M.S. candidates are expected to exhibit competence in applied mathematics. Students meet this requirement by taking two courses - a minimum of six units – of either advanced mathematics offered by the Mathematics department or technical electives which strongly emphasize methods of applied mathematics. Approved mathematics courses offered by the Aero/Astro department include:

- AA 212 Advanced Feedback Control Design
- AA 214A/CME 207 Intro to Numerical Methods for Engineering
- AA 214B Numerical Methods for Compressible Flows
- AA 214C Numerical Computation of Viscous Flow
- AA 215A/CME 215A Advanced Computational Fluid Dynamics
- AA 218 Intro to Symmetry Analysis
- AA 222 Intro to Multidisciplinary Design Optimization
- AA 228/CS 238 Decision Making under Uncertainty
- AA 229/CS 239 Advanced Topics in Sequential Decision Making

The list of Mathematics courses on the previous page has additional suggestions. In order to use applied mathematics courses not on the list to fulfill this requirement, prior approval should be obtained from the student's advisor. (Note: Calculus, ordinary differential equations, and vector analysis are fundamental math prerequisites and will not satisfy the mathematics requirement; they may be counted only as a free elective.)

## Technical Electives

Students, in consultation with their advisor, select at least four courses (totaling at least 12 units) from among the graduate-level courses offered by departments of the School of Engineering and related science departments. This requirement increases by one course [3 units] for each basic course requirement which is waived. Up to three seminar units may count toward a technical elective requirement (equivalent to one technical elective course).

## Other Electives

It is recommended that all candidates enroll in a humanities or social sciences course to complete the 45-unit requirement. Courses fulfilling this requirement may be taken as credit/no credit. Practicing courses in art, music, dance and physical education do not qualify in the free elective section. Language courses may qualify.



## Experimentation/Design Requirements

M.S. candidates must take a minimum of 3 units of course work that include an experimental/design component, for which courses on the following list are pre-approved. Students should consult with their advisors in selecting the most appropriate classes for their field.

<u>Course Number</u>	<u>Course Name</u>	<u>Unit Count</u>
AA 236A	Spacecraft Design	3 - 5
AA 236B	Spacecraft Design Laboratory	3 - 5
AA 236C	Spacecraft Design Laboratory	3 - 5
AA 241X	Design, Construction, and Testing of Autonomous Aircraft	3
AA 257	Design of Multifunctional Composite Structures	3
AA 284B	Propulsion System Design Laboratory	3
AA 284C	Propulsion System Design Laboratory	3
CS 225A	Experimental Robotics	3
CS 402 (EDUC 211X)	Beyond Bits and Atoms- Lab	3 - 4
EE 233/133	Analog Communications Design Laboratory	3 - 4
EE 234	Photonics Laboratory	3
EE 251	High-Frequency Circuit Design Laboratory	3
EE 312	Integrated Circuit Fabrication Laboratory	3 - 4
ENGR 206	Control System Design	3 - 4
ENGR 207A	Linear Control Systems I	3
ENGR 341	Micro/Nano Systems Design and Fabrication	3 - 5
MATSCI 160	Nanomaterials Laboratory	4
MATSCI 164	Electronic and Photonic Materials and Devices Laboratory	3 - 4
MATSCI 171/161	Nanocharacterization Laboratory	3 - 4
MATSCI 172/162	X-Ray Diffraction Laboratory	3 - 4
MATSCI 173/163	Mechanical Behavior Laboratory	3
MATSCI 322	Transmission Electron Microscopy Laboratory	3
ME 210	Introduction to Mechatronics	4
ME 218A	Smart Product Design Fundamentals	4 - 5
ME 218B	Smart Product Design Applications	4 - 5
ME 218C	Smart Product Design Practice	4 - 5
ME 218D	Smart Product Design: Projects	3 - 4
ME 220	Introduction to Sensors	3 - 4
ME 310A	Project-Based Engineering Design, Innovation, and Development	4
ME 310B	Project-Based Engineering Design, Innovation, and Development	4
ME 310C	Project-Based Engineering Design, Innovation, and Development	4
ME 324	Precision Engineering	4
ME 348	Experimental Stress Analysis	3
ME 354	Experimental Methods in Fluid Mechanics	4
ME 367	Optical Diagnostics and Spectroscopy Laboratory	4

**Notes:** If you fulfill your Experimentation/Design requirement with a course other than AA 290 (or equivalent independent research study from another department), it is possible to count AA 290 as a technical or free elective. All courses other than seminars and your free elective must be taken for a letter grade.

## **Waivers of Requirements**

**Waivers** of the Basic Courses required in the M.S. program can only be granted by the instructor of that course. Students who believe that they have had a substantially equivalent course at another institution should consult with the course instructor to determine if they are eligible for a waiver, and with their advisor to judge the effect on their overall program plans. To officially request a waiver, students should fill out a Petition for Waiver form (reverse side of the department's Program Proposal) and have it approved by the instructor and their advisor. One additional technical elective must be added for each Basic Course which is waived. Students taking Aero/Astro qualifying exams are strongly encouraged to take specific classes (described in "Ph.D. Qualifying Procedures in Aero/Astro"), and should consult with their advisor before waiving courses.

## **Program Proposal for Master's Degree**

Each Master's student must submit a "Master's Program Proposal" by the last day of classes in your first quarter of study. It must be signed by your advisor, then submitted to the Aero/Astro Student Services Office for the Candidacy Chair's approval signature. This first submission is intended as a planning document to ensure that the student has identified at least one plan of study which meets all department and University requirements, and also fits the student's own abilities and interests. Recommended timing: discuss several versions of this overall plan with your advisor when choosing classes for the first quarter; then schedule an appointment for just after midterms to work out a detailed course plan for future quarters and file an official Program Proposal for department review and approval.

Any changes to this program of study should be made in consultation with your advisor. Such changes may be made more than once, but the final program proposal must be filed early in the quarter in which your degree is to be conferred. The changed program of study should be summarized on a Program Proposal marked "Revised," signed by your advisor and submitted to the Aero/Astro Student Services Office for the Candidacy Chair's approval signature. The M.S. degree cannot be conferred unless the student has successfully completed all courses on the (most recent) fully approved Program Proposal.

A sample is shown below for reference only. Note that this student could petition for a reduced tuition quarter for winter of year 2 (conferral quarter), or enroll in courses not contributing to the completion of the MS. International students should consult with the Bechtel International Center, but typically must be enrolled in at least 8 units per quarter to maintain legal status.

# AERO/ASTRO MASTER'S PROGRAM PROPOSAL

Name: \_\_\_\_\_ SUID#: \_\_\_\_\_ New [ ] Revised [ ]  
(Last) (First)

Email: \_\_\_\_\_

45 units completed at Stanford

All courses other than seminars & free elective must be taken for a letter grade. Courses cannot be counted toward any other Stanford degree. You must apply to graduate. To file your application through AXESS: Select "Apply to Graduate" from the drop down menu on the Student Center Academics tab and complete the entire application to graduate process. Consult the Office of the University Registrar page for deadlines.

Requirement	AUTUMN	WINTER	SPRING	SUMMER
1. Fluids – select 1 course	<b>AA 210A (3)</b>	<b>AA 200 (3)</b>		
2. Structures – select 1 course	<b>AA 240A (3)</b>			
3. Guidance & Controls – select 1 course	ENGR 205 (3)	<b>ENGR 105 (3)</b>	<b>ENGR 105 (3)</b>	
4. Propulsion – select 1 course		AA 283 (3)		
5. Experimentation/Design – select 1 course (See full list of courses in A/A Guide, page 15)	AA 236A (3) AA290 (see reverse)	AA 284B (3) AA290 (see reverse)	AA 241X (3) AA 290 (see reverse)	
<b>3 Courses From:</b>	<b>AUTUMN</b>	<b>WINTER</b>	<b>SPRING</b>	<b>SUMMER</b>
1. Fluids – 1 course	<b>AA 210A (3)</b>	AA 200 (3) AA 244A (3)		
2. Structures – 1 course		<b>AA 240B (3)</b> AA 256 (3)	AA 242B (3) AA 280 (3)	
3. Dynamics / Control – 1 course	<b>AA 242A (3)</b>	AA 279A (3)	AA 242B (3) AA 251 (3) AA 271A (3) AA 272C (3)	
4. AA above 200 – 1 course (examples listed, any AA course over 200 will count)	AA 241A (3) AA 284A (3)	AA 241B (3) AA 250 (3) AA 272D (3) AA 274 (3) AA 277 (3)	AA 201A (3) AA 252 (3) AA 257 (3) AA 273 (3) AA 279B (3) AA 279C	
<b>Mathematics</b>	<b>AUTUMN</b>	<b>WINTER</b>	<b>SPRING</b>	<b>SUMMER</b>
– select 2 courses (See full list of courses in A/A guide, page 12)	AA 212 (3) AA 214A/CME 207 (3) <b>AA 228 (3-4)</b>	AA 214B (3) AA 215A (3) AA 229 (3-4)	<b>AA 203 (3)</b> AA 214C (3) AA 218 (3) <b>AA 222</b> (3) AA 242B (3)	
<b>Technical Elective</b>	<b>AUTUMN</b>	<b>WINTER</b>	<b>SPRING</b>	<b>SUMMER</b>
– at least 4 courses (12 units) – Grad-level courses in Engineering or Physics				
<b>Free Elective</b>	<b>AUTUMN</b>	<b>WINTER</b>	<b>SPRING</b>	<b>SUMMER</b>
– 3 units				
<b>Total Units</b>				

**Courses marked in bold are recommended preparation courses for the Qualification Examination**

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Advisor Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Candidacy Chair: Brian Cantwell Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Experimentation/Design Requirement** is satisfied by: List of courses in AA Guide, page 15; AA 290 with "experimental" content (see below)

<b>Complete this section if using AA 290 (Problems in Aero/Astro) for experimentation requirement</b>	
experimental content:	
instructor name:	instructor's signature:

A maximum of three independent study/research units (AA 290 or independent study in another department) may count toward your MS program. If you fulfill your Experimentation/Design requirement with a course other than AA 290 (or equivalent from another department), it is possible to count AA 290 as a technical or free elective.

**Math requirement:** two graduate-level math or applied-math courses (see AA Guide, page 12, for extended list)

**Technical Electives:** at least 4 courses\*, totaling at least 12 units, plus one course for every core course waiver granted. Should be graduate level courses in engineering or related disciplines & should be taken for a grade (student should not elect the credit/no-credit option for any course except free elective.)

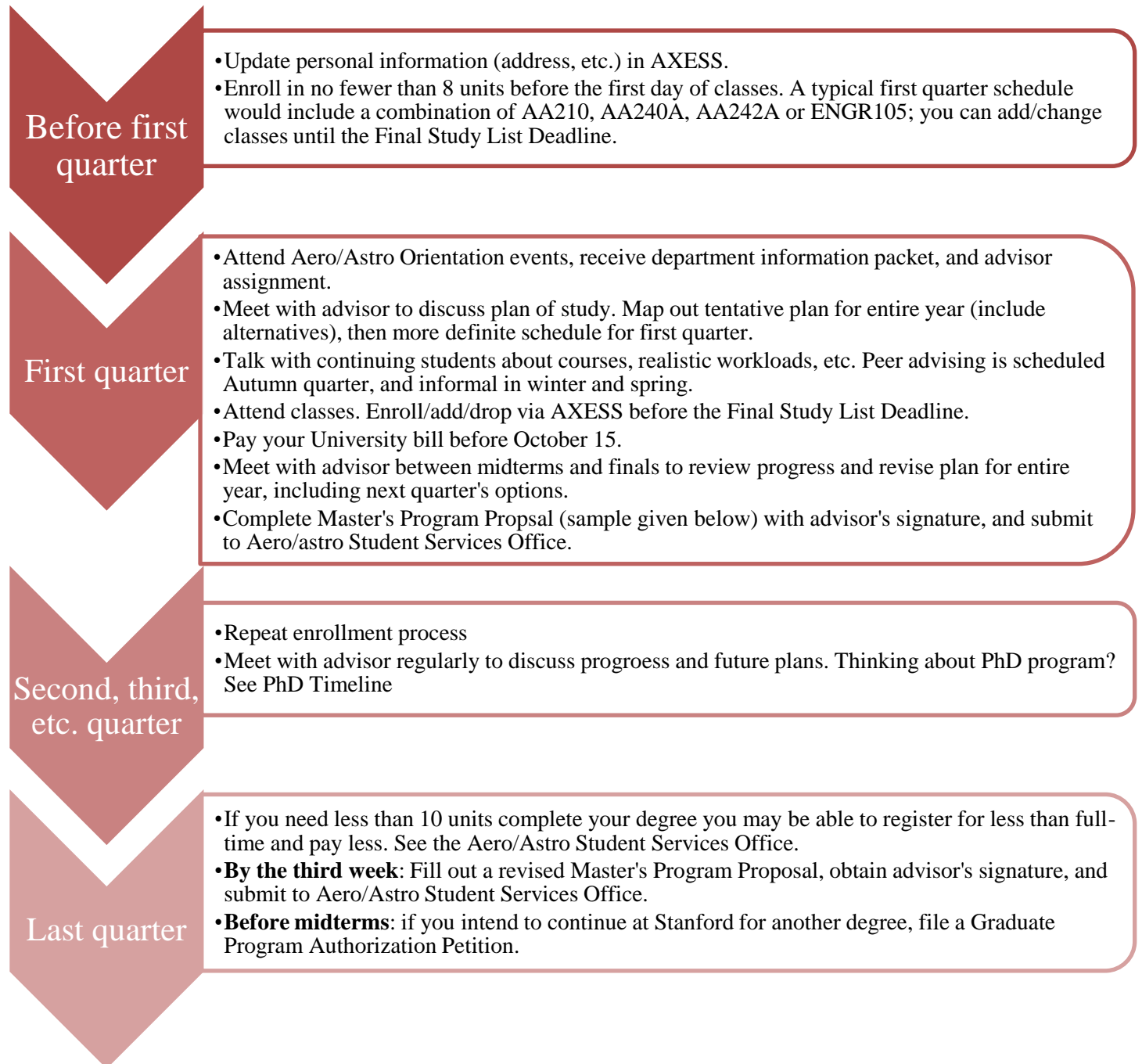
\*Up to three seminar units may count toward your MS program, and will be counted as one technical elective. At least three additional graduate courses offered in Engineering or related math/science departments should be taken to meet the technical elective section requirement.

**Waivers (core courses only)** Note: waivers do not reduce the 45-unit total requirement for MS

I hereby request a waiver for: _____ (Stanford Course #, in A/A Core)	
I believe I have fulfilled the substantial equivalent through the following prior work:	
Course #: _____	Title: _____
School and year: _____	
Supporting documentation (course description, grade, etc) have been reviewed and approved by:	
Instructor Name: _____	Signature: _____ Date: _____
Advisor Name: _____	Signature: _____ Date: _____

I hereby request a waiver for: _____ (Stanford Course #, in A/A Core)	
I believe I have fulfilled the substantial equivalent through the following prior work:	
Course #: _____	Title: _____
School and year: _____	
Supporting documentation (course description, grade, etc) have been reviewed and approved by:	
Instructor Name: _____	Signature: _____ Date: _____
Advisor Name: _____	Signature: _____ Date: _____

## Timeline for an Aero/Astro Master's Student



## Degree Completion

Every student should be familiar with the University's requirements for minimal progress as outlined in the Graduate Academic Policies and Procedures [GAP](#). A minimum grade point average (GPA) of 2.75 is required to fulfill the department's Master's degree requirements, and a minimum GPA of 3.5 is required for eligibility to attempt the Ph.D. qualifying examination. Students must also meet the University's quarterly academic requirements for graduate students, as described in the Bulletin. All courses used to satisfy the Basic Courses, Mathematics and Technical Electives requirements must be taken for a letter grade (excluding seminars).

For midyear degrees, the date of conferral is during the first week of the next quarter. Students who have no outstanding Stanford obligations (financial or academic) may obtain an official "certificate of completion" from the Graduate Degree Progress Office after degree conferral. Diplomas are distributed once a year at Commencement in June. In addition, diplomas for graduate degrees are available for pickup or by mail. Once you have begun study for the Master's, you have three years to complete the degree (five years for Honors Cooperative students). This time is not extended by Leaves of Absence.

Time limits for MS Degree:

- HCP (Honors Cooperative Students): Five years from the first quarter of enrollment in the MS program.
- Co-terminal students: Three years after the quarter in which 180 units are completed.
- All other students: Three years from the first quarter of enrollment in the MS program, or 60 units completed.

## Study after the Master's Degree

Students wishing to continue at Stanford after receiving the M.S. degree must be approved for further study by their last M.S. quarter. In order to continue enrolling, a Graduate Program Authorization petition should be submitted online through AXESS and fully approved before your M.S. is conferred (see Changes of Degree, above). Students who are not citizens or permanent residents of the U.S. will need to verify their funding for the new degree, and update their visa documentation, as part of the Graduate Program Authorization procedure. These forms are available from the Bechtel International Center. Support from research assistantships can be verified by the professor providing support, and the Aero/Astro Student Services Office can verify course assistantships. For personal funding or other support, inquire at Bechtel International Center about the proper forms of verification.

**If you leave Stanford for employment or study at another institution and later wish to return for further degree work, you will need to submit a standard admission application to the department. Check with the Aero/Astro Student Services Office to verify deadlines and required credentials. International students will be subject to visa requirements when they are considered for admission.**

# MASTER OF SCIENCE IN ENGINEERING

The Master of Science in Engineering is available to students who wish to follow an interdisciplinary program of study that does not conform to any existing graduate program in a department. Each such degree program must be approved and administered ("sponsored") by a department within the School of Engineering, meeting department as well as School standards.

Sponsorship by the Aeronautics and Astronautics department requires that the student petition for admission to this program. No more than 18 units used for the proposed program may have been completed previously. The petition should include a statement explaining the objectives of the program, how it is coherent, contains depth, and fulfills a well-defined career objective. It should also include a Master's Program Proposal listing the specific courses to be included in the degree (see Program Proposal, below.) Both documents must be approved by the student's advisor and submitted to the Aero/Astro Student Services Office for approval by the Chairman of the Candidacy Committee. If approved, the actual transfer will be accomplished through the Graduate Authorization Petition process.

## Course Requirements

The School of Engineering requires that the student's program include at least 21 units of courses within the Engineering School with numbers 200 or above, for which a letter grade is received. The proposed program must include at least 12 units of graduate level work in the department of Aeronautics and Astronautics and meet rigorous standards of technical breadth and depth comparable to the regular Aero/Astro Master of Science degree. **Note:** Except in the free elective, students should not elect credit/no-credit grading in a course where letter grades are available.

**Mathematics Courses:** M.S. candidates are expected to exhibit competence in applied mathematics. Students may meet this requirement in the same manner as students pursuing the M.S. in Aeronautics and Astronautics by taking a minimum of six units of advanced mathematics offered by the Mathematics department or courses that strongly emphasize methods of applied mathematics. (Please refer to the Master of Science in Aeronautics and Astronautics section of this Guide for a discussion of courses.)

**Other Electives:** It is recommended that all candidates enroll in a humanities or social sciences course as part of the Master's program of study. Three (3) units of such "free electives" may be included in the 45-unit M.S. program. Practicing courses in, for example, art, music and physical education, do not qualify in this category. Language courses may qualify.

## Program Proposal for Master's Degree

University regulations regarding the Master's Program Proposal are the same as for the M.S. in Aeronautics and Astronautics; departmental procedures and deadlines are also the same. For the M.S. in Engineering, however, the University's standard Program Proposal should be used, and the initial Proposal must be accompanied by a statement describing the degree objectives (as described within sponsorship conditions, above).

Changes to the degree plan should be filed in the same manner as for the M.S. in Aero/Astro; in addition, an amended statement of objectives should also be submitted if the course changes involve a significant change in focus from the original proposal.

## Degree Completion

The length of study, grade and unit requirements, and procedures for conferral of degrees are the same as for the M.S. in Aero/Astro.

# ENGINEER'S DEGREE

The Engineer's degree represents one to two additional years of study beyond the Master's degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded solely by a Master's degree.

Applicants not currently enrolled at Stanford should follow the standard procedures for graduate applications. Current Stanford students who wish to continue or transfer to the Engineer's degree program should submit the following materials to the Aero/Astro Student Services Office several weeks before the end of their current degree program:

- Online Graduate Program Authorization Petition;
- Statement of purpose describing the area of study and topic for thesis research;
- Short letter from an Aero/Astro faculty member, addressing your preparation for the proposed research and their willingness to serve as your academic/research advisor.

Refer to the "Changes of Degree Level or Department" section, above, for more information.

## Course Requirements

Each individual Engineer's Degree program, designed by the student in consultation with the advisor, should represent a strong and cohesive program reflecting the student's major field of interest. Engineer's Degree candidates must complete a minimum of 90 units. Candidates who received their MS from Stanford may count up to 45 units towards the 90-unit total. Students who received an MS degree at another institution may petition (through the university Registrar's Office) to transfer up to 45 units toward the 90-unit requirement.

Of the 45 units required beyond the MS, a student must complete a minimum of 21 units (including 6 units of mathematics) of approved courses in advanced study in engineering, science, and mathematics (excluding research, directed study, and seminars) beyond the MS degree. **These units must be taken for a letter grade, and all courses must be numbered 200 and above. Note: One math course may be taken at the 100 level if approved by the advisor.** Students may register for up to 24 units of Engineer thesis. Units which were applied toward the MS degree cannot be used again. An advisor approved Engineer's Degree course proposal must be submitted when applying for Engineer's Degree candidacy.

**Mathematics Courses:** Engineer's Degree candidates are expected to exhibit competence in applied mathematics. Students meet this requirement by taking two courses - a minimum of six units - of either advanced mathematics offered by the Mathematics department or courses that strongly emphasize methods of applied mathematics. The Aero/Astro Department and the other engineering departments offer many courses that have sufficient mathematical content that they may be used to satisfy the mathematics requirement; a pre-approved list is included in this Guide, but there are many others which may be acceptable. Please consult with your advisor and the Aero/Astro Student Services Office before assuming that a particular course will be accepted in your own program. **Note: One math course may be taken at the 100 level if approved by the advisor.**

## Academic Requirements

Every student should be familiar with the University's requirements for minimal progress as outlined in the Graduate Academic Policies and Procedures [GAP](#). A minimum cumulative grade point average (GPA) of 3.0 is required to fulfill the department's Engineer's Degree, and to maintain satisfactory academic standing in the program. It is incumbent upon the student to request letter grades in all courses listed on the Application for Candidacy form. Students must receive a passing grade, and maintain a minimum GPA of 3.0, on all courses listed on the Candidacy form.



## **Candidacy**

Students in the Engineer degree program must submit an Application for Candidacy no later than the second quarter of Engineer's study, and at least one quarter before graduating. This form indicates the courses and thesis work which the student will be using for the degree. If the research topic cannot be clearly described when this form is filed, the area of research should be described along with a timetable for identifying a thesis topic. Aero/Astro has a department-specific Candidacy form, available in the Aero/Astro Student Services Office.

The Application for Candidacy should be signed by the student's research advisor, and submitted to the Aero/Astro Student Services Office for the Candidacy Chair's approval signature. Neglecting to file for candidacy can prevent you from receiving your degree. Changes to your program of study can be filed at any time by submitting a revised Candidacy form. Obtain your advisor's signature and submit it to the Aero/Astro Student Services Office for Candidacy Chair's approval signature. In order to graduate or go TGR, you must have completed all the units listed on your current Candidacy form.

## **Engineer's Thesis**

For specific information regarding the format and deadlines for submission of theses, please check with the Graduate Degree Progress Office. The department recommends that students follow the format defined in the handbook [Directions for Preparing Doctoral Dissertations](#), available in the Graduate Degree Progress Office. Note: the advisor must sign the thesis before the filing deadline, which is generally the last day of classes during the graduation quarter.

Mid-year degrees are not officially conferred until the first week of the quarter after degree completion, and actual diplomas are distributed at the University's Commencement in June. However, students who have submitted their theses and have no outstanding Stanford obligations (financial or academic) may obtain an official University "certificate of completion" from the Graduate Degree Progress Office after degree conferral.

# Ph.D. IN AERONAUTICS AND ASTRONAUTICS

In order to be admitted to study for the degree of Doctor of Philosophy in Aeronautics and Astronautics, students must have fulfilled the requirements for the Department's Master of Science degree or its substantial equivalent.

Applicants who have received their M.S. from other institutions may apply directly to the Ph.D. program. Students who are currently pursuing the M.S. in our department and wish to continue for the Ph.D. should submit an online Graduate Program Authorization Petition at, or before, the **beginning** of their last quarter in the M.S. program - see Changes of Degree Level, above. Current Stanford students in other degree programs who wish to be considered for admission to the Aero/Astro Ph.D. program will also follow the procedures described in "Changes of Degree Level", above, but will need to submit additional supporting materials; check with the Aero/Astro Student Services Office for details.

## Candidacy

Ph.D. students must complete the candidacy process and be admitted to candidacy by the end of their second year of doctoral study. There are two requirements for admission to Ph.D. candidacy in Aeronautics and Astronautics. Students must:

- Find a research topic (AA 290) and supervisor
- Pass the departmental qualifying exam
- Submit an Application for Candidacy

The candidacy form lists the courses the student will take to fulfill the requirements for the degree. The form must include the 90 non-MS units required for the Ph.D.; it should be signed by the advisor and submitted to the Aero/Astro Student Services Office for the Candidacy Chair's approval signature. Aero/Astro uses a department-specific candidacy form, which may be obtained in the Aero/Astro Student Services Office.

**The Application for Candidacy is due in the Aero/Astro Student Services Office before the end of the quarter in which you pass the Qualifying Examination.** Changes can be filed at any time by submitting a revised Candidacy form: obtain your advisor's signature and submit it to the Aero/Astro Student Services Office for the Candidacy Chair's approval. In order to graduate or go TGR, you must have completed all the units listed on your current Candidacy form.

Candidacy is valid for five years from the date of approval by the department unless terminated by the department (e.g., for unsatisfactory progress). This term is not affected by leaves of absence. The candidacy end date is listed on the student's record in AXESS. Students who are unable to graduate before their five years of candidacy expire may submit an extension request for up to one additional year of candidacy (per request). Extensions require review of a dissertation progress report, a timetable for completion of the dissertation, and any other factors regarded as relevant by the department. Students must file a request for candidacy extension before the end of their program's time limit. The department is not obligated to grant an extension. Please submit any request for extension to the Aero/Astro Student Services Office. Extensions are subject to final approval by the Aero/Astro Department Chair.

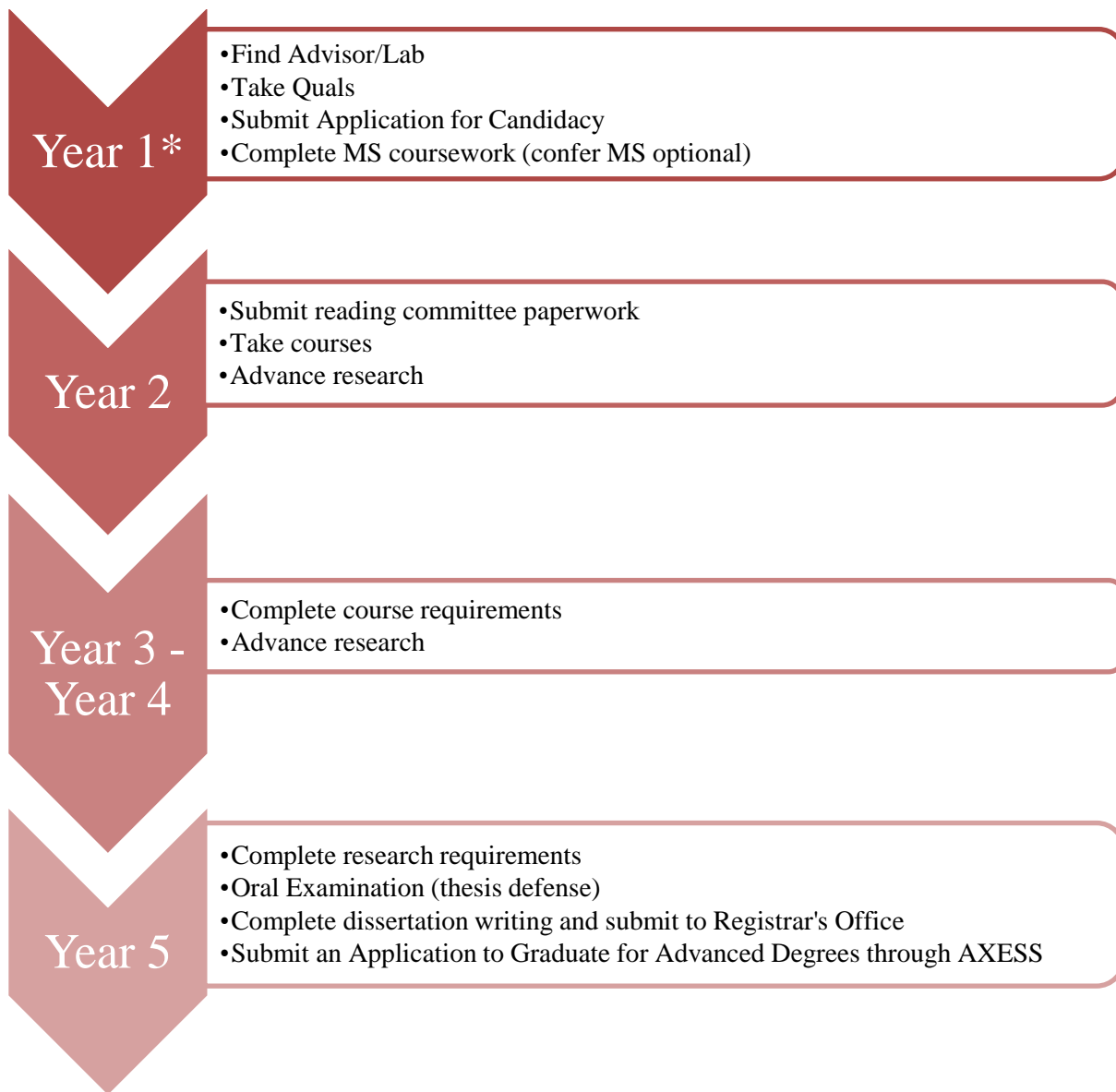
## Ph.D. Requirements and Milestones

In order to meet the requirements of the Ph.D. program, every candidate must meet department and university requirements:

- Form a dissertation reading committee.
- Pass the Oral Examination, in which dissertation results are presented and defended.
- Submit the final dissertation to the university.
- Submit an Application to Graduate for Advanced Degrees through AXESS.

Every student should be familiar with the University's requirements for minimal progress as outlined in the Graduate Academic Policies and Procedures [GAP](#). A minimum cumulative grade point average (GPA) of 3.0 is required to fulfill the department's Ph.D., and to maintain satisfactory academic standing in the program. It is incumbent upon Ph.D. students to request letter grades in all courses listed on the Application for Candidacy form. Students must receive a passing grade, and maintain a minimum GPA of 3.0, on all courses listed on the Candidacy form.

This is a typical timeline for an AA-PhD student. Actual progress may vary.



\*Year 1 is most likely year 2 of the graduate program, with the first year spent on the MS program.

### **Ph.D. Qualifying Procedures in Aero/Astro**

Before beginning dissertation research for the Ph.D. degree, a student must pass the departmental Qualifying Examination (Quals). (Students may be admitted to the Ph.D. program and begin doctoral coursework before taking the Quals) The basis of this examination is a series of oral exams in the general areas of control theory and dynamics; fluids; structures; and applied math and informatics.

#### **Time**

The Aero/Astro Ph.D. Qualifying Examination is given once in the Autumn Quarter and once in the Spring Quarter, usually in the second week of November and May. The exact dates will be announced several weeks before the exam.

## Eligibility

A student must meet the following conditions by the appropriate deadline to be able to take the Qualifying Examination:

- Current enrollment in a graduate program at Stanford University with at least 30 units of Master's coursework completed. A student who has completed fewer than 30 units may petition to take Qualls.
- Stanford graduate GPA of 3.5 or higher.
- Investigation of a research problem, under the direction of a faculty member who will evaluate this work as evidence of the potential for doctoral research. The minimum requirement for taking Qualls is to complete 3 units of AA 290 before the Qualls quarter.

## Application

**All petitions (to waive specific Qualls conditions or to defer the exams) are due prior to the start of the Qualls quarter (deadline announced); they must include advisor signature and appropriate documentation.**

Application forms (including the dates and participating faculty for this exam) are made available early each Qualls quarter and are due approximately two weeks later; the application serves as the basis for exam scheduling. The application must have the signed approval of the student's advisor and research supervisor.

A student in the Aero/Astro M.S. program who wishes to pursue doctoral study must take the Qualifying Examination in the second year. A Ph.D. student who did not study in our M.S. program must take the first available Qualifying Examination after two quarters of study here. Honors Cooperative students who have enrolled at less-than-fulltime for most of their study should take the Qualifying Examination within two years after entering the graduate program.

## Examination Procedures

Examinations are given in the four fields of Dynamics and Controls, Fluids, Structures, and Applied Math and Informatics. Every student is examined in three of these fields: one field for a Major Field Exam and two other fields for Minor Field Exams.

- The Major Field Exam will be a sixty-minute test of knowledge and understanding on topics selected by the committee, based on the student's chosen area, including fifteen minutes devoted to pertinent mathematics. It will be conducted by a committee of four examiners, chaired by either the academic or research advisor. Committee members should be from Aero/Astro faculty participating in the exams, from the field closest to the student's specialty. If the student has done significant research in this area with another faculty member, however, the student may petition to have that professor on the Major Field Exam committee. Also, for Applied Math and Informatics, committee members may be faculty from other departments at Stanford who are specialists in these areas.
- There will be two examinations in each Minor field. Each Minor examiner will conduct a separate 15-minute oral exam. Questions are usually from materials in courses (ENGR 105, AA 242A, AA 200, AA 210A, AA 240A, AA 240B, courses listed under Applied Math and Informatics), or their equivalent at other universities, but may cover fundamentals from earlier (undergraduate) courses as well. Examinations are not intended to evaluate course work, but focus on general understanding, aptitude, and assimilation of knowledge. Minor examiners are to be chosen from the faculty participating in the exams in each field.
- The Qualifying Exam includes a thirty-minute research examination consisting of a twenty-minute presentation and ten minutes of questions and answers. The research presentation committee will be selected from your major exam area, and will include at least three Aero/Astro faculty members, counting the advisor. We will sometimes also reach out to other Stanford departments for additional examiners. The content of the presentation should be based on a minimum of 3 units of completed AA 290 work, focus on what the student has done, and demonstrate an understanding of how to approach a research problem.

You should consider the following outline when preparing your Qualifying Examination research presentation:

1. What is the research problem? Why is it hard? Who does it impact?
2. How is it solved today? What are the limits of current practice?
3. What is the new technical idea? Why we can succeed now?
4. Are there others dedicated to finding a solution to the problem?
5. What is the impact if successful?

General advice for Qualls research:

- Be sure that the faculty member understands you are doing **Qualls research** - the type of project and level of interaction may differ from a simple "let me try this field" AA 290.
- If the supervising faculty member is not in the Aero/Astro Department, you should consult in advance with the Aero/Astro Student Services Office and your Aero/Astro advisor to ensure that this research will meet the Qualls requirement.

## Recommended Courses to Prepare for the Qualifying Exams

### 1. Controls and Dynamics

ENGR 105: Feedback Control Design  
AA 242A: Classical Dynamics

### 2. Fluids

AA 200: Applied Aerodynamics  
AA 210A: Fundamentals of Compressible Flow

### 3. Structures

AA 240A: Analysis of Structures  
AA 240B: Analysis of Structures

### 4. Applied Math and Informatics

Students can choose one sub-area in this field as a choice for a Major or Minor Field Exam. The exam will be based on two non-overlapping courses selected from a sub-area below. Additional courses in any sub-area may be proposed with advisor consent, and will be reviewed for approval by the Candidacy Chair.

- a. Mathematics of Continuous Systems
  - CME 204: PDEs in Engineering (ME 300B)
  - CME 303: PDEs of Applied Mathematics (MATH 220)
  - EE 261: The Fourier Transform and Its Applications
- b. Linear Algebra and Numerical Methods
  - EE 263: Intro to Linear Dynamical Systems (CME 263)
  - CME 200: Linear Algebra with Application to Engineering Computations (ME 300A)
  - CME 302: Numerical Linear Algebra
  - CME 306: Numerical Solution of PDEs
- c. AI / Machine Learning
  - AA 228 : Decision Making under Uncertainty (CS 238)
  - CS 221: Artificial Intelligence: Principles and Techniques
  - CS 229: Machine Learning
- d. Stochastic Processes & Control
  - MS&E 221: Stochastic Modeling
  - CME 308: Stochastic Methods in Engineering (MATH 228)
  - EE 278A: Intro to Statistical Signal Processing
  - ENGR 207B: Linear Control Systems II
  - MS&E 251: Stochastic Control
- e. Optimization
  - AA 203: Intro to Optimal Control and Dynamic Optimization
  - AA 222: Intro to Multidisciplinary Optimization

## Qualifying Decision

Following the Qualifying Examination, the results will be discussed by the department faculty in a closed meeting. In addition to performance on the examination, the student's research potential and academic performance are considered. **FINAL DECISIONS WILL BE RELAYED TO THE STUDENT BY THE ADVISOR.** The actual decision on the qualification of each student for the Ph.D. program is based on the student's:

- Ability to assimilate knowledge.
- Aptitude for independent thought.
- Fundamental understanding of the basic principles.
- Potential to conduct research.

## After the Exams

A student who **passes** the Qualifying Examination must file for candidacy before the end of the quarter; doctoral candidacy is valid for five calendar years.

A student who **fails to qualify** may remain in (or be admitted to) the Ph.D. program only if he or she passes the next available Qualifying Examination. The Qualifying Examination may not be taken more than twice. A student who fails to qualify after two attempts may remain in the AA-PhD program for one additional quarter. After this additional quarter, a student will be formally dismissed from the PhD program by the Aero/Astro Faculty Committee. In this quarter, the department will not approve a leave of absence or any form of reduced tuition.

If a student elects to formally enter the Engineer degree, they must discontinue the PhD at the same time they add the Engineer degree via the Graduate Program Authorization Petition.

## Course Requirements

Each individual Ph.D. program, designed by the student in consultation with the advisor, should represent a strong and cohesive program reflecting the student's major field of interest. Ph.D. candidates must complete a minimum of 135 units. Ph.D. candidates who received their MS from Stanford may count up to 45 units towards the 135-unit total. Students who received an MS degree at another institution may petition (through the university Registrar's Office) to transfer up to 45 units toward the 135-unit requirement.

Of the 90 units required beyond the MS, a student must complete a minimum of 27 units (including 9 units of mathematics) of approved courses in advanced study in engineering, science, and mathematics (excluding research, directed study, and seminars) beyond the MS degree. **These units must be taken for a letter grade, and all courses must be numbered 200 and above. Note: One math course may be taken at the 100 level if approved by the advisor.** The remainder of the 90 units may be in the form of either Ph.D. dissertation units or free electives. Units which were applied toward the M.S. degree cannot be used again. An advisor approved Ph.D. course proposal must be submitted when applying for Ph.D. candidacy.

## Mathematics

Ph.D. students in Aeronautics and Astronautics must take 3 mathematics courses (a minimum of 9 units), with at least 6 units from courses numbered above 200. The Aero/Astro Department and the other engineering departments offer many courses that have sufficient mathematical content that they may be used to satisfy the mathematics requirement; a pre-approved list is included in this Guide, but there are many others which may be acceptable. Please consult with your advisor and the Aero/Astro Student Services Office before assuming that a particular course will be accepted in your own program.

## Ph.D. Minor

If choosing to take a Ph.D. **minor** in another department, a maximum of 9 units from the minor program may be included in the 27 units of formal coursework; the remaining minor units may be considered free electives, and included within the 90-unit total (beyond the MS) required for the Aero/Astro Ph.D.

### Dissertation Reading Committee

Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. Qualifying Examination. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

A Dissertation Reading Committee consists of the principal dissertation advisor and at least two other readers. If the principal advisor is emeritus, there should be a non-emeritus co-advisor. If the principal research advisor is not within the Aero/Astro Department, then the student's Aero/Astro academic advisor should also be a member of the reading committee. It is expected that at least two members of the Aero/Astro faculty will be on the reading committee.

Although all readers are usually members of the Stanford Academic Council, the department Chair may approve one non-Academic Council reader if the person brings unusual and necessary expertise to the dissertation research. Generally, this non-Academic Council reader will be a fourth reader, in addition to three Academic Council members.

The student must submit a Doctoral Dissertation Reading Committee form, signed by each of the readers, to the Aero/Astro Student Services Office for approval by the Department Chair. Approval of a non-Academic Council reader requires submission of an additional petition. Any changes to the committee must be submitted to the Aero/Astro Student Services Office for approval by the Department Chair prior to submission of the dissertation. [The "Change of Advisor or Reading Committee" form requires the signature of anyone who is added to the committee; advisors/readers who signed the original form do not need to sign again.]

### University Oral Examination

Each Ph.D. candidate is required to take the University Oral Examination after the dissertation is substantially completed (with dissertation draft in writing) but before final approval of the dissertation. The examination consists of a public presentation of dissertation research, often during a seminar, followed by substantive private questioning on the dissertation and related fields by the University Orals Committee. This Committee is comprised of four faculty examiners plus a chairman. Once the oral examination has been passed, the student finalizes the thesis for reading committee review and final approval.

The coordination of this exam is the responsibility of the department (primarily the student and advisor). The Registrar review but does not participate in the examination. Forms for the University Orals Scheduling are available in the Aero/Astro Student Services Office. These forms must be submitted with a thesis abstract to the Aero/Astro Student Services Office at least three weeks prior to the date arranged for the oral. Note: Students must be enrolled during the quarter when they take their University Orals. If the orals take place during the break time between quarters, the student must be enrolled in the prior quarter.

A portion of the oral examination may take the form of a public seminar, but a period of private questioning by the official examining committee must be included. The examination should be conducted according to the major department's stated practice, although it should not exceed three hours in length. **A typical exam in Aero/Astro is expected to take three hours.** At the conclusion of the examination the candidate should be asked to leave so that the committee can confer in private. At the conclusion of the examination, a vote is taken and the chair tallies the votes of the members.

## Procedures for Scheduling University Oral Examinations

- Register for the quarter in which you will be taking your Orals.
- Check your Reading Committee (you can see this on AXESS): If the committee who signed on the form when you submitted your Doctoral Dissertation Reading Committee form is no longer appropriate, inquire at the Aero/Astro Student Services Office about how to obtain official approval for any changes. (Use a “Change of Advisor or Reading Committee” form.)
- Identify your Orals committee
  - **Four examiners:** normally your reading committee plus one other faculty member, although readers are not required to be members (for instance, in case of scheduling conflicts). At least one examiner must be from your major department; Aero/Astro expects that two or, more likely, three members will be from among our faculty. Check with your minor department for their rules as to representation. At least three examiners must be members of the Academic Council (i.e., a Stanford Professor, Associate Professor, or Assistant Professor - not Consulting or Visiting). A non-Academic Council member requires a Petition for Doctoral Committee Members (unless already approved for your Reading Committee).
  - **Committee chair:** must be a member of the Academic Council (see above) or an emeritus member. Must not hold an appointment in the same department as you or your advisor (this includes joint appointments, but does not include courtesy appointments). Should not be a member of the reading committee. The chair is an "impartial representative of the University" in the exam; although s/he does vote, s/he need not be expert in your field. If you are having difficulty identifying a chair, ask your advisor or fellow students for suggestions. If you decide on a chair from a very distant field (e.g., History or Music), I suggest you alert your advisor before the exam!
- Schedule a room: for participation in a public seminar, ask the Aero Astro Office (Durand 202)
- Submit to Aero/Astro Student Services Office three weeks in advance- for the Department Chair's review and signature:
  - University Oral Examination Schedule Form (if you have a minor, obtain minor department chair signature)
  - Dissertation abstract (for the committee chair)
  - Petition for Doctoral Committee Members, if required (with curriculum vitae if they are not visiting faculty or on the Stanford academic staff.)
- Deliver to Committee Chair - About three days before the oral, pick up the information packet for your committee chair from the Aero/Astro Student Services Office, and hand-deliver it. This serves two purposes: it delivers necessary paperwork, and it reminds the chair of the exam date and time. Optional: you can make copies of the Schedule form to give to the examiners as a reminder, if you choose - and of course, you can read the information packet yourself, to learn the details of exam procedure, voting, etc.

## Doctoral Dissertation

Please refer to the [Directions for Preparing Doctoral Dissertations](#), which outlines the University guidelines for preparing a PhD dissertation. When you are ready for a final draft of your dissertation, make an appointment to consult with the Graduate Degree Progress officer to go over a review of the completion of your PhD program and the strict formatting requirements for the dissertation. Submit the final version of your dissertation to the GDP no later than the posted deadline. Note: All members of the Reading Committee must sign the dissertation before the filing deadline.

Mid-year degrees are not officially conferred until the first week of the quarter after degree completion, and actual diplomas are printed only once a year for distribution at the University's Commencement in June. However, students who have submitted the dissertation and have no outstanding Stanford obligations (financial or academic) may obtain an official University "certificate of completion" from the Graduate Degree Progress Office after degree conferral.



Note: Students may be eligible to petition for a Graduation Quarter during the quarter they plan to submit the dissertation. For details, contact the Aero/Astro Student Services Office. International students should consult carefully with the International Center before selecting specialized registration status because their visas may prohibit it.

## RESEARCH AND COURSE ASSISTANTSHIPS (RAs and CAs)

Research and Course/Teaching Assistantships are paid positions available to Stanford students who are registered and making satisfactory progress in a graduate degree program.

**Research Assistants** are selected and paid by individual faculty members. During the academic year, assistantship appointments may not exceed 50% FTE (20 hours/week); most Aero/Astro RAs are hired at 50%. Salaries are set according to department standards, within limits set by the University and School. Generally, salaries are highest for students who have passed the Qualifying Exams, and lowest for those who have not received the M.S. degree.

When Aero/Astro faculty members agree to pay a student as a research assistant, the faculty and student fill out an Engineering Research Administration RA Appointment form. This form specifies the salary, hours per week, and grant/contract which will pay for the work; it also clarifies the terms and conditions of the RA pay. The student should submit this signed form to the Aero/Astro Student Services Office before the start of each quarter; late forms will result in late pay and possibly loss of the health subsidy!

**Course Assistants** are assigned by the Aero/Astro Department prior to the start of each quarter. Application information for Course Assistantships is posted by the Aero/Astro Student Services Office in the Spring Quarter. Applicants are expected to have taken and done well in the course in which they will assist. Aero/Astro CAs can be 50% appointments (20 hours/week) or 25% appointment (10 hours/wk); salaries are comparable to RAs. Aero/Astro students may also serve as course assistants in other departments. Procedures for selecting course assistants vary from department to department; students interested in applying for positions in another department should contact the appropriate student services office for information.

Students who hold assistantships receive tuition grants in addition to their monthly salaries, if their research or teaching is related to their academic degree. (Assistantships awarded within the student's academic department are always considered related to the degree.) This tuition grant is intended to support the academic progress of the student, not the specific needs of the grant, contract, or department providing the funds.

A 50% RA or CA tuition payment covers the full 8-10-unit cost, and students holding these appointments may not enroll for more than 10 units. RAs and CAs for less-than-50% bring a proportionally smaller salary and tuition grant (see Tuition and Assistantships chart, below). These students may enroll at either the 8-10 unit rate or the full tuition rate; the RA/CA tuition grant will partially pay the bill, and the student must pay for the remainder. Students with a less-than-50% appointment may accept more than one RA/CA appointment in the same quarter, so long as the combined percentage does not exceed 50%. The student will receive both salaries and a tuition grant based on the combined percentage (e.g., if they total 50%, the tuition grant will be 8-10 units).

- **Enrollment:** All students holding assistantships **must** be enrolled in the quarter for which the assistantship is held (including summer).
- **Unit requirement:** Students with assistantships must be enrolled in at least 8 units during Autumn, Winter and Spring Quarters. Part time enrollment is only allowed during Summer Quarter. Maximum enrollment is 10 units if you have a 50% RA/CA.
- **TGR:** Students who have fulfilled unit requirements and only need to complete their oral defense and dissertation may apply for Terminal Graduate Registration (TGR) status for a reduced tuition rate. TGR students with assistantships must enroll in the 0-unit TGR course.

**Other Paid Positions:** Occasionally, there are temporary jobs available (course grading, office work, etc.) which pay an hourly wage and no tuition benefit. Employment in addition to a 50% assistantship must be formally approved by the faculty research supervisor, and may not exceed more than 8 hours per week. International students may not work at all in addition to a 50% RA/TA/CA (their visas set a limit of 20 hours/week of paid work during academic terms.) Students with fellowships may work 8 hours in addition; students without financial aid are not limited (except by their visas, if any).

## SUMMER QUARTER RAs - Options and Examples:

The standard Research Assistantship, during the academic year and during summer quarter as well, is a 50% appointment which requires 20 hours a week of work and pays for 8-10 units or TGR fees. However, in Summer Quarter students can also be hired to work for **MORE-than-50%, up to a maximum 90%** - which brings proportionally more salary and less tuition payment. Different labs have different policies about whether, and when, students will be paid for more than 50% effort.

Students who are "trying out" research with a faculty member might also be hired for **less-than-50%** appointments, which bring proportionally less salary and fewer units. This can happen during any quarter. In Summer Quarter only, however, students may enroll at less than 8 units (minimum 1 unit), so an RA which pays for less than 8 units will not necessarily leave the student with a large tuition bill to pay.

Examples of 50%, 25%, 75% and 90% appointments are described in some detail below. (Other percentages are also possible, but these should be sufficient to demonstrate the principles involved.) In every case, the salary is proportional to hours-paid (e.g., 25% is half of the 50% standard; 75% is 150% of that standard; 90% is 180% the standard). Tuition charges will be proportionally lower, however, with the minimum tuition = 3-unit rate.

### 50% RA (20 hrs/wk), not TGR

quarterly salary: \$10,722.00 postquals, \$10,410.00 postMS, \$9,828.00 preMS

tuition paid: 8-10 units: \$11,310.00/quarter

Enroll in 8-10 units (AA 290 may be more than 5 units in summer)

### 50% RA (20 hrs/wk), TGR

quarterly salary: \$10,722.00 postquals

TGR tuition fully paid: \$3,186.00/quarter - Enroll in TGR course

### 25% RA (10 hrs/week)

quarterly salary: \$5,631.00 postquals, \$5,205.00 postMS, \$4,914.00 preMS

tuition paid: 5 units: \$5,655.00

Summer Only: Enroll in 3-5 units; you are billed for additional tuition if enrolled in > 5 units.

During the academic year: Enroll in 8 units or more; you will be billed for 8-10 units or for full tuition, as appropriate, and will be responsible for paying the remainder.

### 90% RA (36 hrs/week) - not TGR SUMMER ONLY

quarterly salary: \$19,299.60 postquals, \$18,738.00 postMS, \$17,690.40 preMS

tuition paid: \$3,393.00 - Enroll in 3 units

### 90% RA (36 hrs/wk), TGR SUMMER ONLY

quarterly salary: \$19,299.60 postquals

TGR tuition fully paid: \$3,186.00 - Enroll in TGR course

### 75% RA (30 hrs/wk) - not TGR SUMMER ONLY

quarterly salary: \$16,083.00 postquals, \$15,615.00 postMS, \$14,742.00 preMS

tuition paid: 5 units: \$5,655.00

Enroll in 3-5 units; you will be billed for additional tuition if enrolled in > 5 units

### 75% RA (30 hrs/wk), TGR SUMMER ONLY

quarterly salary: \$16,083.00 postquals

TGR tuition fully paid: \$3,186.00 - Enroll in TGR course

## 2017-18 Engineering Tuition Charges & Assistantship Tuition Payments

Units	Tuition	RA/CA which pays for this amount of tuition [ % FTE ]	Weekly work effort (average)
11-18 “full tuition”	\$17,396.00	none	
8-10 “minimum fulltime”	\$11,310.00	50% the "standard" RA/CA	20 hours
7	\$7,917.00	35%	14 hours
6	\$6,786.00	30%	12 hours
5	\$5,655.00	25%	10 hours
4	\$4,524.00	20%	8 hours
3	\$3,393.00	15%	6 hours
TGR (0)	\$3,186.00	15% or more	

### Notes:

Graduate students will usually be charged a minimum of the 8-10 unit tuition rate – which is considered minimum full-time registration for a graduate student. Enrollment in more than 10 units for a quarter will result in a higher tuition charge. Enrollment in fewer units will NOT lower tuition charges, but will result in academic and visa problems.

The chart above does not imply that students holding a less-than-50% assistantship may reduce their tuition bill. Students whose assistantships (or fellowships) pay for less than 8-10 units are expected to enroll for at least 8 units during the academic year, and are responsible for paying the remainder of their tuition bill. For details, including the few exceptions to this minimum tuition and minimum enrollment rule, refer to the Stanford Bulletin or to the “Registration Requirements” section of this Guide.

Several fellowships will pay for “full tuition” (11-18 units). Students holding such fellowships are advised to take advantage of this generous support, and to enroll in at least 11 units – or more likely, in 15-16 units – each quarter. If they enroll in 10 units or less, their tuition bill will remain at the 8-10 unit rate. This remainder is usually not “bank-able” for use in a later quarter, nor convertible to stipend or to the payment of other fees. (Of course, students should always consult their academic advisors and the Student Services Office about a specific academic or financial situation.)

# STUDENT PAYROLL AT STANFORD

Any student employee (RA, CA, TA, grader, etc.) must meet several requirements before receiving a paycheck. You must be enrolled in any quarter in which you are paid (including summer), make suitable academic progress, and maintain good standing in the University.

If this is your first employment by Stanford, you need to fill out these forms:

- "I-9 Verification" for the University and INS. To complete, bring to the Aero/Astro Student Services Office:  
 Permanent Residents: an unexpired resident alien card  
 F1/J1 visa holders: unexpired passport and most recent entry/departure card, plus a current I-20 or DS-2019.  
 U.S. Citizens: a U.S. Passport; or two documents: driver's license or Stanford I.D. card (to establish identity) AND an original Social Security card or U.S. birth certificate or unexpired INS Employment Authorization (to establish employment eligibility).  
 Student Services must see the original documents; both the student and Student Services sign the I-9 form.
- Declare Federal and State Withholding allowances through employee tab on AXESS (to instruct the University how much tax to withhold from your salary)
- If you do not have a social security number, a copy of your application (and then a copy of the actual social security card, when you receive one). **Note:** If any of these forms is missing or outdated, your paychecks will be delayed!

**International students** may also qualify for "tax treaty" status: some countries have agreements with the U.S. which exempt their students from some or all taxes. To claim an exemption, the appropriate forms must be filed annually. For payroll, file IRS form 8233 and a country attachment; information can be found on the web at [https://web.stanford.edu/group/fms/fingate/staff/taxcompliance/quick\\_steps/claim\\_taxTreaty\\_salary.html](https://web.stanford.edu/group/fms/fingate/staff/taxcompliance/quick_steps/claim_taxTreaty_salary.html)

**We strongly encourage you to sign up for DIRECT DEPOSIT and PAYROLL DEDUCTION.** Click on the website for more information <https://sfs.stanford.edu/student-accounts/refunds/direct-deposit>.

Assistantship or grader salaries are processed through Stanford's Payroll system. Assistants and graders are University employees. (Fellowships are entirely different.)

**Deductions:** Federal and state taxes are withheld from salary checks; the earnings and withholding are reported like any other salary. Tuition amounts are not taxable or reported. (Student bill items like housing, ASSU fees, insurance etc. can be paid by payroll deduction if you make prior arrangements - see the website info above.)

**Schedule:** Tuition is paid directly to Student Accounts. You can see the payment on your University bill. Click the Finances tab in AXESS.

Payroll checks or direct deposit statements come twice a month, to the Aero/Astro Main Office. Work performed from the 1st to 15<sup>th</sup> of a month is paid on the 22<sup>nd</sup>; pay for the 16<sup>th</sup>–31<sup>st</sup> of the month is paid on the 7<sup>th</sup>. Assistantship appointments follow a standard quarterly schedule which does not coincide with the registration and exam dates:

	appointment span	first check	last check
Autumn	Oct 1 - Dec 31	Oct 22	Jan 7
Winter	Jan 1 - Mar 31	Jan 22	Apr 7
Spring	Apr 1 - Jun 30	Apr 22	July 7
Summer	July 1 - Sept 30	July 22	Oct 7

**If a check does not arrive on time:** First, examine your own status. Are you enrolled? Is there a Hold on your registration? If this is your first check, have you filed all the appropriate paperwork? If you have worked elsewhere on campus, have you checked with the other department? Then, come to the Student Services Office to report either that you have found and fixed one of the problems, or to find out what is wrong. For an RA, the faculty member may have forgotten to initiate or renew your appointment for the quarter. In any event, we will try to find the problem and help you fix it.

# FUNDAMENTAL STANDARD

The Fundamental Standard has set the standard of conduct for students at Stanford since it was articulated in 1896 by David Starr Jordan, Stanford's first president. It states: Students at Stanford are expected to show both within and without the university such respect for order, morality, personal honor and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the university.

## Understanding the Fundamental Standard

The Fundamental Standard is an aspirational statement of Stanford's ideal of civic and moral community. Although the spirit of the Fundamental Standard remains unchanged since 1896, these aspirational learning goals for all Stanford students elaborate its basic values today:

1. Students are expected to respect and uphold the rights and dignity of others regardless of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or socio-economic status.
2. Students are expected to uphold the integrity of the university as a community of scholars in which free speech is available to all and intellectual honesty is demanded of all.
3. Students are expected to respect university policies as well as state and federal law.
4. For the purposes of clarity, students should be aware that they may be subject to discipline at Stanford University for acts of misconduct including:
  - Violation of university policy
  - Violation of a specific university directive
  - Violation of an applicable law
  - Physical assault
  - Theft of property or services
  - Threats
  - Hazing
  - Hate crimes
  - Alcohol- and drug-related violations, including driving under the influence
  - Intentional or reckless property damage
  - Seeking a university benefit to which a student is not entitled
  - Falsifying a document
  - Impersonating another
  - Computer violations
  - Knowingly or recklessly exposing others to significant danger

## Sanctions for Violating the Fundamental Standard

There is no standard sanction that applies to violations of the Fundamental Standard. Infractions have led to sanctions ranging from formal warning and community service to expulsion. In each case, the nature and seriousness of the offense, the motivation underlying the offense and precedent in similar cases are considered.

# HONOR CODE

The Honor Code is the university's statement on academic integrity written by students in 1921. It articulates university expectations of students and faculty in establishing and maintaining the highest standards in academic work.

## Honor Code

1. The Honor Code is an undertaking of the students, individually and collectively:
  1. that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;
  2. that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.
2. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.
3. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.

## Violations of the Honor Code

Examples of conduct that have been regarded as being in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper
- Unpermitted collaboration
- [Plagiarism](#)
- Revising and resubmitting a quiz or exam for regrading, without the instructor's knowledge and consent
- Giving or receiving unpermitted aid on a take-home examination
- Representing as one's own work the work of another
- Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted

## Sanctions for Violating the Honor Code

In recent years, most student disciplinary cases have involved Honor Code violations; of these, the most frequent arise when a student submits another's work as his or her own, or gives or receives unpermitted aid. The standard sanction for a first offense includes a one-quarter suspended suspension from the University and one or more educational components. In addition, most faculty members issue a "No Pass" or "No Credit" for the course in which the violation occurred. The standard sanction for multiple violations (e.g. cheating more than once in the same course) is a three-quarter suspension and 40 or more hours of community service.

## Interpretations of the Honor Code

In the Spring of 1977, the Student Conduct Legislative Council authored and adopted the following guidelines to assist students and faculty in understanding their rights and obligations under the University's Honor Code. The most recent revisions to the original text were adopted in the Winter of 2002 by the Board on Judicial Affairs.

It must be understood that the individual and collective responsibility of the students for upholding the Honor Code was not imposed upon the students by the administration or the faculty but was assumed by the students at their own request starting in 1921. Without such student responsibility, the Honor Code cannot be effectively maintained

## 1. General

- The Honor Code is agreed to by every student who registers at Stanford University and by every instructor who accepts an appointment.
- The Honor Code provides a standard of honesty and declares that compliance with that standard is to be expected. It does not contemplate that the standard will be self-enforcing but calls on students, faculty, and administration to encourage compliance and to take reasonable steps to discourage violations. If violations occur, procedures are prescribed by the Student Judicial Charter of 1997. However, the Honor Code depends for its effectiveness primarily on the individual and collective desire of all members of the community to prevent and deter violations rather than on proceedings to impose penalties after violations have occurred.
- In interpreting and applying the general provisions of the Honor Code, it should be kept in mind that although primary responsibility for making the Code effective rests with the students, faculty cooperation is essential, since the faculty sets the academic requirements which students are to meet. The faculty should endeavor to avoid academic requirements and procedures which place honorable and conscientious students at a disadvantage. The faculty should also be ready and willing to consult with students and should be responsive to their suggestions in these matters.
- While an instructor's failure to observe these guidelines might be viewed as an extenuating circumstance in evaluating penalty options for a student's misconduct, it would not preclude the initiation of an otherwise warranted charge against the student.

## 2. Specific Interpretations and Applications

- Third-party responsibility: A primary responsibility assumed by students is to discourage violations of the Honor Code by others. Various methods are possible. Drawing attention to a suspected violation may stop it. Moral suasion may be effective. Initiating formal procedures is a necessary and obligatory remedy when other methods are inappropriate or have failed. Faculty members have like responsibilities when suspected violations come to their attention.
- Proctoring : Proctoring means being present in the examination room during a written examination, with the following exceptions:
  1. The prohibition against proctoring should not be construed to prohibit an instructor or teaching assistant from remaining in the examination room for the first few minutes to distribute and explain the examination; or from visiting the examination room briefly to transmit additional information; or from returning at the end of the examination to collect examination papers.
  2. Nor does the prohibition against proctoring prohibit an instructor or teaching assistant from visiting the examination room in response to specific reports from students that cheating has been observed, to investigate the basis for such reports.

The instructor or teaching assistant may also visit the examination room briefly and infrequently in order to answer students' questions.
- Unusual and unreasonable precautions: In interpreting and applying this provision, consideration should be given to standard procedures which are customary to Stanford and the need for cooperation between students and faculty in making the Honor Code effective. The following situations are cited as examples: An instructor should not require students to identify themselves before being admitted to an examination room, or require students to submit in advance to being searched for notes or other materials, or maintain surveillance upon students who leave the examination room. Nor should the instructor take deliberate steps to invite dishonesty in order to entrap students. Procedures of this kind would be unusual and unreasonable. On the other hand, an instructor may require copies of an examination or test to be returned after the examination. When possible, alternate seating should be provided and used for all examinations. To avoid controversy in any rereading or regrading of students' work, the instructor may take measures by which the original work may be clearly identified. With clear advance notice, an instructor may systematically compare work submitted to current or previous submissions. An instructor who requires students to make up a missed test or examination may administer a different test or examination of equivalent range and difficulty. Such procedures are not to be construed as unusual or unreasonable.



- Procedures that create temptations to violate the Honor Code: Although students are expected to resist temptations to cheat, the faculty should endeavor to minimize inducements to dishonesty. Examples of undesirable procedures include the following: failure to give clear directions and instructions concerning course requirements and the limits of acceptable collaboration in coursework; treating required work casually as if it were unimportant; carelessness or inconsistency in maintaining security of examinations or tests; reusing an examination which is neither kept secure from public exposure nor made available to all students. If take-home examinations are given, they should not be closed-book examinations, nor should there be a specific time limit less than the full period between the distribution of the examination and its due date. Such procedures place honorable and conscientious students in a difficult position and often at a disadvantage, and could be interpreted as mitigating by a judicial panel.
- Penalty grading: Students are not to be penalized for violations of the Honor Code without adjudication under the procedures specified by the Student Judicial Charter of 1997. An instructor may not, therefore, lower a student's grade or impose any other academic penalty on the grounds of dishonesty in the absence of such formal proceedings.
- Instructor Discretion: Procedures falling under instructor discretion would include exam location, alternate times for exams, and alteration of due dates. Tests will be taken from the classroom only with the consent of the instructor.
- Basis of Grading: All student work in a course or independent study (exams, quizzes, problem sets, drafts of papers, oral presentations, internet/websites, research, classroom discussions, etc.) forms the basis for evaluating and/or grading. The Honor Code applies to all academic work whether or not the work is given a letter grade, and whether or not the Honor Code is cited and/or signed. Therefore, regardless of the nature or extent of an assignment, academic dishonesty of any type is expressly prohibited and should always be considered a violation of the Honor Code.
- Dual Submission Policy: One of the principal motivations behind the Honor Code is to prevent one student from taking unfair advantage over the other students in a class. For example, receiving unpermitted aid on an assignment or consulting notes on a closed book exam gives a student an advantage that students who adhere to the Honor Code do not have. In much the same way, submitting the same work in more than one course without the knowledge of the instructor undermines fairness because faculty assume that student work prepared for a course is done for that course alone. To this end, the Interpretations of the Stanford Honor Code shall include the following: No student may submit substantially similar work in more than one class without the approval of any instructors who might otherwise assume that the work has been undertaken in their classes alone. Thus, submitting work that was prepared for a previous class requires the approval of the current instructor. Submitting substantially similar work in concurrent classes requires approval, in advance, from each instructor.

(Last amended 2002)

## Honor Code Tips

Below is a listing of several tips that can make upholding the Honor Code an easier part of your day to day academic life. Since this list is not exhaustive, we welcome you to engage with some of the resources available on the site such as academic integrity videos for computer science assignments, lab work and in essays and papers.

### **Make sure to understand all guidelines for academic assignments.**

This is especially applicable regarding permitted or unpermitted collaboration and aid. Guidelines frequently vary from course to course, instructor to instructor and assignment to assignment. Ask the instructor directly if there is any ambiguity on the guidelines for a particular assignment.

### **Sit apart during exams.**

Alternate seating during in-class examinations when this is possible. Allowing space in between you and another student reduces the likelihood of looking at another's exam or copying.

### **Cite, cite, cite.**

Citation is key in upholding the honor code in essays and other written work. You must cite all resources that were used in producing your work. Omission of citation can be viewed as an attempt to pass off someone else's words or thoughts as your own, whether this was intended or not.

### **Be actively engaged with the Honor Code.**

All members of the Stanford community have an obligation to respond in some manner if they observe an Honor Code violation. If you observe another student behaving in a way that you believe is not aligned with the Honor Code, you should notify a TA or professor. Formal reporting of Honor Code violations by students should be discussed with a member of the Office of Community Standards.

### **Do not be tempted to take dishonest shortcuts.**

Try to stand back and identify options. Think about the value of personal integrity. Think about the consequences of being caught. These can include embarrassment and negative academic, career and family impact – and most likely a quarter of suspension. Alternatives such as dropping a course, arranging for an incomplete or even accepting a lower grade are always better choices.

Do not make crucial decisions when judgment is impaired.

This applies to both academic and non-academic situations. It is clearly wiser not to decide upon anything important when feeling desperate, exhausted, grief-stricken or panicked.

### **Think before acting.**

Most students need help at one time or another. Tap into the wealth of resources on campus and seek help or advice on how to proceed.

# COMPUTER AND NETWORK USAGE POLICY

**Authority:** Approved by the Vice President for Business Affairs and Chief Financial Officer.

**Applicability:** Applies to all University students, faculty and staff, and all others using computer and communication technologies, including the University's network, whether personally or University owned, which access, transmit or store University or student information.

**Policy Statement:** Use of Stanford's network and computer resources should support the basic missions of the University in teaching, learning and research. Users of Stanford network and computer resources ("users") are responsible to properly use and protect information resources and to respect the rights of others. This policy provides guidelines for the appropriate use of information resources.

## 1. Definitions

As used in this policy:

- a. "Information resources" are all computer and communication devices and other technologies which access, store or transmit University or student information.
- b. "Information" includes both University and student information.
- c. "Personally owned resources" are information resources that are under the control of University employees or agents and are not wholly owned by the University.

## 2. Policies

### a. General Policy

Users of information resources must protect (i) their online identity from use by another individual, (ii) the integrity of information resources, and (iii) the privacy of electronic information. In addition, users must refrain from seeking to gain unauthorized access, honor all copyrights and licenses and respect the rights of other users of information resources.

### b. Access

Users must refrain from seeking to gain unauthorized access to information resources or enabling unauthorized access. Attempts to gain unauthorized access to a system or to another person's information are a violation of University policy and may also violate applicable law, potentially subjecting the user to both civil and criminal liability. However, authorized system administrators may access information resources, but only for a legitimate operational purpose and only the minimum access required to accomplish this legitimate operational purpose.

#### (1) Prohibition against Sharing Identities

Sharing an online identity (user ID and password or other authenticator such as a token or certificate) violates University policy.

#### (2) Information Belonging to Others

Users must not intentionally seek or provide information on, obtain copies of, or modify data files, programs, passwords or other digital materials belonging to other users, without the specific permission of those other users.

#### (3) Abuse of Computing Privileges

Users of information resources must not access computers, computer software, computer data or information, or networks without proper authorization, or intentionally enable others to do so, regardless of whether the computer, software, data, information, or network in question is owned by the University. For example, abuse of the networks to which the University belongs or the computers at other sites connected to those networks will be treated as an abuse of University computing privileges.

### c. Usage

The University is a non-profit, tax-exempt organization and, as such, is subject to specific federal, state and local laws regarding sources of income, political activities, use of property and similar matters. It also is a contractor with government and other entities and thus must assure proper use of property under its control and allocation of overhead and

similar costs. Use of the University's information resources must comply with University policies and legal obligations (including licenses and contracts), and all federal and state laws.

**(1) Prohibited Use**

Users must not send, view or download fraudulent, harassing, obscene (i.e., pornographic), threatening, or other messages or material that are a violation of applicable law or University policy. In particular, contributing to the creation of a hostile academic or work environment is prohibited.

**(2) Copyrights and Licenses**

Users must not violate copyright law and must respect licenses to copyrighted materials. For the avoidance of doubt, unlawful file-sharing using the University's information resources is a violation of this policy.

**(3) Social Media**

Users must respect the purpose of and abide by the terms of use of online media forums, including social networking websites, mailing lists, chat rooms and blogs.

**(4) Political Use**

University information resources must not be used for partisan political activities where prohibited by federal, state or other applicable laws, and may be used for other political activities only when in compliance with federal, state and other laws and in compliance with applicable University policies.

**(5) Personal Use**

University information resources should not be used for activities unrelated to appropriate University functions, except in a purely incidental manner.

**(6) Commercial Use**

University information resources should not be used for commercial purposes, including advertisements, solicitations, promotions or other commercial messages, except as permitted under University policy. Any such permitted commercial use should be properly related to University activities, take into account proper cost allocations for government and other overhead determinations, and provide for appropriate reimbursement to the University for taxes and other costs the University may incur by reason of the commercial use. The University's Chief Financial Officer and Vice President for Business Affairs will determine permitted commercial uses.

**(7) Use of University Information**

Users must abide by applicable data storage and transmission policies, including Admin Guide 6.3.1 (Information Security). Consult the University Privacy Officer ([privacyofficer@stanford.edu](mailto:privacyofficer@stanford.edu)) for more information.

**d. Personally Owned Resources**

Stanford does not require personnel to use their personally owned resources to conduct University business. Individual units within the University may permit such use, and users may choose to use their own resources accordingly. Any personally owned resources used for University business are subject to this policy and must comply with all Stanford requirements pertaining to that type of resource and to the type of data involved. The resources must also comply with any additional requirements (including security controls for encryption, patching and backup) specific to the particular University functions for which they are used.

**e. Integrity of Information Resources**

Users must respect the integrity of information and information resources.

**(1) Modification or Removal of Information or Information Resources**

Unless they have proper authorization, users must not attempt to modify or remove information or information resources that are owned or used by others.

**(2) Other Prohibited Activities**

Users must not encroach, disrupt or otherwise interfere with access or use of the University's information or information resources. For the avoidance of doubt, without express permission, users must not give away University information or send bulk unsolicited email. In addition, users must not engage in other activities that damage, vandalize or otherwise compromise the integrity of University information or information resources.

**(3) Academic Pursuits**

The University recognizes the value of legitimate research projects undertaken by faculty and students under faculty supervision. The University may restrict such activities in order to protect University and individual information and information resources, but in doing so will take into account legitimate academic pursuits.

#### **f. Locally Defined and External Conditions of Use**

Individual units within the University may define "conditions of use" for information resources under their control. These statements must be consistent with this overall policy but may provide additional detail, guidelines restrictions, and/or enforcement mechanisms. Where such conditions of use exist, the individual units are responsible for publicizing and enforcing both the conditions of use and this policy. Where use of external networks is involved, policies governing such use also are applicable and must be followed.

#### **g. Access for Legal and University Processes**

Under some circumstances, as a result of investigations, subpoenas or lawsuits, the University may be required by law to provide electronic or other records, or information related to those records or relating to use of information resources, ("information records") to third parties. Additionally, the University may in its reasonable discretion review information records, e.g., for the proper functioning of the University, in connection with investigations or audits, or to protect the safety of individuals or the Stanford community. The University may also permit reasonable access to data to third-party service providers in order to provide, maintain or improve services to the University. Accordingly, users of University information resources do not have a reasonable expectation of privacy when using the University's information resources.

### **3. Oversight of Information Resources**

Responsibility for, and management and operation of, information resources is delegated to the head of a specific subdivision of the University governance structure ("department"), such as a Dean, Department Chair, Administrative Department head, or Principal Investigator ("lead"). This person will be responsible for compliance with all University policies relating to the use of information resources owned, used or otherwise residing in their department.

The lead may designate another person to manage and operate the system, but responsibility for information resources remains with the lead. This designate is the "system administrator."

The system administrator is responsible for managing and operating information resources under their oversight in compliance with University and department policies, including accessing information resources necessary to maintain operation of the systems under the care of the system administrator. (See also section 4.b; system administrators should defer to the Information Security Office for access beyond that necessary to maintain operation of the system.)

#### **a. Responsibilities**

The system administrator should:

Take all appropriate actions to protect the security of information and information resources. Applicable guidelines are found at <http://securecomputing.stanford.edu>.

Take precautions against theft of or damage to information resources.

Faithfully execute all licensing agreements applicable to information resources.

Communicate this policy, and other applicable information use, security and privacy policies and procedures to their information resource users.

Cooperate with the Information Security Office to find and correct problems caused by the use of the system under their control.

#### **b. Suspension of Privileges**

System administrators may temporarily suspend access to information resources if they believe it is necessary or appropriate to maintain the integrity of the information resources under their oversight.

### **4. Reporting or Investigating Violations or University Concerns**

#### **a. Reporting Violations**

System users will report violations of this policy to the Information Security Office, and will immediately report defects in system accounting, concerns with system security, or suspected unlawful or improper system activities to the Information Security Office during normal business hours and the Office of the General Counsel emergency after-hours phone line at other times.

#### **b. Accessing Information & Systems**

Inspecting and monitoring information and information resources may be required for the purposes of enforcing this policy, conducting University investigations or audits, ensuring the safety of an individual or the University community,

complying with law or ensuring proper operation of information resources. Only the University's Chief Information Security Officer (or designate) may authorize this inspection and monitoring.

**c. Cooperation Expected**

Information resource users are expected to cooperate with any investigation of policy abuse. Failure to cooperate may be grounds for cancellation of access privileges, or other disciplinary actions.

**5. Consequences of Misuse of Information Resources**

A user found to have violated this policy may also have violated the University Code of Conduct, the Fundamental Standard, the Student Honor Code, and/or other University policies, and will be subject to appropriate disciplinary action up to and including discharge, dismissal, expulsion, and/or legal action. The Chief Information Security Officer will refer violations to University units, i.e., Student Affairs for students, the supervisor for staff, and the Dean of the relevant School for faculty or other teaching or research personnel, if appropriate.

**6. Cognizant Office**

University's Chief Information Security Officer, or other person designated by the Vice President for Business Affairs and Chief Financial Officer, shall be the primary contact for the interpretation, monitoring and enforcement of this policy.

**7. Related Policies**

**a. Student Discipline**—See Student Life/Codes of Conduct/Fundamental Standard/Honor Code

**b. Staff Discipline**—See [Guide Memo 2.1.16](#): Addressing Conduct & Performance Issues

**c. Faculty Discipline**—See the Statement on Faculty Discipline in the Faculty Handbook

**d. Patents and Copyrights**—See [Research Policy Handbook 9.1](#) and [9.2](#); see also the Stanford University [Copyright Reminder](#)

**e. Political Activities**—See [Guide Memo 1.5.1](#): Political Activities

**f. Ownership of Documents**—See [Research Policy Handbook 9.2](#) and [Guide Memo 1.5.5](#): Ownership of Documents

**g. Incidental Personal Use**—See [Research Policy Handbook 4.1](#), and [Guide Memo 1.5.2](#): Staff Policy on Conflict of Commitment and Interest

**h. Security of Information**—See [Guide Memo 6.6.1](#): Information Security Incident Response

**i. Privacy and Security of Health Information (HIPAA)**—See [Guide Memo 1.6.2](#): Privacy and Security of Health Information

**j. Data Classification, Access and Transmittal and Storage Guidelines**—See <http://dataclass.stanford.edu>.

**k. Endpoint Compliance**—See [http://securecomputing.stanford.edu/endpoint\\_compliance.html](http://securecomputing.stanford.edu/endpoint_compliance.html)

**l. Online Accessibility**—<http://ucomm.stanford.edu/policies/accessibility-policy.html>

# AERO/ASTRO DIRECTORY 2017-18

## Durand Building

Aero/Astro Main Office, Room 202, 723-3317

<u>Labs</u>	<u>Director</u>	<u>Room</u>
Aerospace Computing Lab (ACL)	Jameson	203
Aerospace Design Lab (ADL)	Alonso	464
Aerospace Robotics Laboratory (ARL)	Rock	017
Autonomous Systems Lab (ASL)	Pavone	009
Extreme Environment Microsystems (XLab)	Senesky	012-B
Farhat Research Group (FRG)	Farhat	224, 226
Global Positioning System Laboratory (GPS)	Enge	452
Multi-Robot System Lab (MSL)	Schwager	028
Space Environment and Satellite Systems (SESS)	Close	032
Space Rendezvous Lab (SLAB)	D'Amico	006
Stanford Intelligent Systems Lab (SISL)	Kochenderfer	227
Stanford Propulsion and Space Exploration Group (SPaSE)	Cantwell	051
Structures and Composites Lab (SACL)	Chang	054
Unsteady Flow Physics and Aeroacoustics Lab	Lele	204

Most labs maintain their own Web pages - <http://aa.stanford.edu/research-0>

<u>Aero/Astro Faculty</u>	<u>Durand Building</u>	<u>@stanford.edu</u>
Juan Alonso	Room 252	jjalonso@
Andrew Barrows	Room 205	abarrows@
Brian Cantwell	Room 250A	cantwell@
Fu-Kuo Chang	Room 250C	fkchang@
Richard Christensen (Emeritus)	Room 404	christensen@
Sigrid Close	Room 264	sigridc@
Simone D'Amico	Room 262	damicos@
Daniel DeBra (Emeritus)	Room 405	ddebra@
Per Enge	Room 260	per.enge@
Charbel Farhat (Chair)	Room 257	cfarhat@
Scott Hubbard	Room 207	scott.hubbard@
Antony Jameson	Room 250B	ajameson@
Mykel Kochenderfer	Room 255	mykel@
Ilan Kroo	Room 263	kroo@
Sanjay Lall	Packard Room 235	lall@
Sanjiva Lele	Room 253	lele@
Marco Pavone	Room 261	pavone@
Stephen Rock	Room 265	rock@
Mac Schwager	Room 209	schwager@
Debbie Senesky	Room 254	dsenesky@
George Springer (Emeritus)	Room 412	gspringer@

Short summaries of faculty research interests can be found on our website at: <http://aa.stanford.edu/people/faculty>

