UCSC Astronomy & Astrophysics
Unofficial Orientation Guide

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Important: much of the information in here about room numbers, phone numbers, and other where-things-are will be going out of date this summer as the astro dept moves from Kerr Hall into a new building, the ISB. I will try to keep this updated as I learn new stuff, but bear with me. And certainly don't keep old copies of this document around; check in the summer/fall for new ones.

Contents

1 Introduction

This document isn't really endorsed in any official way, it's just a place where we hope you find the answers to some of your questions. If you find that we're wrong, please let us know and we'll update this.

This guide is a bit crammed full of information. It's pretty dense, and probably not fun to read in one sitting. What we hope is that the answers to most (or maybe all) of your questions are in here, and we hope you come here first to look for them. When the answers aren't here, or the stated answers are wrong, let us know.

First there is a section on what to do when you first arrive. Then the guide is organized from smallest to largest, from the Dept., to the University, then the city of Santa Cruz and environs.

This document lives on the web at
`http://www.ucolick.org/~board/grad/orientation/orientation.html`, so check there for updates (or just start at `http://www.astro.ucsc.edu/grads.xml`).

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2 What to do in your first days

There are a few things you should do pretty quickly upon arriving in the area. Some will be covered in more detail later.

2.1 Upon your arrival at the Astronomy & Astrophysics Dept.

Unless you already have housing (by some miracle of miracles), you have no place from which to base operations, so you ought to head to the Dept. Things to do immediately (order not necessarily important):

- Go to the Dept. office (Kerr 477) and introduce yourself to Mary Kiegelis, the department manager, if she's around. She can probably help you through all the rest of this.
- Get a key to Kerr hall and a "grad" key. Mary will help you contact the Lick Observatory Business Office (LOBO), and you go up there (they're in the Natural Sciences II Annex) to get your keys.
- Mary will give you some paperwork to get a computer account. Then, go downstairs to NICS, the computer system administrators, and set it all up. They're located in several offices around Kerr 13. Your new account may only work on one machine, `bigdog`, for a day or so.
- Get on the payroll. There are a couple of aspects here. If you will ever TA, which of course you will, then you need to get on the Natural Sciences Division payroll. They're located in Baskin Engineering, a.k.a. Applied Sciences. Mary can help you get in touch with them. For doing research as opposed to teaching, you will need to get on the payroll with LOBO, which you can probably do when you go get your keys. You can set up direct deposit to your bank accounts at the two payroll offices. If you will be on a fellowship, then you will be paid no matter what. Not sure how to set up direct deposit for a fellowship, but it is possible.
- Introduce yourself to Kurtis Williams, a grad student whose office is Kerr 231. He is in charge of office space and will show you where your desk and such is.
- You already have a mailbox in the UCO/Lick mailroom, Kerr 9. Check for mail.

2.2 Within your first couple of weeks

Other things that are not incredibly urgent but that you ought to take care of include:

- Get a UCSC ID card. These are available at ID Card Services, located adjacent to the Bay Tree Bookstore. (Ok, it turns out you can't get your ID until mid-September anyway, so if you're here early you can ignore this.)
- Register for fall classes early, so there won't be any surprises if you have missing paperwork or something. (For instance, if you just graduated, you may have to have an updated transcript sent to UCSC to prove you got your degree.)
- Get a CA driver's license or ID, and register your vehicle with the DMV. Even if you do not own the vehicle (like it's your parents'), technically you must register it anyway within 10 days.

- Besides getting your CA driver's license, do other things that establish your California residency, like open a bank account, register to vote, etc. Of course the best way to establish residency is with a lease/rental agreement.

The DMV, some banks, etc., are discussed in §5.

2.3 Find housing!

Your real job during your first few weeks is to find housing, but you didn't need us to tell you that, did you? For details on housing, check out §4.4 (on-campus resources), §5 (Santa Cruz-wide info), and the list of housing links in §A.

3 The Astronomy & Astrophysics Dept.

Welcome to grad school at the UCSC Astro Dept. There's a lot to cover here, and we'll probably miss a lot, but here goes.

3.1 Who's who

Grads

Table 1 has the current graduate student population, including you, as of 1 August 2001.

Table 1: **Current Astronomy & Astrophysics graduate students** as of January 2002.

Name	*Email*[a]	*Year*[b]	*Previous Education*	*Current Advisor(s)*
Phil Choi	`pchoi`	AC	Wesleyan	Guhathakurta
Ian Dobbs-Dixon	`iandd`	1	UC-Santa Cruz	...
Shawfeng Dong	`dong`	AC	U. of Science & Tech. (China)	Lin
Marla Geha	`mgeha`	AC	Cornell, NMSU	Guhathakurta
Justin Harker	`jharker`	1	U. of Wisconsin-Madison	...
Justin Howell	`jhhowell`	$\sim$4	Caltech, Columbia	Guhathakurta
Patrik Jonsson	`patrik`	AC	Uppsala (Sweden)	Primack, Faber
Michael Kuhlen	`mqk`	2	Caltech	Woosley, Madau
David Lai	`david`	1	Reed	...
Laura Langland-Shula	`laura`	1	...	...
Sarah Martell	`martell`	1	U. of Washington	...
Alex McDaniel	`alexm`	2	Princeton	Laughlin
Jason Melbourne	`jmel`	1	Wesleyan	...
Anne Metevier	`anne`	AC	Northwestern	Koo
Greg Novak	`novak`	1	Harvard	Lin
Lynne Raschke	`lynne`	4	Haverford	Faber
Tami Rogers	`tami`	3	U. of Arizona	Woosley
Linda Schroder	`linda`	AC	Arizona State	Brodie
Scott Seagroves	`scott`	3	UNC-Chapel Hill	Thorsett
Andrew Sheinis	`sheinis`	AC	UMass-Amherst, Worcester	Miller
Kim-Vy Tran	`vy`	AC	U. of Arizona	Illingworth
Kurtis Williams	`williams`	5	Penn State	Bolte
Weiqun Zhang	`zhang`	AC	U. of Science & Tech. (China)	Woosley

[a] all emails are @ucolick.org

[b] Once a student has successfully proposed a thesis topic (passed his or her "Qualifying Exam"), that student has Advanced to Candidacy (AC). At that point it becomes very easy to lose track of how long s/he's been here ...

Faculty and other researchers

What follows is a very concise, *definitely non-exhaustive* summary of the faculty's research interests. Listed in the "Notes" field are current projects or collaborations that person is affiliated with; see §3.2 for descriptions of these projects.

GEORGE BLUMENTHAL
Office: 439B Kerr *Phone:* 459-2005 *Email:* george@ucolick.org
Notes:
Issues in theoretical cosmology, including: the role of dark matter; the origin of structure in the universe; galaxy evolution; voids; inflation; perturbations in the CMB. Also: AGNs; accretion disks; GRBs.

PETER BODENHEIMER
Office: 415F Kerr *Phone:* 459-2064 *Email:* peter@ucolick.org
Notes: CODEP
Theoretical studies of star and planet formation, including: calculation of protostellar collapse; multiple-star system formation; evolution of protostellar disks and the formation of planets within them; giant planets; solar system formation.

MICHAEL BOLTE
Office: 401 Kerr *Phone:* 459-3896 *Email:* bolte@ucolick.org
Notes: CELT
Primarily observational studies of globular clusters as tests of theories about stellar structure & evolution, star formation, and for constraining the age of the universe. Also: stellar populations; dwarf galaxies; effects of environment on galaxies; instrumentation.

JEAN BRODIE
Office: 141B Kerr *Phone:* 459-2987 *Email:* brodie@ucolick.org
Notes:
Observational studies of Galactic and extragalactic globular clusters; galactic dynamics and chemical evolution; instrumentation.

HARLAND EPPS
Office: 133A Kerr *Phone:* 459-3454 *Email:* epps@ucolick.org
Notes: HST NICMOS
Astronomical instrumentation: optical design, fabrication, and testing.

SANDY FABER
Office: 470 Kerr *Phone:* 459-2944 *Email:* faber@ucolick.org
Notes: DEEP, DEIMOS, CfAO, HST WFC
Observational and theoretical studies of the formation and evolution of galaxies, including: stellar populations; black holes in galactic nuclei; dark matter; velocity fields; high-z galaxies. Also: adaptive optics and astronomical instrumentation.

JOHN FAULKNER
Office: 403 Kerr *Phone:* 459-2815 *Email:* johnf@ucolick.org
Notes:
Theory of stellar evolution, including: red giants and horizontal branch stars; solar models; dwarf novae; nucleosynthesis. Also: cosmology; mathematics; history of science.

RAJA GUHATHAKURTA
Office: 481 Kerr *Phone:* 459-5169 *Email:* raja@ucolick.org
Notes: DEEP, CfAO, CELT
Observational studies of globular clusters, galaxies, and galaxy evolution, including: interacting galaxies; dwarf galaxies; faint blue galaxies; Tully-Fisher relation; dust and reddening; stellar populations; gravitational lensing; dark matter. Also: adaptive optics.

Garth Illingworth
Office: 467 Kerr *Phone:* 459-2843 *Email:* gdi@ucolick.org
Notes: DEEP, HST ACS, NGST
Observational studies of high-z galaxies; galaxy formation and evolution, including: structure; kinematics; stellar populations. Also: space telescopes.

Burt Jones
Office: 473A Kerr *Phone:* 459-2384 *Email:* jones@ucolick.org
Notes:
Observational studies of stellar dynamics and stellar evolution, including: astrometry and proper motion studies; spectroscopy of young and low-mass stars; the rotation, lithium abundance, age, and chromospheric activity of solar-type stars.

David Koo
Office: 435 Kerr *Phone:* 459-2130 *Email:* koo@ucolick.org
Notes: DEEP, DEIMOS, CfAO
Observational cosmology: angular and redshift distributions of galaxies, quasars, and gas; clustering; stellar populations; galaxy evolution. Also: adaptive optics and astronomical instrumentation.

Greg Laughlin
Office: 464 Kerr *Phone:* 459-3208 *Email:* laugh@ucolick.org
Notes: CODEP
Theoretical astrophysics, including topics in planet formation and evolution; extrasolar planet searches; multiple-planet systems; dynamical interactions; evolution of the universe into the distant future.

Doug Lin
Office: 461 Kerr *Phone:* 459-2732 *Email:* lin@ucolick.org
Notes: CODEP
Theoretical astrophysics: star and planet formation; dynamical evolution of planetary, stellar, and galactic systems; galaxy formation; galactic structure; globular clusters and dwarf galaxies; interacting galaxies; astrophysical fluid dynamics; AGNs; accretion.

Piero Madau
Office: 473 Kerr *Phone:* 459-3839 *Email:* pmadau@ucolick.org
Notes:
Theoretical astrophysics, including: early structure formation; reionization; the intergalactic medium; universe at high-z; radiative transfer; high-energy astrophysics.

Bill Mathews
Office: 421 Kerr *Phone:* 459-2074 *Email:* mathews@ucolick.org
Notes:
Theoretical studies of astrophysical gas dynamics, including: galactic winds; cooling flows; elliptical galaxies; instabilities and dynamics in cores of quasars and AGNs.

Claire Max
Office: 14 Kerr *Phone:* 459-2049 *Email:* max@ucolick.org
Notes: CfAO
Adaptive optics instrumentation; science with adaptive optics; solar system science.

Joseph Miller
Office: Nat. Sci. II Annex *Phone:* 459-2991 *Email:* miller@ucolick.org
Notes: Director of UC Observatories, CELT
Observational studies of AGNs. Also: astronomical instrumentation and telescopes.

Jerry Nelson
Office: 463 Kerr *Phone:* 459-5132 *Email:* jnelson@ucolick.org
Notes: CfAO (Director), CELT
Design of giant telescopes; astronomical instrumentation; adaptive optics.

Joel Primack
Office: 209 Kerr *Phone:* 459-2580 *Email:* joel@ucolick.org
Notes: UCSC Physics Dept., SCIPP, DEEP
Theoretical cosmology, including: nature and composition of dark matter; galaxy formation and evolution by analytic and semi-analytic methods; N-body and hydrodynamical simulations of structure formation and galaxy interactions.

Jason X. Prochaska *New faculty member, arriving summer 2002*
Office: *Phone:* *Email:* @ucolick.org
Notes:
Observational cosmology and galaxy formation, including: quasar absorption line systems, chemical abundances at high-z and in the Galaxy, missing baryons, high-z galaxy dynamics, star formation. Also: ISM, cosmological simulations, metal-poor stars.

Graeme Smith
Office: 149 Kerr *Phone:* 459-2907 *Email:* graeme@ucolick.org
Notes:
Observational studies of old stellar populations; stellar evolution; Galactic chemical evolution; red giants; comets.

Steve Thorsett
Office: 439A Kerr *Phone:* 459-5170 *Email:* thorsett@ucolick.org
Notes: HETE, GLAST
Observational studies of compact objects, including: pulsar timing, dynamics, & ages; neutron stars; GRBs & GRB afterglows. Also: radio observations & instrumentation; high-precision VLBI; GRB host galaxy observations; high-energy astrophysics.

Steve Vogt
Office: 129 Kerr *Phone:* 459-2151 *Email:* vogt@ucolick.org
Notes: CODEP, CELT
Design and use of high-resolution spectrometers; extrasolar planets; quasar spectra.

Stan Woosley
Office: 433A Kerr *Phone:* 459-2976 *Email:* woosley@ucolick.org
Notes: Department Chair, CODEP, HETE
Theoretical high-energy astrophysics, including supernovae and gamma-ray bursts. Also: stellar evolution, particularly of high-mass stars; hydrodynamics; nucleosynthesis; nuclear astrophysics.

Besides the faculty, there are some other relatively permanent researchers, valuable resources you should know about:

Julian Christou
Office: 59 Kerr *Phone:* 459-5775 *Email:* christou@ucolick.org
Notes: CfAO
Adaptive optics, especially characterization of PSFs and deconvolution; science with AO.

Rachel Dewey
Office: 415G Kerr *Phone:* 459-3081 *Email:* dewey@ucolick.org
Notes:
Radio pulsars; astronomy education and outreach.

Terry Mast
Office: 229 Kerr *Phone:* 459-3807 *Email:* mast@ucolick.org
Notes: CfAO, CELT
Design of giant telescopes; astronomical instrumentation; adaptive optics and its applications.

Ruth Peterson
Office: 17 Kerr *Phone:* 459-3559 *Email:* peterson@ucolick.org
Notes:
Spectroscopy of stellar populations.

Drew Phillips
Office: 499 Kerr *Phone:* 459-3841 *Email:* phillips@ucolick.org
Notes: CfAO, DEEP, DEIMOS
High-z galaxies and galaxy evolution; instrumentation; adaptive optics.

Scott Severson
Office: 241 Nat. Sci. II *Phone:* 459-5149 *Email:* severson@ucolick.org
Notes:
IR instrumentation, adaptive optics, science with AO.

And of course, like any healthy department, we have lots of top-notch postdocs. It is quite likely you will work closely with some, but they're an even more transient population than graduate students, and hence hard to list here.

Astronomers vs. professors?

This is a confusing aspect you shouldn't worry about: Some of our faculty are entirely affiliated with the Astronomy & Astrophysics Department; others are only 20% with the department, and 80% with the U. of California Observatories/Lick Observatory (UCO/Lick). This does affect who teaches more classes (the ones with entirely Dept. appointments), but otherwise this is not a concern for graduate students. In all respects all faculty members are well-integrated in the department, and students may work with whomever they wish.

3.2 Projects/Acronyms

Members of UCSC Astronomy & Astrophysics are affiliated with large collaborations and other major projects. Here is a brief summary of some of them, along with a few other acronyms you've seen floating around:

• **CfAO**: `http://www.ucolick.org/~cfao/`
Astronomical images taken from ground-based observatories suffer blurring from turbulence in the atmosphere. 'Adaptive optics' is a set of technologies and techniques for correcting these aberrations in real-time, resulting in images as sharp as those taken from space.

The Center for Adaptive Optics is a major NSF-funded center based in Santa Cruz, but with member institutions from other campuses of UC and from across the nation. Jerry Nelson is director of the CfAO; other Center faculty include Sandy Faber, David Koo, and Raja Guhathakurta. In addition, further researchers (Julian Christou, Drew Phillips), a great host of postdocs, and several grad students are affiliated with the Center.

• **CELT**: `http://www.ucolick.org/~celt/`
The University of California and Caltech are exploring the idea of a 30-meter telescope, and have dubbed this project the California Extremely Large Telescope. (If this seems giant to you, note that the Europeans have begun planning OWL — the Overwhelmingly Large telescope — which will have a 100-meter primary!) CELT and the CfAO are somewhat related, because CELT is being designed for AO from the start.

Jerry Nelson and Terry Mast (who were 'instrumental' in the design and construction of the Keck telescopes) are working on this project. Other faculty affiliates include Mike Bolte, Raja Guhathakurta, Joe Miller, and Steve Vogt.

• **CODEP**: `http://natsci.ucsc.edu/codep/`
CODEP is the Center for the Origin, Dynamics, and Evolution of Planets, and that pretty well explains what they're about. Over the next four years, CODEP will coordinate the hiring of seven new faculty members, some in Astronomy & Astrophysics, some in other departments.

CODEP affiliates in the Dept. include Peter Bodenheimer, Doug Lin, Steve Vogt, and Stan Woosley. Astrophysics grads also enjoy the valuable resources of some other CODEP faculty, including Gary Glatzmaier of the Earth Sciences Dept. (who is an expert on magnetohydrodynamics and dynamos) and Erik Asphaug of the Institute of Tectonics (who is an expert on impacts within the solar system and other aspects of planetary science).

• **DEEP**: `http://www.ucolick.org/~deep/`
The Deep Extragalactic Evolutionary Probe, composed of researchers at UCSC in collaboration with researchers at Berkeley, Caltech, U. of Chicago, Hawaii, and Johns Hopkins, is a long-term Keck and HST project. The broad goals of this large-scale survey of distant, faint field galaxies include studying galaxy formation and evolution, the origin of large-scale structure, the nature and role of dark matter, and the overall geometry of the universe. Phase I of DEEP, already under way, involves Keck observations with the current suite of instruments, and HST observations. The next phase of DEEP will employ DEIMOS, a new spectrograph for Keck being constructed at Santa Cruz, and SIRTF, NASA's next great space telescope.

Members of the DEEP team at Santa Cruz include Sandy Faber, Raja Guhathakurta, Garth Illingworth, David Koo, and several postdocs.

• **DEIMOS**: `http://www.ucolick.org/~loen/Deimos/deimos.html`
The Deep Extragalactic Imaging Multi-Object Spectrograph is an impressive Keck instrument being built at Santa Cruz. Sandy Faber is the PI of the project; other Santa Cruz researchers affiliated with DEIMOS include Terry Mast, Garth Illingworth, Drew Phillips, and other DEEP team members.

• **GLAST**: `http://glast.gsfc.nasa.gov`
The Gamma-ray Large Area Space Telescope is a future NASA mission that may launch as early as 2005. It will study high-energy astrophysical phenomena, including but not limited to neutron stars and GRBs.

Steve Thorsett is an interdisciplinary scientist on the GLAST team.

• **HETE**: `http://space.mit.edu/HETE/`
The High Energy Transient Explorer mission recently launched, and the commissioning of its instruments is under way. HETE's goal is to provide precise localizations of gamma-ray bursts. This will facilitate follow-up observations of the afterglows, and further our understanding of GRBs a great deal.

Stan Woosley and Steve Thorsett are affiliated with the project.

• **HST**: `http://www.stsci.edu/`
Of course, one of the premier instruments of astronomy today is the Hubble Space Telescope. Harland Epps was involved in the optical design of the NICMOS instrument; Sandy Faber is on the WFC team. Garth Illingworth is affiliated with the Advanced Camera, an instrument slated to be installed on HST as a testbed for NGST technologies. Many (if not most) researchers at UCSC work with HST data regularly.

• **NGST**: `http://ngst.gsfc.nasa.gov/`
A high priority in major astronomy funding over the next decade, the proposed Next Generation Space Telescope will be an orbiting 8-meter class telescope. It is intended to pick up where HST leaves off . . .

Garth Illingworth has some affiliations with the project.

• **SCIPP**: `http://scipp.ucsc.edu`
The Santa Cruz Institute for Particle Physics, primarily concerned with accelerator experiments at SLAC and CERN, is also involved in particle and high-energy astrophysics. Current interests include the Milagro cosmic ray airshower detector and the GLAST mission. In addition, SCIPP supports the work of theoretical cosmology.

Joel Primack, George Blumenthal, and several members of the Physics Dept. faculty are affiliated with SCIPP.

• **UCO/Lick**: `http://www.ucolick.org`
The University of California Observatories/Lick Observatory is an organized research unit of the UC system. Lick Observatory, located atop Mt. Hamilton near San Jose, harbors 3-m and 1-m 'workhorse' telescopes that are extensively used by faculty and graduate students. In addition, UCO/Lick administers the UC portion of access to Keck Observatory atop Mauna Kea, which is shared with Caltech. The twin Keck telescopes (10-m) are the largest in the world, and UCSC researchers make extensive use of this facility.

3.3 The graduate curriculum

In roughly chronological order, here's how you get from where you are now to a PhD:

Classes

Table 2 lists the classes usually taught in our curriculum. In approximately your first two years (that's 6 quarters, not 4 semesters), you will take 12 "real" classes, plus 2 others. Let me get the "others" out of the way first: one (Intro. to Research) is simply a course where each faculty member comes by to chat with your class of first-years about his or her research; the other is Independent Study, which you must take in connection with your Research Project. Read more about that below.

Table 2: **Astronomy & Astrophysics courses.**
(**Boldface** indicates a required class; 14 total required.)

Physics (3)[a]	*Stars* (3)	*Galaxies* (3)	*Other* (2)
E&M/Plasmas	**Stellar Structure**	**Galaxies A**	**Intro. to Research**
General Relativity	Star Formation	Galaxies B	**Ind. Study**
Physics of Astrophysics A	Star Death	Galaxies C	Observation Techniques
Physics of Astrophysics B	Accretion	Cosmology	Radio/Sub-mm
Gas Dynamics	Compact Objects	Low-Density	Instrumentation
QM sequence[b]	Atmospheres	Stellar Dynamics	Planetary Science
Classical Mechanics[b]			Numerical Techniques
Magnetohydrodynamics[b]			

[a]The minimum number of classes you must take from each column is listed.
[b]These courses are taught in other departments.

As for the 12 "real" classes: You will be required to take 3 classes in particular. One is an E&M class on radiation and plasma physics; one is a standard course in stellar structure & evolution; one is a standard course on galaxies. After that, you must take at least 2 more classes from the "physics" column, 2 more from the "stars" column, 2 more from the "galaxies" column, and then take whatever you like until you have 12. Read more about classes in §3.4.

TA

At least one quarter you must be a Teaching Assistant. Typically students do this early, when they don't necessarily have a regular research advisor for financial support anyway. You become a TA by signing up to TA for a particular class or by consultation with Mary (the Dept. Manager). There may be some paperwork to fill out and you have to be on the appropriate payroll. TAs at UCSC are unionized; this can have arbitrarily small or large impact here in the Astronomy & Astrophysics Dept. where TAs have usually not been particularly abused. TAing involves teaching sections, holding office hours, and grading papers. You may need to guest lecture for the professor when s/he's out of town.

Research Project

Ideally during the summer between your 1st and 2nd year, you will work on a roughly Master's-thesis-size project. (This is sometimes referred to as the Second-Year Project.) A good thing to do is to use the Independent Study course in the spring before or the fall after that summer, either to prepare for your project or to finish it up. Your first summer is coming sooner than you think, so start thinking about this! When you're done, if you can get a publication out of it, that's great; if not you must submit a journal-style writeup to the Dept. to help fulfill this requirement. You must also give a talk (in the form of a FLASH, see below) on your Research Project.

It is certainly allowed (sometimes even encouraged) to change topics completely between your Research Project and your thesis. So don't worry that in your first year you are choosing the field you will spend the rest of your life on. Of course, if you find that you *do* want to continue in a certain specialty beyond the Research Project requirements, and into a thesis, well that's fine too.

FLASH

FLASH (the Friday Lunch Astronomy Seminar Hour) is a weekly talk given by visitors, faculty, postdocs, or grads. In connection with the Research Project, you must give a FLASH by the end of your 2nd year to finish the completion of this requirement.

Prelims

The prelims are two 3-hour written examinations: one is on basic physics and the other is on graduate-level astronomy & astrophysics. The department offers the prelims every June. You may pass either or both exams in your first attempt. You really should pass both sections by the summer after your 2nd year, i.e., after your second attempt. However, see the Dept. Review.

You should get your hands on prelims from previous years; that's the best way to grasp what level the exams are at. But basically, the physics exam is intended to test your use of basic physics and physical intuition. In principle there is no need to have taken the grad astro classes for this exam. You are expected to answer/attempt all questions on the physics exam. The astro exam, on the other hand, is usually formatted as a question or two from every class that has been offered in our dept. over the previous two years. (In addition, sometimes classes from outside the dept. are included if it is known that astro students took the class or it otherwise seems relevant.) You are then usually asked to answer/attempt a portion of the questions, of your choosing.

Dept. Review

Typically just before your 3rd year the faculty review your progress. By the time of the Dept. Review, you should have completed your classes, your Research Project and its FLASH, and passed the prelims. "Passing" the Dept. Review typically means being granted a Master's and being encouraged toward thesis work. In other instances you may be provisionally passed with the opportunity to re-take the prelims or an extension on your FLASH. In principle, the faculty could choose not to pass you.

Qual

After completing classes, prelims, and all Research Project requirements, it's time to start thinking about a thesis. The Qualifying Exam is the place to propose and defend a thesis topic; that means you don't necessarily have to complete lots of the thesis work before this exam. The Qual is a defense-style exam: you give some presentation but also face comments, objections, and suggestions from your committee. Students are encouraged to complete their Qual by the end of their 3rd year, and are required to do so before the end of their 4th. Upon passing the Qual, one has "Advanced to Candidacy".

More FLASHes

You need to give a couple more FLASHes as you progress on your dissertation work; this is good practice for your thesis defense and all the talks you'll have to give as you apply for postdocs.

Defense

Finally, of course, you must write a thesis and defend it in front of your committee. Hopefully your thesis is composed of several publications you've written while you worked; that will help with your postdoc applications. Then you're done!

3.4 Classes

A little more about classes: To fulfill your class requirements, there will be quarters in which you will have to take 3 classes. Our advice is to be careful when you do this. Ask around about the relative workloads of various classes, and factor in whether you'll be TAing or whether you expect to get any research done. It is nearly impossible (or dangerously stressful) to TA or GSR while taking 3 relatively serious classes.

The current mode of class scheduling in the dept. works like this: one year is a "stars" year — 220A (Stellar Structure & Evolution), 220B (Star & Planet Formation), and 220C (Late Stellar Evolution/Death/Supernovae) are taught in succession in such years. The next year, then, is a "galaxies" year, with an analogous sequence of courses taught. In any year there are other courses taught from any and all columns as well.

It is not always the case that the same person teaches the same course every time, but often it is. Here's a quick list of the courses and who you might want to chat with about them, along with a pithy statement and the textbook used if there is a consistent one. Be warned that there's been some tinkering with what goes in what classes, and that continues to go on, so don't take this as cast in stone:

AY202: E&M/Plasma Physics George Blumenthal. Basically a course on the second half of Jackson — classical radiation processes. A required class for astro grads (the required class of the "physics" column); often cross-listed as PH213, the second half of the physics grads' E&M sequence.

AY204A: Physics of Astrophysics A Doug Lin. What material goes in what order in the PoA series is in flux. In the past this has been a course on dynamics and statistical mechanics. Not sure what it will be in the future.

AY204B: Physics of Astrophysics B George Blumenthal. Ditto the previous PoA disclaimer. In the past the course has been on the disparate topics of quantum radiation processes and MHD.

AY205: Intro to Astro Research Graeme Smith. Graeme organizes a seminar series, basically, wherein each faculty member comes and describes her/his research with your class of 1^{st}-years. In some sense not a "real" class, but required.

AY210: Stellar Atmospheres ??. Not offered in anyone's memory.

AY220A: Stellar Structure & Evolution Peter Bodenheimer. The standard course in stellar structure. Peter uses Kippenhahn & Weigert as the text. Pencil-and-paper as well as stellar model coding is involved. This class is the required course in the "stars" column.

AY220B: Star & Planet Formation Peter Bodenheimer. Much like 220A in form; assumes 220A as prerequisite.

AY220C: Advanced Stages of Stellar Evolution & Nucleosynthesis Stan Woosley. "Star Death" or "Supernovae" — no one calls it by the catalog name. Assumes 220A as prerequisite.

AY222: Planetary Science Doug Lin. Not taught recently, but will be this year, so tell us how it goes.

AY225: Compact Objects Steve Thorsett. Not taught recently.

AY226: General Relativity George Blumenthal. When last taught, George used Weinberg's text.

AY230: Low-Density Astrophysics Bill Mathews. Sort of a course on the ISM.

AY231: Astrophysical Gas Dynamics Bill Mathews. Also sort of a course on the ISM.

AY233: Physical Cosmology George Blumenthal. Regarded as complementary, but perhaps prerequisite to, Joel's class PHYS224.

AY235: Numerical Techniques Greg Laughlin. A new class.

AY237: Accretion Doug Lin. Don't know very much about this class, sorry.

AY240A: Galactic & Extragalactic Systems Sandy Faber. The required class from the "galaxies" column. Binney & Merrifield with some from Binney & Tremaine.

AY240B: ditto? Garth Illingworth. Not sure what the "official" name of this is, but like AY240A but with more emphasis on high-z galaxies.

AY240C: ditto? Piero Madau. Very high redshift cosmology.

AY253: Stellar Dynamics Doug Lin. A standard course out of Binney & Tremaine.

AY257: Modern Observational Techniques Mike Bolte. Data reduction techniques, etc.

AY260: Instrumentation Jerry Nelson & Terry Mast. Jerry and Terry organize a series of lectures by themselves and many others on topics in instrumentation.

AY275: Radio/Sub-mm Steve Thorsett. Last time Steve suggested Rohlfs & Wilson, and Burke & Graham-Smith.

PH224: Cosmology/Early Universe Joel Primack. A course with a heavy emphasis on current research.

PH215-218: QM/QFT sequence Various instructors. Standard non-relativistic quantum mechanics (215 & 216) followed by quantum field theory (217 & 218). A sequence, each class a prerequisite for the later courses.

EMS275: Magnetohydrodynamics Gary Glatzmaier. Offered in the Earth & Marine Sciences Dept. Gary also teaches courses in fluid dynamics that parallel the astro dept's.

EMS290: Topics in Planetary Science Erik Asphaug. A seminar.

ENG206: Bayesian Statistics David Draper. A new course in the Applied Mathematics dept.

AY292: Seminar The astro colloquium.

AY297: Independent Study What you sign up for to get credit-hours for non-thesis research, like your 2^{nd}-year Research Project. Mary can give you the codes to sign up with your particular advisor.

AY299: Thesis Research What you sign up for to get credit-hours (and thus make you a student) after classes are done and you are working on your thesis.

AY301: Teaching What you sign up for so that TAing appears on your transcript.

If you take classes outside the department, keep in touch with Steve Thorsett or Stan Woosley (Dept. Chair) about what requirements they might fulfill. We have in mind here some courses in the Physics Dept. or in Earth & Marine Sciences.

You register for classes via the Schedule of Classes and Teleslug. The SoC is at `http://reg.ucsc.edu/soc/` while Teleslug is `http://teleslug.ucsc.edu/`. All that is explained in §4.

In principle you have the option to take classes for a grade, rather than Pass/Fail (or, we guess, Satisfactory/Unsatisfactory is what your grade record actually says). The consensus opinion is that there is no reason to opt for grades, and we aren't aware of grads who do or have. You will receive "narrative evaluations" of your performance, once the professor gets around to writing them. These can either be essentially just a grade ("Student X performed in the middle third of the class"), or, in the best of situations, a highly-detailed account of your strengths and weaknesses. This can alert you to what you might want to work on.

3.5 Advising

A logical question you might ask at this point is, "Who's my advisor?" In some sense, you don't have (or really need) one, until you are doing research. Then whomever you work for is your advisor.

Before you are doing research, if you feel you need advising, in some sense any faculty member will do. More strictly, though, Steve Thorsett is the Associate Chair in charge of the grad program. So probably, you should start with him on whatever advising questions you have.

Once you start research, your research advisor is your advisor. (You should still feel free to shop around for opinions, however.) Upon passing the Dept. Review, you will need to form a committee of advisors to serve as your Qualifying Exam Committee. This same committee will likely become all or most of your Thesis Exam Committee when you do your defense.

3.6 Department events

There is an extremely informal coffee/tea/cookie break at 3:30pm nearly every day. It takes place at the table and chairs in front of the elevators on the 4^{th} floor of Kerr Hall.

The Astronomy & Astrophysics colloquium is on Wednesday afternoons. Cookies and coffee start at around 3:30pm, usually in Kerr 283 but sometimes in the 2^{nd} floor lobby. Then, eventually, people wander up to Nat. Sci. Annex room 101, where the colloquium talk is actually held. The talk typically starts around 4:00. **See 3.7 for important info about colloquium cookies.**

The FLASH — Friday Lunch Astronomy Seminar Hour — is held on Fridays at 12:30 in Kerr 283. Bring your lunch and see a talk. Sometimes there are FLASH-like talks on other days, given cute names like MLASH, THLASH, etc.

The talk schedule for a week is usually emailed out on Monday. Repeated reminders of the talk may come from the speaker's host(s). In addition, the current talk schedule is available at `http://www.astro.ucsc.edu/talks.xml`.

Some other talks in other departments: The Physics Dept. colloquium is on Thursday afternoons, with a similar 3:30 cookies and 4:00 talk schedule. The colloquium schedule is at `http://maxwell.ucsc.edu/events/colloquia.html`. The CODEP seminars are always moving around, but the schedule is at `http://www.es.ucsc.edu/~asphaug/taps.html`.

GAS, the Grad Astro Seminar, is something like a journal club. Grads give short informal talks on a rotating schedule. Check it out at `http://www.ucolick.org/~novak/Gas/`.

Subject to the whims of the Beer Czar, we usually have Beer Hour on Friday evenings.

Other less frequent department events include:

- The annual Lick Picnic, at the Observatory on Mt. Hamilton. This year it's on September 22.
- A welcoming reception for you, the incoming grad students, sometime in the fall. Be warned, you will probably be asked to supply some story about yourself or something.
- Cake and champagne for grads completing their defenses; goodbye festivities for departing postdocs, grads, etc., the occasional wild party at a faculty member's house, ...
- Prospective season: hosting prospective graduate students, answering questions, taking them out to dinner, etc., as was done for you when you were a prospective.

3.7 Your dept. responsibilities; Czars

You should sign up for ASTR292, which is labeled "seminar" in the Schedule of Classes. It's actually the Dept. colloquium, it isn't really a class at all. It's just necessary that people sign up so that the department can reserve the room.

Every grad student who has not yet passed his/her Qual is needed to prepare cookies & coffee for colloquium. Each week, it becomes the next student's turn. When it's your turn, you should go buy about $20 worth of cookies and other goodies. You prepare the coffee, cookies, and set up the room where the refreshments will be served. You clean up after the colloquium, turn in your receipt to the office to get reimbursed, and you're done. The Cookie Czar will explain all this to you as well. Or you can check out the instructions at the current cookie czar's website: `http://www.ucolick.org/~laura/cookies/`. You may wonder why this is our job — the origins are lost to unrecorded history.

Various other responsibilities are delegated through *czarships*. In principle, czars are elected democratically by the grads; in practice, czars often choose their successors and the voting is a formality. As the name suggests, czars typically have complete reign over their domain. Czars are determined in a meeting held in the fall, long enough after you get here that you'll have figured most of this out. Here's some of the current czars:

Czar Czar The 'czar of czars' is our graduate student representative in Dept. faculty meetings — our way of providing input into many department decisions. Also, the czar czar is in charge of grad office space (so is sometimes also known as Space Czar). This position can entail a lot of work. Currently the position is in flux, with some of the duties being filled by Patrik Jonsson.

Telescope Czar The telescope czar keeps track of the locations, state of health, sign-outs, etc., of the several small amateur telescopes the department owns. The current telescope czar is Jason Melbourne.

CPMC Czar The CPMC is the Computing Policy Management Committee. This czar is the grad representative to that committee. Currently Phil Choi.

Beer Czar This extremely important czar is in charge of beer hour on Friday evenings. In the distant past beer czars arranged for folks to meet at a bar downtown; the current beer czar has simplified the process by bringing beer and pizza to the Kerr Hall balcony. Prices are low; chances for hilarity are high. The current beer czars are Mike Kuhlen and Ian Dobbs-Dixon.

Colloquium Cookie Czar This czar is in charge of the assignment of colloquium cookie duties to pre-qual grads, as well as maintaining all the necessary supplies. The current colloquium cookie czar is Laura Langland-Shula.

Prospective Czar This czar has the arduous task of coordinating the visits and recruitment efforts for prospective graduate students. This position can be quite a lot of work. This year's prospective czar is Tami Rogers, assisted by Alex McDaniel.

Ask-an-Astronomer OK, it doesn't have "czar" in its name. This team answers questions from our ask-an-astronomer website. The team is currently Kurtis Williams, Marla Geha, Mike Kuhlen, and Greg Novak.

GSA rep Another without "czar" — so sue us. This person is the Astro department representative to the Graduate Student Association.

Mail Czar This czar or czars handles paper mail the Observatory and Dept. receive from the public, often with questions similar to what Ask-an-Astronomer gets. Currently these are David Lai and Sarah Martell.

Admissions committee The faculty allow a grad to sit on the admissions committee that decides who enters our grad program. Last year this representative was Anne Metevier.

Advising The grad who serves as advising point-person is Scott Seagroves.

RSI Czar This czar is in charge of distributing painful debilitating injuries — just kidding. Many grad students have suffered a little or a lot from RSI — repetitive strain injuries — because we sit around and type all the time. This czarship was created as a watchdog/activist for various things like ergonomic furniture, seminars, `xwrits` software (that reminds you to take wrist breaks), and other safety concerns. Currently the RSI czar is Kurtis Williams.

Phone Czars Traditionally (but not without protest) the inhabitants of Kerr 413 have phone calls from the public directed toward them. These calls range from "Hey what's this bright star I see for an hour or so after sunset in the west?" to "Is it true that we will all die because of the tidal forces during a planetary alignment?" and so on. You don't always know the answers — often you don't even understand the questions — but just do your best and be nice.

GAS Czar The grad student journal-club like seminar is maintained by Greg Novak.

Of course, other things come up that need to be done, that don't necessarily fit into these czarships. For instance, the document you are reading needed to be written; similarly a FAQ was written for prospective students in the spring (and some of this is cribbed from there). Usually we take a czar-like attitude about these things too, meaning once someone has volunteered to take care of a task it generally becomes that person's exclusive domain.

3.8 Computing

The Lick and Dept. system administrators are NICS — Network, Information, and Computing Services. Their email alias is `nics@ucolick.org`. Be warned that the information in this section is more likely to go out-of-date soon, given the nature of computers and computing.

Hardware

There are NICS-managed and non-NICS-managed computers on the network; the non-NICS-managed hosts are maintained by their users. Among the NICS-managed hosts, there are several public machines which everyone has accounts on. When you first arrive, you will likely have a computer on your desk; if not you will have an X terminal from which you login to one of these public machines. (Some of the public machines are unable to serve up X sessions, but you may still login to them via `ssh` once you have a session running.)

Public machines running SunOS/Solaris include `isis` and `megatron`. Public DECs running Digital UNIX include `bigdog`. Public Linux boxes include `cobra`, `mariachi` and `zoltar`. We have probably missed some public machines.

Your public account will appear as `/u/yourusername`, which is usually visible from any NICS-managed machine (public or not) as `/home/public/yourusername`.

If you don't have a computer, eventually you will move up from the X terminal on your desk to a computer of your own, so that you do not have to share processor time with others. This will mean you will have both a public account and a separate, private account on that machine. That machine may be a NICS hand-me-down, or a machine bought for you by an advisor (which can then be NICS-managed or not).

A quick list of some printers: the main general-use printer on the 4^{th} floor is, naturally enough, `floor4`. The color printer next to it is `color`. You can use the command `printers` to see lots of printers around the dept. if you are curious what a printer's name is.

Software

Usually, though not always, the set of NICS-supported software is consistent across machines running the same OS. That is to say, a given program like `enscript` has been installed on the Solaris hosts, and is consistent no matter which one you are logged into. It may happen to not exist on the Linux hosts, however. If that becomes a problem you could always ask NICS to install something.

Often one can download open-source software and install it privately on your own account. This is fine. But make sure the software you want *really* doesn't exist elsewhere or that it's not worth it to ask NICS to install/update it, before you go using your own disk space on it. (An example: I (SS) keep my own set of LaTeX packages, my own set of IDL Astro Library routines, etc., because I keep them more up-to-date than NICS does.)

OK, this will certainly not be an exhaustive list, but here's some of the software commonly used around here:

Network/Internet All insecure forms of login are disabled; we use `ssh` for remote logins (also `slogin`) and remote command-execution. Print to the printers via `lpr` and other scripts/variations thereof; query the print queue with `lpq`. `netscape` is the default browser, but you could try `opera` or `mozilla`. Mail programs used by folks include `pine`, `elm`, `mutt`, and UNIX `mail`.

Document production Standard editors like `emacs`, `pico`, `vi`, etc., are used around here. We have a fairly standard TeX/LaTeX/AASTeX/BibTeX distribution. Some people use StarOffice (`soffice`) for working with documents (and you can make PowerPoint-like presentations). `xfig` is a clunky but useful graphics-production program; for graphics manipulation we also have `gimp`.

Viewers For viewing all these sorts of documents, we have `xdvi` as part of the standard TeX distribution — and we forgot to mention `dvips` and `dvipdf` for making PostScript and PDF files from your LaTeX dvi output. Various implementations of GhostScript (`gv` and `gs`) are used to look at PS and PDF files; often more useful for PDF is `acroread`. `xv` is useful for looking at graphics files in almost any format.

Science Here's where we're most likely incomplete. For coding, standard `f77`, `f90`, `cc`, etc., compilers are around. Also people code in IDL (`idl`), `perl`, other scripting languages, and the standard UNIX shell scripts plus `sed`, `awk`, and derivatives. For producing graphics/plots there are IDL, SuperMongo (`sm`), the `pgplot` and `pgperl` routines for producing plots from within other code, `xmgrace`, and we're sure more that we're forgetting. Data reduction with IRAF (plus `ximtool` and SAOImage/`ds9`), IDL, and other standard stuff is, well, standard. Other, more specialized packages like DAOPHOT/ALLSTAR/ALLFRAME, GIM2D, SExtractor, and many many more are usually maintained at the user level (or gotten from the authors) rather than at the system-wide level.

3.9 Funding/Support

The Dept. guarantees support (in some form or another) for its graduate students. There is the occasional Dept. Fellowship, often used to support 1^{st}-year students who take a heavy courseload. You can be a TA; you can be a GSR (Graduate Student Researcher, what is often called an RA position at most other institutions). TAing in our department involves holding discussion sections, office hours, grading papers, etc. GSRs are paid to do research.

You are, of course, encouraged to apply for funding (grants, fellowships, etc.) of your own. This frees you from the particular project an advisor might have a grant for, for instance.

Assuming you don't have external support, you need to secure funding for the next quarter, every quarter. That is, suppose your Dept. fellowship is up (if you have one at all) after, say, two quarters. Then sometime during the winter quarter you need to find someone to do research with during the spring, or else sign up to TA in the spring. The Dept. fellowship given in the first year is the only real instance of "free" money — for the rest of your time you will need to GSR or TA (barring external support).

The pay scale is confusing, and we will probably get it wrong here. The gross pay for a GSR in our department before advancing to candidacy (pre-qual) is "Step 4", \$1566/month. Immediately upon advancing to candidacy the pay increases to "Step 5", \$1670/month. One year later, the pay increases again to "Step 6", \$1748/month. There is a plan which may happen, which would implement a pay *decrease* of one "step" upon year 7 in grad school — an obvious attempt to keep time-to-degree short. Here's the confusing part: TAs, we think, make \$1413/month *if they are not 1st-years.* In your first year, as some sort of break, the Dept. pays your "fees" (a couple hundred dollars a month), so if you TA your pay is a bit higher in your 1st year. Confusing? Yes.

TAs and GSRs are paid at the beginning of each month, for the previous month. This means you may not get paid until November 1, depending on when you joined the payroll. If you are on a fellowship, you will be paid once at the beginning of the quarter — make sure the money lasts! It is possible to take out (rather enormous) federal student loans while in graduate school. Not necessarily a bad thing, but be careful.

3.10 Miscellany

Little things that didn't fit anywhere else are here.

Your address at the mail room (Kerr 9) is something like:

UCO/Lick Observatory
Astronomy Dept., Kerr Hall, UCSC
Santa Cruz, CA 95064

Other variants that take advantage of the UCSC address (1156 High St.) will probably also work.

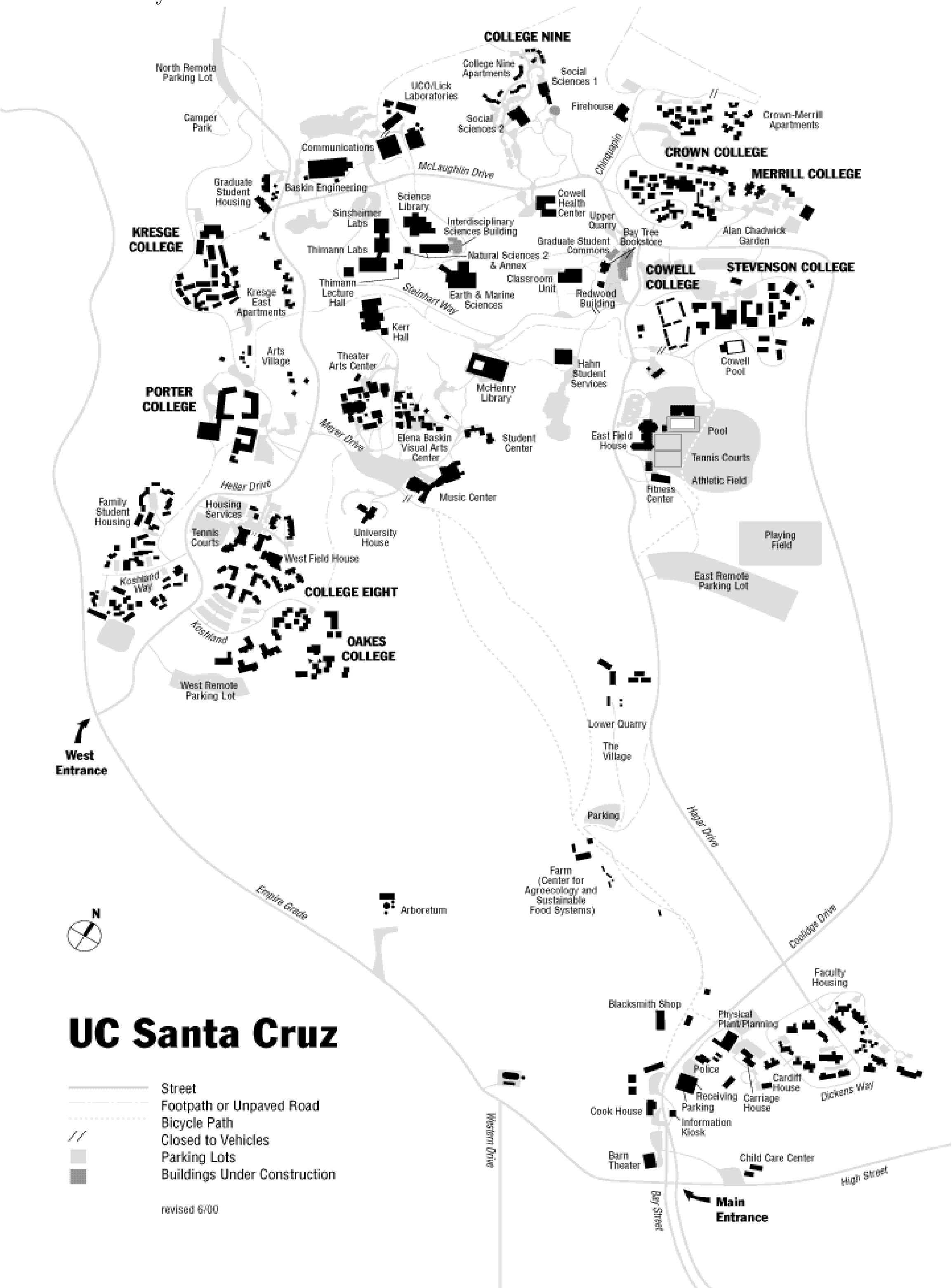
Mary will loan you keys to the supply closet (adjacent to the stairwell on the basement floor) whenever you need. There you can get all sorts of office supplies for your desk. She also keeps a mini-stash in her office.

The copy machines take copy-cards, not real money. When TAing, the dept. can issue you a copy card for that purpose; similarly your research advisor can usually get you a copy card that deducts from his/her grant. For personal use, you need to purchase a copy card from one of the libraries, and maintain money on it.

You need a sticker from Mary at the beginning of each new quarter, which goes on the front of your student ID. This indicates that you are currently enrolled; without the sticker your ID has essentially expired, meaning you can't ride the bus for free and other inconveniences.

4 The University

The UCSC website is, appropriately enough, `http://www.ucsc.edu`. The “A-Z Index” is often useful when you don’t know where to start.



4.1 What's where; campus facilities

It seems silly, but you might want to keep a campus map with you for a while, if you plan to be walking those footpaths and trails through the redwoods. Just getting from Kerr Hall over to seemingly nearby places like McHenry Library or the Hahn Student Services can be confusing at first.

Science Hill

The astronomers and physicists are in Kerr Hall (bet you already knew that), which is at the southern, low-elevation end of "Science Hill". Our new building, the Interdisciplinary Science Building, will be complete soon (and we'll move) — it's located more in the heart of Science Hill, adjacent to Natural Sciences II, the Earth & Marine Sciences building, and the new almost-finished Center for Adaptive Optics building.

"Union"

The campus doesn't really have a student union in the sense that many other campuses do, but we didn't know what else to call this section. There's a region of campus east-northeast of Kerr where the Bay Tree Bookstore (`http://slugstore.ucsc.edu`), Whole Earth Restaurant, and Graduate Student Commons (`http://www2.ucsc.edu/gradcommons/`) are located. Incidentally, ID card services are located adjacent to the bookstore.

Cashier, Registrar, etc.

The campus cashier (`http://www2.ucsc.edu/accts-rec/cashier.htm`), registrar (`http://reg.ucsc.edu`), and financial aid (`http://www2.ucsc.edu/fin-aid/`) offices are all located in Hahn Student Services, sort of between the bookstore and McHenry Library.

Libraries

It is surprising how little we need to use the libraries for work, but you may be curious so here goes. The main university library is McHenry, located east of Kerr along a couple of footpaths. You can buy a personal copy card there, among other things. The Science Library, more likely to be of use, is north of Nat. Sci. II. We think you can buy copy cards there too.

Mail

Outgoing campus mail and US mail can be dropped in the appropriate mailbags in the Dept./Lick mailroom, Kerr 9. There is a US Post Office located in Applied Sciences aka Baskin Engineering, on its west side, lowest floor.

Restaurants and coffee carts

Aside from the Whole Earth Restaurant located at the Grad Commons building, there is also a restaurant in Kresge (whose name is always changing); a co-op at Kresge that sometimes sells good food; a taqueria in Merrill; a coffeeshop in Cowell.

There are Peabody's Coffee carts/stands all over campus: in the Theater Arts Center; in Sinsheimer; in Earth & Marine Sciences; and probably more.

The "lunch lady" brings food to the 2^{nd}-floor lobby of Kerr every weekday at 12:00.

4.2 Structure

The University is organized by Divisions and Colleges. The undergraduate program revolves around the residential colleges (Kresge, College Eight, Porter, etc.), while academia for undergrads and grads involves the divisions. For instance, our department is, as you might expect, a part of the Natural Sciences Division. If you are ever asked what college you belong to (on a form or something), just say you are a grad student. This is confusing because really, we have no college, but there is a Graduate *Division*.

So for your purposes, the only relevant levels in the hierarchy are the Natural Sciences Division, through which you get paid when you TA (among other things), and the Graduate Division, which sets things like the deadlines for submitting one's PhD materials, thesis guidelines, etc.

Many activities, such as registering for classes, changing your address with the Registrar, and more, can be done online. Most of the websites mentioned in the text, along with some more, are collected in §A.

4.3 Transportation and parking

The University runs shuttles around the campus, free of charge. Maps with the various routes are at `http://www2.ucsc.edu/taps/maps.html`. The Santa Cruz bus system has a series of bus routes numbered between 10 and 19, which service the University and town and are free to students during academic quarters. Their routes and other information are available at `http://www.scmtd.com`.

Parking is very expensive. The permits that are available to grads are listed at `http://www2.ucsc.edu/taps/students01.html#grads`; a B permit will cost you $192/year. A much more cost-effective option is the carpool permit; a B carpool permit is $108/quarter, and this can be split among those participating in the carpool. (There are various requirements — you need to show that you live off-campus, show your car registration, etc.) If you are concerned that there might be times when you *don't* want to carpool, you can also buy a packet of 50 "scratch-offs" (one-time-use permits) for $125, once per year.

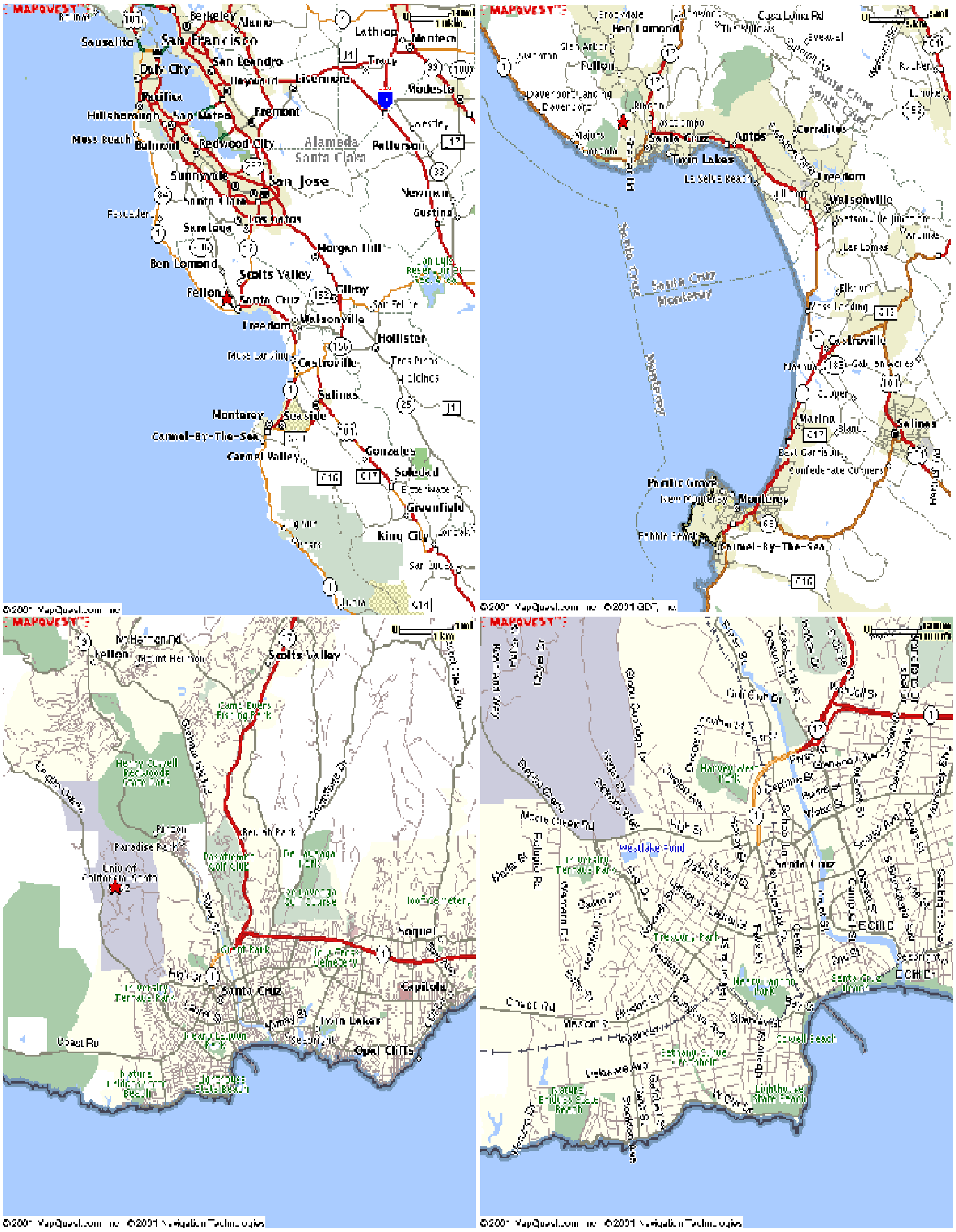
4.4 Housing

There is University housing for graduate students. The rent is expensive even by Santa Cruz standards: $800/month for 2001-2002 and going up every year. This buys you a room in a four-bedroom apartment with other grads. For more, check out `http://www.housing.ucsc.edu/housing/graduate.html`.

If you are married, in a domestic partnership, or have children or other dependents, you are eligible for Family Student Housing. Those with children are given priority; the rent is $810/month, which buys you a two-bedroom townhouse. This is a great deal in Santa Cruz. Check them out at `http://www.housing.ucsc.edu/housing/family.html`.

For living off-campus, the University has the Community Rentals Office where there are many listings. They are physically located in Social Sciences II, but you can now access the listings online at `https://housingweb.ucsc.edu/cro/welcome.asp`.

5 Santa Cruz and environs



5.1 Geography

Basic geography: the greater Santa Cruz area occupies the northern end of the Monterey Bay. Several towns merge smoothly together to form this area: from west to east they are

Santa Cruz, Live Oak, Capitola, Soquel, and Aptos, with of course other small places too that we didn't name. Continuing around the Bay along Hwy 1, one arrives at Watsonville (important for your purposes because it hosts the local Target!) after 12-15 minutes' drive. Continuing on you eventually get to the other "end" of the Monterey Bay at Monterey itself.

So, the immediately adjacent towns that you might see, for instance, in housing listings, are: Santa Cruz, Live Oak, Capitola, Soquel, Aptos, along the Bay roughly from west to east; in the hills north of Santa Cruz along Hwy 9 (and the San Lorenzo River) are the towns (from south to north) of Felton, Ben Lomond, and Boulder Creek; north of the campus along Empire Grade is Bonny Doon; Davenport is northwest of Santa Cruz along Hwy 1; north along Hwy 17 is Scotts Valley.

The urban areas of the San Francisco Bay are closest "over the hill" at the South Bay — San Jose, Santa Clara, etc. This can be a 30-minute drive over Hwy 17, or much much longer depending on traffic. All the larger cities from San Jose up to San Francisco (on the west side of the Bay) or up through Oakland and Berkeley (on the east side of the Bay) are easily two hours' drive from Santa Cruz, and often much shorter depending on traffic.

5.2 Housing

OK, you're probably aware that getting housing in Santa Cruz is an ordeal. There's not much we can say here that will make it *not* an ordeal, so we'll just briefly give you some information.

If access to the University by bus, bike, or easy commute is important to you (as it is to most), then you probably want to live in "westside" Santa Cruz (west of the river), or in "eastside" Santa Cruz or Live Oak. As you move further east to Capitola, Soquel, Aptos, etc., you will find that you have to transfer bus routes to get to the University, or that your 12-minute car ride becomes 50 minutes during rush hour.

It's hard to pin down what a "typical" rent is; it of course depends on how great the place you're renting is. It is possible to pay less than \$500/month, but that is becoming rare. So, expect that you may need to fork out first and last month's rent plus a deposit in order to move in to a place — that could be \$1500–\$2000.

A bunch of places to look for listings are given in §A. Finding housing is a bit of a game. You are in competition with lots of other students, but remember that many of them are undergrads. You stand out if you present yourself differently. Rather than calling yourself a "student", emphasize that you are a "PhD student" or something similar. Don't assume that a potential landlord knows what a grad student is, or that it differs from an 18-year old college freshman. Pursue housing actively; passively leaving messages and waiting for calls back may work eventually but will take much longer than you'd like. If you need references, Mary in the dept. office, or perhaps a faculty member if you ask nicely, will lie and claim to have known you forever. Or if they won't lie, they can at least vouch for the fact that you are employed and all.

5.3 Transportation

It is possible to live in Santa Cruz without a car. The bus system (`http://www.scmtd.com`) is pretty good, and free to enrolled students during academic quarters. Some service is available directly from where you might live to the University; from other locations you might have to transfer routes.

Some public transport is available to get over the hill — via the Santa Cruz route that goes over 17, or via Greyhound and other bus services. Once over the hill it is not hard to make one's way to the Bay area's transit options like BART (`http://www.bart.org`) and Caltrain (`http://www.caltrain.com/caltrain/index.html`).

There is a lot of support for bicyclists: bike racks on buses, a University van with bike trailer from Mission & Bay to campus each morning (see the TAPS webpage); bike racks for BART and CalTrain, etc.

Most who have lived in Santa Cruz without a car gave in after a year or so — it is pretty difficult and time-consuming to go to the city or go to Target in Watsonville without a car.

5.4 Businesses and other miscellany

The main business districts in the Santa Cruz area are: along Mission (Hwy 1) from about Chestnut to Western, particularly around Mission & Bay; "downtown" centered around Pacific and extending a block or two east and west; across the river along Soquel; and many more as you move further east.

Suppose you need to shop for groceries; this seems like something that might come up. Your choices include the Safeway on the westside at Mission and Swift; New Leaf Market or Zanotto's downtown; on the eastside a Safeway along Soquel or an Albertson's along Water. As we write this paragraph we realize that there are places to shop everywhere and it is silly to try to enumerate them so perhaps this section was a bad idea.

Hey, if you just can't live without the mall, there's one at Capitola Rd. & 41st Ave. in Capitola.

Something you may need to know relatively soon is the location of the DMV: they are on Capitola Rd. beyond 41st Avenue (like 42nd or 43rd), in Capitola. It helps if you make an appointment first.

Opinions vary on local banks. Bank of America has the advantage of omnipresent ATMs and all the disadvantages of a faceless corporate conglomerate. At the other extreme are the Bay Federal Credit Union and the Santa Cruz Community Credit Union. Wells-Fargo is also used by some grads.

A Useful websites

Many websites were mentioned in the text, but here we gather some (and add some more) for convenience.

Housing Links

Some resources to help you on your housing search:
TRG Property Management: `http://www.trgprop.com/`
Sherman & Boone Real Estate: `http://www.sb-property.com/property/rental.html`
Santa Cruz Property Management: `http://santacruzproperty.com/listings.cfm`
Bailey Properties:
`http://baileyproperties.com/rental/rentalform.asp?VAR_type=permanent`
UCSC Community Rentals: `https://housingweb.ucsc.edu/cro/welcome.asp`
Santa Cruz Sentinel listings:
`http://www.adquest3D.com/search_new/search.asp?BRD=881& PAG=470`

Dept. and UCSC

Dept.: `http://www.astro.ucsc.edu`
UCO/Lick: `http://www.ucolick.org`
Astro talk schedule: `http://www.astro.ucsc.edu/talks.xml`
Physics colloquium schedule: `http://maxwell.ucsc.edu/events/colloquia.html`
CODEP seminars: `http://www.es.ucsc.edu/~asphaug/taps.html`
Grad Astro Seminar: `http://www.ucolick.org/~scott/seminar/`
Colloquium Cookies: `http://www.ucolick.org/~scott/cookies/`
Our Ask-An-Astronomer: `http://www.ucolick.org/~mountain/AAA/`

UCSC: `http://www.ucsc.edu`
UCSC Schedule of Classes: `http://reg.ucsc.edu/soc/`
Teleslug: `http://teleslug.ucsc.edu`
Cashier: `http://www2.ucsc.edu/accts-rec/cashier.htm`
Financial Aid: `http://www2.ucsc.edu/fin-aid/`
Registrar: `http://reg.ucsc.edu`
Registrar change-of-address form: `https://oasas.ucsc.edu/reg/address/`
Academic Calendars: `http://reg.ucsc.edu/calendar/`
Transportation and Parking: `http://www2.ucsc.edu/taps`
Bay Tree Bookstore: `http://slugstore.ucsc.edu`
Grad Commons: `http://www2.ucsc.edu/gradcommons`
GSA: `http://www2.ucsc.edu/gsa/`
UCSC Arts & Lectures Series: `http://events.ucsc.edu/artslecs/`
Grad Student Housing: `http://www.housing.ucsc.edu/housing/graduate.html`
Family Student Housing: `http://www.housing.ucsc.edu/housing/family.html`

Santa Cruz and environs

Santa Cruz Metro Transit (bus system): `http://www.scmtd.com`
When is the next bus off campus? `http://www.ucolick.org/cgi-bin/Tcl/nextbus.cgi`
Bay Area Rapid Transit: `http://www.bart.org`
CalTrain: `http://www.caltrain.com/caltrain/`

What movies are playing, when? `http://www.metroactive.com/movies/times-sc.html`
Was that an earthquake? Where? How big? `http://quake.usgs.gov/recenteqs/latest.htm`