

**The ARC's Frosh Guide to Academics**

Caltech

2012-2013

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# AN INTRODUCTION

Hello soon-to-be-Techer!

I hope you're enjoying your summer. Hopefully you're looking forward to the upcoming school year. While there are probably many reasons why you chose to come to Caltech, from the world-class research to the collaborative student culture, academics is probably at the top of everyone's list. The ARC (Academic Research Committee) is a student committee that works towards improving the academic environment at Caltech. Our official mission statement states "The Academics and Research Committee serves as an objective liaison between students and faculty, to facilitate effective communication, and improve the quality of learning at Caltech." In a nutshell, our goal is to make your academic experience as good as it can be.

This fall you will embark on an arduous academic journey that will challenge your abilities and test your determination. Caltech is a great place to learn and grow, but it is also a place that will overwhelm you if you're not careful. For many students, the strategies that enabled them to coast through high school will not work here. Caltech is a different world that you must adjust to. Not only are you faced with living in a completely new environment without the comfort of family and old friends, but you are also trying to master one of the most challenging core curricula in the nation. Fortunately you have two terms of Pass-Fail where you can hone and refine your tactics without any penalty. The ARC understands the difficulty that adjusting to a school like Caltech presents. In this guide, we wish to provide you with information about academics here that we hope will help you find your path to academic success at Caltech.

If you still have questions after reading this guide, feel free to email the ARC ([arc@caltech.edu](mailto:arc@caltech.edu).) We are a group of 15 students who will gladly answer any questions you may have about Caltech. For more about us, see the FAQ below.

# THE BASICS

## LECTURES

For most of Core, you're going to be in a large classroom with at least half of your class. A professor will stand at the front of the class and talk. Expect it to be less interactive than your classes in high school. Feel free, however, to ask questions or make requests of the professor. For example, if the writing on the board is too small or he or she is talking too softly, raise your hand and let the professor know. Professors want you to have a good learning experience, but they don't always know what their students need (despite what you might think, they're only human.) Lectures are not mandatory, but keep in mind that it is to your advantage to attend lectures. Lectures are the primary place that material is presented and the best place to learn the material the professor finds important, not just what's in the textbooks.

## RECITATION

Most large classes have smaller recitation sections with 20 students each. Some smaller classes will not have recitation or will only have office hours. Recitation sections are led by a teaching assistant (TA) who is often a graduate student or undergraduate who excelled in the course. Some departments such as physics have emeriti professors as TAs in addition to graduate students. Different classes utilize sections differently but some typical uses for recitation include covering new material not taught in class, going into more detail or clarifying material, doing example problems, providing hints for homework or going over quiz problems. The general format is usually similar to lecture with the TA doing the teaching and only a slight bit more interaction with students. Sections are also used in certain classes to turn in and hand back problem sets and quizzes. You should take advantage of recitation to ask questions as TAs are really there to help you learn the material. Recitations are like lectures in that recitation is not mandatory (there are a few classes where this is an exception such as Bi1) but should be attended.

## OFFICE HOURS

Outside of recitation each TA (and some professors) holds an office hour. This is a time they set specifically aside to work with students one on one (groups are fine too) and answer any questions. Office hours are a time for students to get the help they need to succeed in the class. A student can attend any office hour for the class, not just the one provided by their recitation TA. Office hours are usually announced at the beginning of a course and posted on the class website. Students often use this time to get pointers on problems they may be stuck on. It is a good idea to look at a problem set prior to attending office hours, so you know what specific questions to ask. Office hours are also a great time to go over old quiz material and prepare for future quizzes. You should feel free to ask a TA to help with anything from reviewing concepts to walking you through practice problems.

## PROBLEM SETS

Though professors are free to do what they like, classes at Caltech typically assign problem sets, which is what we call the assigned homework problems. Problem sets are typically assigned with problems that are intended to teach and familiarize you with the important material in the class. At Caltech, many of the problem sets will have difficult questions that you are not expected to get on your own. Seeking help when you are stuck on a problem through collaboration with other students or a visit to the professor or your TA is strongly encouraged. Often problem sets come out once every week and are due the next week. Typically a course will announce the location of a turn-in box for your problem sets and the date and time they are due. It is definitely beneficial to start early on problem sets so that you have time to work on them independently and prepare questions for office hours or your

peers. Realize that you are expected to utilize collaboration to help you thoroughly understand concepts, not just how to solve the problem.

## UNITS

Uniting is an estimate of the amount of time you should spend on a course. Each unit is equivalent to one hour a week. When you sign up for a course, the units listed for the course, e.g. 3-0-6, are divided into: (# hours spent in class) - (# hours spent in lab) - (# hours spent on outside preparation.) This leads unit numbers to typically be around three times the number of units classes are worth at other schools. You must be registered for a minimum of 36 units per term to be considered a full time student. As a freshman, you may not take more than 45 academic units during the first two terms, and you may not take more than 51 total units during the first three terms, unless you petition for approval (see overloads below.) Upperclassmen cannot take more than 54 units without petitioning.

## DROPPING/ADDING CLASSES

Adding and dropping classes is a very easy process, so long as you follow all the steps. You can add up until add day (usually on the 3<sup>rd</sup> Friday of term) and can drop classes up until drop day (usually on the 7<sup>th</sup> or 8<sup>th</sup> Wednesday of term. Check the calendar on the registrar's website for the exact day each term.) You add and drop classes with a device called a 'Big Red Drop Card' for historical reasons, although they are yellow now. All the houses have them readily accessible, and you can get them from the Registrar's office or Deans. To add a class, go to the professor and get them to sign your add card, then get your adviser's signature on it. Turn this card into the registrar, and you'll be added to the class. Dropping a class is very similar – you have to get the professor to sign the drop card (which is the same as the add card) and then get your adviser's signature. If you want to drop a class before Add Day, however, you do not need the professor's signature. If you urgently need your Add/Drop card signed (i.e. it's add/drop day) and you cannot reach your adviser, the Deans can sign it for you as well as the option representative.

If you want to introduce a time conflict in the meeting times (as posted online) for two classes, there is a separate card, an orange "Add Conflict" card, which both professor and your adviser need to sign. Since this is really a variant of adding classes, you also have to turn these in by Add Day at the end of the third week.

## PASS/FAIL

You won't have to worry about Pass/Fail right away, so don't worry! As a frosh, you are automatically on Pass/Fail for all your classes for your first two terms here (**Warning: don't try to abuse the system by taking many difficult classes while still a freshman—you will be sorry**). After that, P/F (pronounced piff) becomes more complex. You have 90 units of P/F to use during your time at Caltech, not including your first two frosh terms or any classes that are labeled as Always P/F. You aren't obliged to use all of your P/F units, or even any of them, but you are allowed to P/F up to two classes a term so long as you have P/F that you can use. Some classes will be always P/F while others will be P/F only if you take it at a certain time. For example, Ch3a is P/F only if you take it before senior year. Your major will also have specific requirements as to what classes you are allowed to P/F. In most options, classes that fulfill option requirements cannot be Pass/Failed unless the class is Always P/F. Likewise, core classes (with the exception of Bi 1) cannot be Pass/Failed starting with your 3<sup>rd</sup> term frosh year. Additionally, classes that fulfill the Humanities and Social Sciences requirement usually can be Pass/Failed, unless otherwise indicated by the catalog or the Professor.

## DECLARING A MAJOR

At the end of your freshman year you will be asked to declare a major. The registrar will distribute a form in which you will indicate your selection of major as well as any specific focus in that field. The registrar will try to assign you an adviser as close to your field of interest as possible. When you declare your major, don't worry! This will not be

your only chance. You are allowed to switch majors or advisers later if you decide to change your field of interest. You can change advisers by filling out the form on the Registrar's website entitled "Request a Change of Adviser".

# MORE COMPLICATED STUFF...

## OVERLOADS

Anyone wishing to take more than 51 units during their freshman year or 54 units in subsequent years must have their schedule approved by their adviser *and* the deans. A new policy passed by the faculty board also specifies that no more than 45 units of the 51 units during the freshmen year can be classroom courses. Basically, the 6 additional units should come from courses such as PEs, PAs, or independent research. An overload petition must include a description of the student's schedule and explain why that student needs an overload.

Although there are a lot of tempting classes and a seemingly daunting number of requirements to be fulfilled, it is *not* necessary to overload to graduate, especially during the freshman year. In most cases, even those with two options are able to complete their requirements without overloading. Moreover, the stress of an overload will likely make Caltech more painful than it needs to be, even if you are on Pass/Fail. There is no necessity to overload freshman year, but if you decide to try, be sure you are acting for the right reasons. Also, it is wise to get the advice of upperclassmen, your adviser, and the deans' office.

## DOUBLE MAJORING/MINORING

Caltech is a challenging place for those attempting to complete even one option. There are many students, however, who opt to do more, adding a minor, a second option, or in rare cases both. If you are interested in doing this, be sure to prepare and complete requirements in a timely and efficient manner to avoid overly large or stressful course loads. You do not want to find yourself writing two theses while taking three labs and Advanced Quantum Mechanics in your senior year. Also, be aware that second options are typically not granted within the same division, and elective courses may not usually be double-counted.

Those wishing to add a minor or a second option will do so as early as the beginning of their sophomore or as late as the end of their junior year. They will be required to submit a petition for approval which includes their reasons for requesting a second option and a plan to complete all requirements for both options by the end of their fourth year. This petition must be approved by both option representatives and a faculty adviser in each option. Common minors include English and History. Many of these minors differ only slightly from their respective options, and those options are likewise popular choices for those doubling-up. Computer Science, Economics, and Business Economics and Management are also quite popular as second options.

## RESEARCH

Research takes place at Caltech year-round, but most undergraduates who get involved do so during the summer, when (almost) no classes are offered. Around a third of continuing students (those eligible for fall term registration) participate in the SURF program each summer. Additionally, a similar number of students from other schools participate in SURF and a mix of other summer research programs at Caltech and JPL.

It is also possible to participate in research during the school year, but understandably harder because of the time classes take up, and because research tends to go very slowly if you only devote a few hours per week. Still, it is possible to start SURF projects early during the spring term, or continue with work from the previous summer throughout the year. Seniors also often do research during the year in order to write a thesis. Research during the term can count for a range of credit, or as a specified class (like some departments' Senior Theses.)



## GRADUATING EARLY

Occasionally, students find that they are able to complete the requirements for graduation by the end of their third year at Caltech. This is not common, but those who do find they have done so are given the option of graduating early. To exercise this option, the student must notify the registrar of his or her intent by November of their third year.

## GRADUATING WITH A DUAL DEGREE (MASTERS)

In even rarer cases, some students can satisfy the degree requirements of an undergraduate degree and a separate master's degree. For instance, one student fulfilled the requirements for a Bachelor's in Mathematics and a Master's in Geology. However, many departments are reluctant to allow this, so make sure to talk your adviser and the appropriate people in both departments if you want to consider this.

Dual degree applicants must apply and be accepted to the graduate program in their junior years at the latest. This includes a full statement of one's research interests and letters of recommendation along with a lot of other paperwork. The two degrees must be completely separate, with no overlapping requirements (unlike double majors.) This requires at least 621 credits (486+135), which averages out to around 51 credits per term to fit within four years. To find the exact requirements for a master's degree in a given option refer to the catalog.

Two relevant forms include:

<http://www.gradoffice.caltech.edu/Temp/Documents/MS-Instructions.pdf>

<http://www.gradoffice.caltech.edu/Temp/Documents/MSCandidacyform.pdf>

## STAYING FOR GRAD SCHOOL

Generally, most academics discourage remaining at the same institution for a PhD. They emphasize experiencing different research environments and course offerings to form a fuller picture of your field of study. There are some students who do stay anyway, usually because they want to work with a particular professor here. The most common path people take is to stay here for an extra year or two to get a Master's degree, which is not discouraged.

# RESOURCES

## INFORMATION ON GRADUATION AND MAJOR REQUIREMENTS

### **REGISTRAR'S OFFICE [[HTTP://REGISTRAR.CALTECH.EDU/](http://registrar.caltech.edu/)]**

The registrar is the official administrator in charge of student records. You can think of them as the administrative office in charge of the logistical side of academics. They are in charge of things such as keeping a record of your grades, registering you for classes, and preparing the course schedules. The registrar is a good place to start if you have any questions related to academics. In most cases a quick search of their site will find you an answer. On the registrar's website you can find everything from class schedules and book lists to calendars and an FAQ section. Other useful resources provided by the registrar include the course catalog and REGIS. Many important forms such as Add/Drop Cards and Overload petitions can be found on their site. They have a form that allows you to order transcripts.

### **CALTECH CATALOG [[HTTP://PR.CALTECH.EDU/CATALOG/](http://pr.caltech.edu/catalog/)]**

The Caltech catalog basically holds the academic "rules" at Caltech. Although you may be able to find many exceptions to what is found in the catalog, it will serve as your guide while you are here. The catalog is where you find core requirements and graduation requirements. It also contains a listing of all the courses, the terms in which they are offered, the number of units they are, and any prerequisites. Note that you can graduate by satisfying the requirements specified in any of the catalogs corresponding to a year that you were a student at Caltech (however, you can only graduate using one catalog; for example, you cannot double-major using different catalog years for each major.)

### **REGIS [[HTTP://REGISTRAR.CALTECH.EDU/REGIS.HTM](http://registrar.caltech.edu/regis.htm)]**

REGIS, the Registrar's Information System, is the online system that students log in to in order to perform most tasks related to the registrar such as register for classes and check grades. This is also where you can see your unofficial transcript, order an official transcript, and see any other personal academic information. All undergraduates will use REGIS to enroll in courses during the registration period and advisers will approve schedules using REGIS.

### **HSS FLOW CHART [[HTTP://ARC.CALTECH.EDU/FILES/HSS\\_REQS.PDF](http://arc.caltech.edu/files/hss_reqs.pdf)]**

The humanity requirements for core can be rather confusing. This is a helpful chart on the ARC website that does a pretty good job diagramming out exactly what you need to take.

### **OPTION MENTORING PROGRAM [[HTTP://WWW.UGCS.CALTECH.EDU/~ARC/OPTIONMENTORS2010.PHP](http://www.ugcs.caltech.edu/~arc/optionmentors2010.php)]**

Option Mentors are undergraduate students who have agreed to be a resource to people in their major. Option mentors are here to help answer your questions about what it is like to major in a particular option and what sorts of classes are good to take once you decide to major in a particular option.

## INFORMATION ON COURSES

### **ASCIT CLUE [[HTTP://DONUT.CALTECH.EDU/CLUE/](http://donut.caltech.edu/clue/)]**

CLUE stands for Course Listings for Undergraduate Education. This is a useful but notably outdated resource to learn about courses. CLUE provides grade distributions as well as student reviews. CLUE has not been updated in some time (there are no new comments though you can find grade distributions) as TQFRs were a replacement for them, but many of the old reviews are still helpful. There are currently plans to revamp CLUE and it may be updated in the next year.

## **TQFR**

Teaching Quality Feedback Reports are the evaluations that students fill out at the end of the term for each class they are enrolled in. TQFRs can be a helpful resource for students in deciding what courses to sign up for as you can see the general student reaction to a course. For example you can look at data for the number of hours students estimate they spend on a course as well as ratings of the professor's teaching. You can log on to see TQFR results from your access.caltech page. Keep in mind that although you are not obligated to do so, you should fill out your TQFRs at the end of each term as they are extremely helpful to other students as well as the professor teaching the course.

## **ACADEMIC RESOURCES**

### **DEANS OFFICE [[HTTP://WWW.DEANS.CALTECH.EDU/DEFAULT.HTM](http://www.deans.caltech.edu/default.htm)]**

The deans at Caltech are pretty different from what you find at most schools in that they are primarily supporting and helping students rather than doling out punishments. While many students only visit the deans to get their drop cards signed when their adviser is missing, the deans can be very useful to you during your time at Caltech. You can talk to the deans about any concerns or problems you may be having, personal or academic. The deans have a lot of experience in helping students find their way through Caltech and can give you great advice or refer you to other people who may be better suited to help you. For instance, if you become sick or if a family issue arises the deans can help you obtain extensions in your classes. For students who have become injured and unable to take notes for class, the deans have hired others to take notes for them. Basically if you have any problems and you can't think of a good solution, the deans are very helpful people to talk to.

## **TUTORS**

One notable service that the deans provide is student tutors, free of charge. If you are struggling in any class or just want some extra help, you can request a tutor on the deans' website. The tutors are great resources as they are very knowledgeable students who can give you some one-on-one attention. The tutors are undergraduates paid by the deans' office that meet certain academic requirements such as having done well in the course they are tutoring.

## **PROFESSORS**

While professors are very busy people and may be more difficult to get a hold of than TAs, they are very worthwhile people to get to know. Most professors are more than happy to have students come talk to them, whether it be about a class or about research. Typically professors have office hours for their classes or allow you to schedule an appointment with them.

The 3:1 student-to-faculty ratio is more than just a number! There are always plenty of opportunities to get to know your professors outside of class and office hours. One of the easiest ways to meet professors is at the Student-Faculty Lunches. Three times a term, or about once every three weeks, the ARC will host a Student-Faculty Lunch. Professors from across all disciplines join students to enjoy a casual lunch in one of the student houses. The lunches feature a new crop of professors each time and are a great opportunity for those students who are unsure how to make the first steps towards connecting with their professors, because every prof in attendance is there because he or she is interested in getting to know students! Be on the lookout for invitations to Student-Faculty Lunches in your email inbox throughout the school year.

In addition to Student-Faculty Lunches, many options also have clubs or organizations dedicated to increasing student-faculty interaction. Option clubs may host socials, seminars, or other events to help you get to know your professors or identify possible research mentors.

## **TAs**

Teaching assistants are people who have mastered the material in a class. They can be graduate students or undergraduate students or even Emeritus professors. Not only are TAs in charge of recitation sections, they are also typically the people responsible for writing problem sets, quizzes and finals as well as grading them. If you are struggling in a class and need extra help or can't attend the scheduled office hours because of conflict, feel free to email your TA (or any TA you feel comfortable talking to) to set up another meeting time. Not only is this a great time to get help in your course, but it is also a chance to build a relationship with a graduate student. Keep in mind that graduate students are working in labs and are a wonderful people to talk to about their research and possible research opportunities.

## **ADVISORS [[HTTP://REGISTRAR.CALTECH.EDU/ADVISING.HTM](http://REGISTRAR.CALTECH.EDU/ADVISING.HTM)]**

Entering freshmen are all randomly assigned a freshman adviser independent of intended major. Your freshman adviser is probably the first faculty member you will have the opportunity to forge a personal bond with. The administrative things an adviser does include approving your schedule and signing add/drop cards and overload cards. You are required to meet with your adviser at least once a year to avoid getting your Spring registration put on hold. You should also take advantage of your adviser as a knowledgeable resource who can help guide you in any decisions you may be making. For more details on the roles and responsibilities of an adviser, visit the registrar's advising arena. Keep in mind that after your freshman year you will later be assigned (or you can request) an option specific adviser for your next three years at Caltech. Finally, don't forget that your academic advisor can be one of your best networking tools. Aside from delivering sound academic advice, your advisor can suggest who among his or her colleagues might be the best research advisor or SURF mentor for you.

## **OTHER HELPFUL PEOPLE**

### **RAs-RESIDENT ASSOCIATES [[HTTP://WWW.STUDENTLIFE.CALTECH.EDU/RAS/](http://WWW.STUDENTLIFE.CALTECH.EDU/RAS/)]**

Each House selects a graduate student who will live in the house to serve as the RA. There are also RAs in Caltech owned off-campus housing such as Marks and Braun and the Chester and Del Mar Apartments. For the most part, the RAs are present to help ensure the safety of the residents. The RAs work under the housing office and serve as one of the many liaisons between administration and the houses. To become an RA, the graduate students are trained in how to deal with many of the difficulties an undergraduate may face. Also, because the RAs must go through the stringent student run selection process, they are personable, caring people to begin with and have plenty of life experiences to serve as a basis of their guidance. Most freshmen will probably not find themselves in a situation where they "must" see an RA, but keep in mind that they are someone you can consult at all hours of the day about anything you may need advice on from roommate troubles to relationship issues and academic struggles. If you are ever in need of someone to talk to, pay a visit to your RA.

### **UCCs-UPPERCLASS COUNSELORS**

Each House has its own selection process for choosing undergraduate students to be UCCs. Different houses have different responsibilities assigned to their UCCs, such as being in charge of organizing social events. However, like RAs, once selected, UCCs are trained by the Counseling Center to be able to support their fellow undergraduates. As with many upperclassmen, UCCs can be very helpful people to get advice from since they've been through the exact same experiences you are going through. If you are ever confused about what classes you should take or are in need of an academic pep talk, your UCC is a great place to turn.

# CLASSES YOU COULD CONSIDER TAKING

## GENERAL CLASSES

### PIZZA CLASSES

These classes are low-unit classes (typically 1-3 units) that tend to meet once a week and are intended to introduce you to current research in a particular field. Many of these classes also tend to offer food during class. They are a great way to learn what work currently being done looks like and to meet professors with whom you might be interested in doing research. Some are offered first term. For a guide on pizza classes, see <http://arc.caltech.edu/pizzacourses.php> or the Course Catalog.

### CS1

The official title of this course is “Introduction to Computer Programming.” It is a basic class that teaches students the basics of the Python programming language and programming skills in general. Both Computer Science majors and non-majors have found the material taught in this class to be very useful, so it is a good idea to consider taking it if you have not tested out. This class is offered first term.

### FROSH LABS

As part of Core, students must take 12 units of laboratory classes, 6 units of which must be Ch3a or Ch3x. The additional 6 units must be chosen from one of the following: APh/EE 9 (6 units), APh 24 (6 units), Bi 10 (6 units), Ch 3b (8 units), Ch 4ab (9 units per term), Ge 116 (6 units), Ph 3 (6 units), Ph 5 (9 units), Ph 8bc (6 units), or a more advanced laboratory. It is recommended, but not enforced, that students take the introductory chemistry classes during the freshmen year and complete the lab requirement by their second year. For a quick guide on frosh labs, see <http://arc.caltech.edu/froshlabs.php> or the Course Catalog.

### FRESHMAN SEMINARS

These seminars are a great opportunity to take a class where the professor teaches whatever he/she thinks is really cool. They provide an intimate setting to interact with professors, and get to know a professor outside of a large lecture hall setting.

## IN SPECIFIC MAJORS

### MATH

If you tested out of Ma1a, you will be expected to take Ma2a freshman year, and similarly for Ma1b and Ma2b. They are offered at the same time, so you are effectively reducing a class from your sophomore year load by testing out. Unfortunately, in the past students have been signed up for the practical track of Ma2a after testing out of Ma1a. Most students who test out of Ma1a are also the kind who would prefer the analytic track, so be sure to consider which track best suits your style. You will learn more about practical and analytic tracks during your first term, as freshman math and physics classes split into these two tracks starting in the second term.

MA5 - If (and, for the most part, only if) you have solid experience with proof-based mathematics (e.g. you took a college-level Number Theory, Analysis, or rigorous Linear Algebra course, or participated in proof-based math competitions like the USAMO and USAMTS), you may wish to consider taking the Ma5 sequence. This is a year-long course on Abstract Algebra (each term is a prerequisite for the subsequent terms.) It is a requirement for the math

major, an elective for physics and ACM majors, and very interesting if you enjoy proof-based math. You will need to obtain the instructor's approval to begin taking the class first term.

MA/CS 6 - The first and third terms of Ma6 are requirements for the math major (but can be exchanged for higher level classes on the same topic.) Of the math major required classes (Ma5, Ma6, Ma108, Ma109), the Ma6 sequence is usually considered the easiest.

## PHYSICS

PH11 HURDLES - During the first term, two physics challenges called 'hurdles' are posted. Students who satisfactorily answer ('clear') these hurdles get to take Physics 11, a research problem solving class taught by Tom Tombrello. In addition to research during the year, Ph11 students are offered paid research internships during the summer.

PH12 - If you test out of Ph1 (three terms), you can take Ph12 (three terms). This is the sophomore-level physics class for physics majors and others who enjoy physics, which probably describes you if you tested out of all of Ph1. Another option, for those less bent on physics, is Ph2 (two terms). You only have to place out of Ph 1a to take Ph 12a; further placement tests are offered later in the year. Taking Ph12 freshman year allows one to take Ph106 and/or Ph125 sophomore year and have another year to take advanced physics electives.

PH10 is the pizza class for physics (but does not meet during lunch nor provide pizza.)

## CHEMISTRY

If you tested out of Ch1...

CH41 - The chemistry department allows you the option of taking Ch41 or Ch21. Almost all students should take Ch41. If you're not a chemist and have exposure to quantum mechanics, Ch21 might work, but most freshmen are not prepared for Ch21. Even for chemists, Ch41 is usually a sophomore year class and Ch21 is a junior year class.

CH3A/CH4AB - If you are enrolled in Ch41 and take Ch3a first term, you have the option of taking Ch4ab, the first chemistry lab for chemistry majors, freshman year. Ch4a is offered in the winter and Ch4b is offered in the spring, so you have to take Ch3a first term in order to take Ch4ab.

CH10ABC - Ch10ab is a pizza class with talks at lunch each week by a different chemist, and lab tours later each week. After taking Ch10ab, students have the option of working in a chemistry lab (almost always starting work for a SURF) third term. The class Ch10c consists of spending some time in the lab each week, and giving a presentation of the research you are starting on, and counts towards one of the (currently 5) terms of chemistry lab required for chemistry majors.

## BIOLOGY

Bi8/Bi9 - In place of Bi1, students can take Bi8 or Bi9. This is advantageous path for anyone planning to take advanced biology courses as Bi8 and Bi9 are common prerequisites. Keep in mind that Bi 8 is a very important introductory biology course, especially if you are planning on majoring in Biology. Some students make the mistake of not taking the material as seriously, since Bi 8 is a second-term class and therefore taught while freshmen are still on pass/fail. This attitude proves disadvantageous in advanced courses later on, which are taken on grades.

Bi10 - This is the cell biology lab meant to be taken alongside Bi9 in the spring term.

## COMPUTER SCIENCE

MA/CS 6A

CS 1/2 - Both CS1 (offered first term) and CS2 (offered second term, requires CS1 or instructor approval) are requirements for the Computer Science major. CS1 teaches basic programming skills in Python (as described above in the general classes) and CS2 is a survey of topics such as data structures, proofs of algorithm correctness, learning, concurrency, and networking. It is a very good idea to take CS1 if you have not tested out of it, and it may

be a pretty good idea to take CS2 even if you have tested out of it (you may wish to talk to the professor before second term for details.)

CS 21/24/38 - These are upper-level required electives for the Computer Science major that are typically taken by sophomores, but you may wish to continue taking them if you have experience with Computer Science. CS21 is offered second term and is an introduction to complexity theory and the foundations of CS theory. Consider taking this class if you have a good background in doing proofs and a pretty good understanding of CS. CS24 is offered third term and is an introduction to systems. Consider taking this class if you have good experience with programming. CS38 is offered third term and is an introduction to algorithms. The same comments apply to CS38 as CS21.

# FAQ

## **Does it matter what section I am assigned to?**

In most cases no. You are free to attend any section you would like. While you may initially be assigned to a particular section, you can always switch sections. Notably Ch1a and Ph1a have assigned students to super sections and sub sections but you should in no way feel obligated to remain in them. Some departments such as math will not let you officially switch sections for grading reasons, but students can attend another section if it is more convenient or if they like the teaching style of a particular TA more. However, take note that Ma1 Sec1 has additional meeting times so it would not be a good idea to attend other sections in this case.

## **What is core? What courses do I need to take to graduate?**

Core is the name we give to the general education requirements that all students must take to graduate from Caltech. The best resource for figuring out what classes you need to take is the catalog. Also, if you are confused, you can consult your adviser, talk to upperclassmen or email the ARC.

## **If the catalog changes, do I need to meet the new requirements?**

For your option requirements, you may graduate under any catalog that is released during your four years at Caltech. This means that if option requirements change you don't need to worry as the catalog year you entered under is sufficient. Similarly, if the option requirements change, you can choose to follow either the old set or the new set of requirements. For your core requirements, however, you must follow the core requirements of the catalog you entered under. So don't put off taking core requirements, because even if they do change, you won't be affected. In regards to your option requirements, you may not mix and match requirements from different catalog years.

## **How do prerequisites work?**

Prerequisites for all courses can be found in the course catalog. While it is to your advantage to take the required courses as professors teach their courses assuming the class has learned certain material, there is no enforcement of prerequisites. If you do not meet prerequisite requirements and still want to take the class, you must talk to the instructor and get approval. Even though professors will grant permission in most cases, you should seriously consider whether you will be adequately prepared.

## **What is an elective?**

There are several types of elective requirements at Caltech. Generally, an "elective requirement" is a requirement that can be satisfied by many different courses. "General elective credit" refers to credit that does not satisfy any requirements other than the institute requirement of 486 credits for graduation. "Departmental elective credit" refers to classes taken in a department which are not used to satisfy another requirement in a particular option for graduation. In the case of double-majors, sometimes credit satisfying a specific requirement of one major can be used to satisfy an elective requirement of another. However, sometimes this is not permitted. Be sure to check with both option representatives in order to determine what will happen.

## **Which classes are good?**

While I would love to say all classes at Caltech are great and worth taking, it isn't true that all classes are of equal quality. One way to evaluate the quality of a class is by looking at TQFR ratings or reading student written reviews on CLUE. Another easy to find out about classes is to talk to your many resources such as your adviser or upperclassmen. When registering for classes, don't be afraid to ask around as you will find students have a lot to say about the quality of the classes they have been in. As always, feel free to email the ARC with any questions you may have.

## **Which classes have the heaviest and lightest workloads?**



You can find this information yourself on the TQFR website. Generally you should be able to estimate how much time each course takes by the units. However, some classes give more work than the units predict (we call this under united) and others less (over united.) While you need to look up each course individually, the general trend is that HSS (humanities, social science) courses tend to be over united and lab classes tend to be under united.

**Are you required to take at least one humanities class for all three terms of freshman year?**

While no one enforces when you take them, it is highly recommended you take your two frosh hums during your freshman year as you will not be able to register for advanced humanities classes until you have finished. Keep in mind that you will have to take 12 humanities social science classes to graduate, which averages to one a term during your four years at Caltech. If you put off your frosh hums you will have to double on humanities / social science courses in subsequent years. (See HSS flow or Course Catalog for details.)

**Do language classes count toward your Advanced Humanities requirement?**

No, they do not. However, you also need 36 units of general Humanities and Social Science classes. Language classes can fulfill this part of the HSS requirements. (Again, see HSS Flow or Course Catalog for more details)

**Is it easy to change classes once term starts? Would you get behind if you switch into a class?**

Add day (the last day you can add a class) tends to be at the end of the third week of term, and drop day (the last day by which you can drop a class without any record of it) tends to be at the middle of the eighth week. It is typical for students to begin attending a class but only drop it just before drop day, or even add a class about a week late. This almost never ends up being a problem, and is not abnormal in any way. Drop day is generally a more restrictive deadline than add day.

**Do people who place out of math/physics have some trouble at first with the more advanced classes?**

No. The placement tests are there to ensure you learned the necessary material from the courses you tested out of. Also, the more advanced courses do not necessarily draw on material from the earlier courses. If you do happen to be having a difficult time in your courses, keep in mind all the places you can get extra help from.

**Where can I find research positions? How do I go about approaching a professor for a job?**

E-mail professors directly and ask if they have any research positions open and if you could set up a time to meet. If they're really busy and they don't get back to you, try e-mailing their secretary instead for an appointment. It may seem intimidating at first, but most profs are pretty chill (though they can be insanely busy at times.) If they don't have any openings, ask if they know any other professors in their department who may be looking for student researchers. You could also ask your advisor.

Before you meet up with them, read up on the research they do – it'll show your interest and enthusiasm. Most (if not all) professors have websites about their research. It helps if you prepare what you're going to say and any questions about the research you might have. The SURF website has some great tips not limited to just SURF: <http://surf.caltech.edu/applicants/interview.html>

ARC also helps maintain a listing called "UROH" (Undergraduate Research Opportunities Handbook) where professors post available research positions during the year. You can find it here: <http://uroh.caltech.edu/>.

**What is the Housner fund? What sorts of things will they fund?**

The George W. Housner fund [<http://www.deans.caltech.edu/gwhfund.htm>] is a program run by the Dean's office which funds student proposals for scholarly activities. "Scholarly activities" can include research (either independent or with an adviser), travelling to conferences (for example, students often apply for funding to attend the AAAS Annual Meeting), and independent study. To receive funding, students must write a proposal in time for one of the fund's four annual consideration deadlines. The proposal will then be considered by a student-faculty committee. Some recently funded proposals include "Presenting in American Physical Society 2010 March Meeting," "Mobile Phone-Based Automated Cardiac Auscultation for the Developing World," and "Independent Study of Law at UCLA."

**Who are you guys, anyway?**

The Academics and Research Committee (ARC [<http://arc.caltech.edu/>]) is a branch of ASCIT, Caltech's undergraduate student government. The committee consists of one student elected from each house, 3-4 additional students and a secretary appointed by the committee, and a chairman elected by everyone.

Members of the ARC see themselves as resources for students and liaisons to the faculty. Your house's ARC rep can help you with academic advice and with finding information about rules and procedures for various academic issues that might come up. The rep will also know who to contact for different problems and can help put you in touch with the right people.

ARC reps are also a venue for course concerns. If there is a problem with a course that you are taking (for example, maybe the professor needs a microphone, or perhaps the homework is due on a bad day, or the TAs aren't going to office hours) and you can't resolve the problem with a TA or the professor, you can talk to your ARC rep anonymously about the problem. Your rep can then work with the rest of the ARC and the course faculty to try to resolve the issue. You can also make anonymous comments from the ARC website.

The ARC also works to improve teaching and learning at Caltech. We appoint students to various committees of the Faculty Board that are concerned about issues like the core curriculum or the library system. We also pursue various initiatives that we hope will have a positive impact. Recent initiatives include pushing for a new freshman advising system and setting up a student-run course webcasting program. This document is our newest initiative.

The ARC is always looking for new people who are interested in getting involved and making a positive impact on academics at Caltech. If you are interesting in helping us, feel free to contact us at [arc@caltech.edu](mailto:arc@caltech.edu) or talk to the ARC chair.

# ARC Roster, 2011-2012

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