THE ECE INSIDER’S GUIDE
27TH EDITION
MAKING STUDENT LIFE EASIER SINCE 1981
The ECE Insider’s Guide

ECE Graduate Organization (EGO)

2012-2013
On behalf of the Department of Electrical and Computer Engineering, I would like to welcome all of the new graduate students to Carnegie Mellon. I know that you will find your graduate experience intellectually rewarding and socially enjoyable. Graduate school represents a new plateau in your professional career development. The knowledge and skills that you will acquire during your graduate studies will help to shape a surprising amount of what you will accomplish in the future. After graduation, you will find that you will interact frequently with our alumni network, the faculty, as well as current students, as we all continue to participate in this exciting and expanding field in a variety of ways. The department and, indeed, the University, offer a wide variety of resources and I strongly encourage you to make full use of the opportunities these resources provide. During your tenure as a graduate student in the ECE department, please also feel free to speak to me at any time if you wish to discuss any topics of interest.

Professor Ed Schlesinger
ECE Department Head
Contents

1 Introduction 11

2 Building Guide 13
   Hamerschlag Hall (HH) ................................................. 13
   Porter Hall (PH) ................................................. 14
   George A. Roberts Engineering Hall (REH) .................................................. 14
   Collaborative Innovation Center (CIC) .................................................. 15

3 Academic Information 17
   Graduate Studies Committee and Academic Policy ........................................... 17
   University Policy ................................................. 17
   Registration Procedures ........................................... 18
   Ph.D. Degree Overview ............................................. 18
      Qualifying Exam ................................................ 18
      Prospectus ................................................ 18
      Thesis and Defense ............................................. 18
      Other Ph.D. Program Requirements .................................................. 19
   Master’s Degree Overview ........................................... 19
      Course requirements ........................................... 19
      Transfer credit from previous universities or colleges .................................. 19
      Course credit for continuing ECE B.S. graduates ....................................... 19
      M.S. Project report requirements ........................................... 20
      Quality Point Average (QPA) requirement ........................................... 20
      Applying to the Ph.D./M.S. program ........................................... 20
   Taking your Ph.D. Qualifying Exam ........................................... 20
   Teleconferencing and Videoconferencing for Ph.D. Proposals and Defenses ............ 21
      Teleconferencing and Videoconferencing ........................................... 21
   Graduation: Are you Ready? ............................................. 21

4 Advisors and Funding 23
   Your Advisor and Your Funding ............................................. 23
   Changing Advisors ................................................. 23
   Grievances ................................................ 24
   Types of Funding ................................................. 24
      Research Assistantships ........................................... 24
      Company or Government Sponsorship ........................................... 24
      Fellowships ................................................ 24

5
5 Teaching in the ECE Department

Administrative Stuff ........................................ 27
Teaching Classifications ..................................... 27
  Ph.D. Teaching Internship (TI) ............................ 27
  Ph.D. Teaching Assistantships (TA) ...................... 28
  Professional Master Level Teaching Assistantships (MSTAs) 28
  IMB Teaching Assistants with MS and Full Time Status (MSIMB TAs) 28
Teaching 101 ...................................................... 28
  Eberly Teaching Center ................................... 28
Departmental Teaching Seminars ............................ 29
Faculty ............................................................... 29
  Associate Department Head ............................... 29
Typical responsibilities ....................................... 29
A word on time .................................................. 30
Student Feedback ................................................ 30
Communications .................................................. 30
Age before beauty ............................................... 30

6 ECE Departmental Resources .............................. 31
Admissions Office ............................................... 31
Business Operations ........................................... 31
Course Hub ......................................................... 31
Student Relations ............................................... 32
Graduate Office ................................................... 32
Administration .................................................... 32
Facilities ............................................................. 32
Tech Electronics .................................................. 32
Labs ................................................................. 33
Machine Shop ..................................................... 33
Sponsored Research Administration ........................ 33
Information Technology Services (ITS) ................... 34
Mail ................................................................. 34
Office/Desk Locations, Keys, and ID ....................... 34

7 University and Local Resources .......................... 37
Security ............................................................. 37
Transportation ..................................................... 37
  CMU Shuttle ................................................... 37
  Escort Service .................................................. 37
  SafeWalk ......................................................... 38
  PAT Buses and Airport Flyer — 28x ....................... 38
Parking ............................................................... 38
Fixing Your Car .................................................. 39
Eating ................................................................. 39
  Margaret Morrison Street .................................. 40
  University Buildings ....................................... 40
  Craig Street ..................................................... 40
  Oakland .......................................................... 40
<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squirrel Hill</td>
</tr>
<tr>
<td>Shadyside</td>
</tr>
<tr>
<td>Delivery</td>
</tr>
<tr>
<td>Date Food</td>
</tr>
<tr>
<td>Shopping</td>
</tr>
<tr>
<td>Waterfront</td>
</tr>
<tr>
<td>Robinson Town Center</td>
</tr>
<tr>
<td>Monroeville</td>
</tr>
<tr>
<td>McKnight Road</td>
</tr>
<tr>
<td>Housing</td>
</tr>
<tr>
<td>Health Services</td>
</tr>
<tr>
<td>Counseling and Psychological Services</td>
</tr>
<tr>
<td>Women’s Center</td>
</tr>
<tr>
<td>Child Care</td>
</tr>
<tr>
<td>Career and Professional Development Center</td>
</tr>
<tr>
<td>Pittsburgh</td>
</tr>
<tr>
<td><strong>8 Computation Resources</strong></td>
</tr>
<tr>
<td>e-mail</td>
</tr>
<tr>
<td>ECE Resources</td>
</tr>
<tr>
<td>General Overview</td>
</tr>
<tr>
<td>Supported vs Unsupported Machines</td>
</tr>
<tr>
<td>Safe Computing Practices</td>
</tr>
<tr>
<td>Hardware</td>
</tr>
<tr>
<td>Documentation and Help</td>
</tr>
<tr>
<td>University Wide Resources</td>
</tr>
<tr>
<td>The Andrew System</td>
</tr>
<tr>
<td>Wireless Andrew</td>
</tr>
<tr>
<td>PC and Mac Clusters</td>
</tr>
<tr>
<td>Frequently-Used Computer Services</td>
</tr>
<tr>
<td>Text and Word Processing</td>
</tr>
<tr>
<td>Printing</td>
</tr>
<tr>
<td>Newsgroups</td>
</tr>
<tr>
<td>Setting up Personal Webpages</td>
</tr>
<tr>
<td>Blackboard</td>
</tr>
<tr>
<td>Buying a Computer and Software</td>
</tr>
<tr>
<td><strong>9 Libraries and Collections</strong></td>
</tr>
<tr>
<td>Online Resources</td>
</tr>
<tr>
<td>Libraries</td>
</tr>
<tr>
<td>Roger Sorrells Engineering and Science Library</td>
</tr>
<tr>
<td>Hunt Library</td>
</tr>
<tr>
<td>Mellon Institute Library</td>
</tr>
<tr>
<td>Software Engineering Institute (SEI) Library</td>
</tr>
<tr>
<td>Other Libraries in the Oakland Area</td>
</tr>
<tr>
<td>Reserves, Recalls and Renewals</td>
</tr>
</tbody>
</table>
10 Equipment and Material Resources
Tech Electronics ............................................. 57
The Physics Storeroom ........................................... 57
General Stores .................................................. 58
The Machine Shop .............................................. 58
Materials and Spectroscopy Services ......................... 58
Shipping and Receiving ........................................ 59
Media Tech ....................................................... 59
University Center .............................................. 59
   The University Store (Bookstore) ............................. 59
   Computer Store ............................................ 60
   The Arts Store ............................................. 60
   Entropy ..................................................... 60
   United States Post Office .................................. 60
   FedEx Kinko’s ............................................ 60

11 Organizations and Programs .......................... 61
ECE Graduate Student Organization (EGO) .............. 61
   Organization ............................................... 61
   Meetings ................................................... 61
   Events ...................................................... 61
   Volunteers and the eQ .................................... 61
Women in ECE (WinECE) ..................................... 62
Graduate Student Assembly (GSA) ......................... 62
Technical Organizations ....................................... 63
   Eta Kappa Nu (HKN) ...................................... 63
   Institute of Electrical and Electronics Engineers (IEEE) . 63
   National Society Of Black Engineers ....................... 63
   Society of Hispanic Professional Engineers ............... 63
   Society of Women Engineers ................................ 63
   Graduate Women’s Gatherings ............................... 63
Departmental Seminars ....................................... 64
Other Organizations .......................................... 64

12 Leisure and Play ........................................... 65
ECE Graduate Organization (EGO) ......................... 65
   Events ...................................................... 65
   Graduate Student Facilities ................................. 66
Intramurals ..................................................... 66
Other Sports ................................................... 66
Drama ........................................................... 67
Museums ......................................................... 67
Movies ........................................................... 67
Amusement Parks, Zoo, Conservatory, and Aviary ....... 68
More Fun Stuff .................................................. 68
## Contents

### A Quick Links  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE Departmental Resources</td>
<td>69</td>
</tr>
<tr>
<td>University Resources</td>
<td>69</td>
</tr>
<tr>
<td>Organizations</td>
<td>70</td>
</tr>
<tr>
<td>Entertainment</td>
<td>70</td>
</tr>
</tbody>
</table>
Introduction

Welcome!

Congratulations on being accepted into the Department of Electrical and Computer Engineering at Carnegie Mellon University! On behalf of the ECE Graduate Student Organization and the faculty and staff of our department, we welcome you to CMU and Pittsburgh. The ECE Insider’s Guide that you have in front of you is meant as a helpful manual while you start your life as a graduate student in ECE. Keep it handy since it will serve you well as you learn about all the friendly and helpful people, our buildings and labs, your teaching duties, and much more. We’ve collected a plethora of information over the years and we’ve kept it up-to-date for you. This guide was established by ECE graduate students who had to figure out all these bothersome things for themselves.

The ECE Graduate Student Organization (EGO) publishes this guide and organizes many events throughout the year. A copy of this guide can also be found online at http://www.ece.cmu.edu/~ego. We have happy hours, movie outings, ball games, and other social events — we are always open to suggestions on social activities. You will find out what’s happening in ECE via email. EGO is an organization fueled by student volunteers. From time to time as we announce events, we petition fellow ECE graduate students to find the energy and enthusiasm to volunteer for a small part of the organizational efforts in return for a large amount of fun for us and our friends. With just a little bit of help from every graduate student, we can keep our ECE community alive and have lots of social events. Please join everyone as EGO works to make our stay at CMU enjoyable.

Stay good, stay in touch and don’t forget to call your parents. Good luck with your graduate studies.
Building Guide

ECE graduate students and faculty members are spread throughout the Carnegie Mellon Campus. Campus maps can be found at http://www.cmu.edu/about/visit/campus-map.shtml, while an interactive campus map and a guided tour is available at http://www.cmu.edu/tour/. Most ECE folks are located in Hamerschlag Hall (HH), Porter Hall (PH), Roberts Engineering Hall (REH), Gates-Hillman Center (GHC), Smith Hall (SH), or Collaborative Innovation Center (CIC). Here are some highlights of some of these ECE buildings.

Hamerschlag Hall (HH)

History
In the late 1890’s, Andrew Carnegie enlisted architect Henry Hornbostel to design a technical school, Carnegie Tech. The final plan would be in the form of an “explorer’s ship” in search of knowledge, pointed towards the Carnegie Institute and, inadvertently, the University of Pittsburgh. At the helm of the ship was Machinery Hall. With its distinctive smoke stack, it is said to be Hornbostel’s finest work. Renamed for the first president of Carnegie Tech in 1964, Hamerschlag Hall is now home of the department of Electrical and Computer Engineering.

Geography
Hamerschlag Hall has floors “F, E, D, C, B, A, 1, 2, 3, 4”. Where possible, room numbers in Hamerschlag are of the form “HH fwnn”, where the HH indicates the building, “f” indicates the floor, “w” indicates the wing (when facing the clock on Level 1, “1” is toward the mall, “2” is to the right, and “3” to the left), and the room number “nn” varies within a wing.

First Floor
This newly renovated space is home of the main nerve center of the ECE department: department administration offices, undergraduate and graduate offices, finance office, and the Bombardier distance education and learning room are all located here in the 1100 wing. The 1200 wing has MEMS (Microelectromechanical Systems) group offices and the MEMS laboratory. The 1300 (“David Tuma Laboratories”) wing houses Tech Electronics, offices for ECE staff, undergraduate course labs, undergraduate collaborative study areas and CHEAP SODA MACHINES, maintained by the ECE Graduate Organization (EGO).

Floor 2
The students, faculty and staff of the Center for Silicon System Implementation (CSSI) and the Center for Circuit and Systems Solutions (C2S2) reside primarily on this recently renovated floor.

Floor 3
The third floor of Hamerschlag Hall has graduate student office space complete with its own lounge and meeting area.
Floor 4  The small top floor of Hamerschlag houses the graduate student (i.e., your) lounge. The lounge has undergone renovations over the years, and it is definitely worth checking out. It sports many goodies such as a microwave, foosball table, ping-pong/pool table, stereo, TV, and DVD player, maintained by your fellow graduate students at the ECE Graduate Organization (EGO).

A Level  Undergraduate labs, entrance to the machine shop, and faculty, staff, and graduate student offices in the A-200 and A-300 wings.

B Level  The only two lecture halls in HH, some more faculty and student offices in the B-200 wing, some Mechanical Engineering department lab spaces, and access to Roberts Hall Seagate Atrium and Singleton Room, where most Happy Hours are held.

C Level  Mostly occupied by the Mechanical Engineering department with their undergraduate clusters and machine shop.

D Level  Course Hub, ECE staff offices and graduate student cubicles. This floor contains a rather large conference room, a laboratory area for computer engineering projects, as well as a small kitchen.

F Level  The Carnegie Mellon Nanofabrication Facility cleanroom for processing Data Storage, MEMS, and many other micro and nanoscale devices is located on the F-level.

**Porter Hall (PH)**

**History**  This is the oldest building on campus!

**Geography**  There are two entrances to the ECE portion of Porter Hall. One is from the ‘A’ (basement) level of Porter, which is actually at ground level at the lower end of the Mall. The entrance is from the patio in front of HH—walk down the HH stairs and take the first right, take the stairs on your right (next to the elevator) down to the offices and labs in the sub-basement; this is ‘B’ level, and is where all of the ECE’ers reside. The double glass doors at the bottom will take you into the hallway near the lounge and bathrooms. The second entrance into PH is from the parking lot between PH and HH. A wheelchair ramp is available at this entrance.

**B Level**  The ‘B’ level actually has three different floors on it—the main floor, half-level down: grad student offices, half-level up: Professional Masters Student Suite. This suite includes a study area, kitchen, and lounge with a plasma T.V. (yes, including cable!).

**Residents**  Student, faculty and staff working in areas related to Controls, Communication and Signal Processing.

**George A. Roberts Engineering Hall (REH)**

**History**  In the spring of 1997, the Data Storage Systems Center (DSSC), which includes electrical, mechanical and chemical engineers, moved into George A. Roberts Engineering Hall (REH). Approximately $11 million towards the cost of building REH was donated by 1942 Materials Science alumnus George A. Roberts. Dr. Robert’s career is outlined in a small display in the building’s atrium.
Geography

REH was built on the edge of a cliff that separated the train tracks from Hamerschlag Hall (HH). The bow of the ship that marked the end of campus was moved from HH to the top of REH after the construction was complete. Anti-vibration materials were used in the construction of the building to protect the sensitive experiments in the labs from the tremors caused by passing trains.

HH connects to REH at Levels B and F. The B-level entrance from HH is located about 20 feet to the right of the main elevator in HH and is accessible without a key. The walkway to REH passes over a narrow (but important) street that connects the first floor of Wean Hall to the Porter Hall parking lot.

Singleton Room

At the end of the walkway is a reception area called the Seagate Atrium and a conference room called the Singleton Room. This room is used for seminars and entertaining visitors and sponsors. If you walk around Singleton Atrium, you will end up on the REH balcony. There is a nice view of the Carnegie and Pitt Campus from here.

Collaborative Innovation Center (CIC)

History

Construction of the Collaborative Innovation Center, CIC for short, was completed in the Spring of 2005. It is located on the Carnegie Mellon University campus, adjacent to Forbes Avenue and Hamburg Hall. This new center was designed to facilitate the interaction between industry partners and sponsors and their academic collaborators.

Residents

Some of the current and past tenants include Apple, Disney Research, Intel, Google, the Center for Innovative Robotics, the Data Center Observatory and the Network Systems Survivability program. CIC is also home to many ECE faculty and students whose research is focused on Cyber Security (CyLab), Storage Systems (PDL), and real-time and embedded systems.
Academic Information

Graduate Studies Committee and Academic Policy

The academic policy for ECE is set by the Graduate Studies Committee (GSC) (although ECE is also under policy set by our college, Carnegie Institute of Technology (CIT), and that set by the university). The Graduate Office (HH1115) maintains current and correct information on the ECE website that lists all ECE Professional M.S. and Ph.D. program requirements. There is also information on Masters and Doctoral thesis requirements, the Ph.D. Qualifying Exam, Ph.D. Proposal requirements, and Ph.D. Course and Breadth Requirements. Most of this information can be found at http://www.ece.cmu.edu/graduate/. The Graduate Office must be notified at least two weeks prior to any of these major milestones.

The GSC meets approximately once a month and will review written petitions for such educational issues as transferring credits from other universities, proposal and qualifier extensions, and acceptance of course substitutions. All petitions regarding these issues are due on the first day of each month. The GSC does not meet in May, December or in the summer months. For M.S. and Ph.D. requirements, petitions are submitted through the Graduate Office. Information regarding procedures for submitting petitions can be obtained through the Graduate Office or the ECE grad website, http://www.ece.cmu.edu/graduate/gsc.html.

Academic policy for the ECE department is available on the department website. Academic policy for all of the CIT is also available online at: http://www.cit.cmu.edu/currentstudents/graduates/policies.html.

University Policy

Carnegie Mellon University publishes two items which address concerns and regulations pertaining to students at CMU. These documents are most easily accessible in electronic form. The Student Handbook called “The Word” contains guidelines regarding university living and academic policies and procedures. The Graduate Student Guidebook contains a quick overview regarding academics, Pittsburgh, rules and regulations, as well as information which may be particularly useful for graduate students such as tax information. The guide outlines the classifications of stipends, fellowships, and other monies and how they are taxed. For additional information regarding taxes, contact the ECE business office, HH1114. Both guides are accessible from: http://www.studentaffairs.cmu.edu/

As an institution, CMU follows a policy of non-discrimination. The university maintains a strong commitment toward eliminating violations of discrimination, specifically sexual discrimination, by explicitly outlining a grievance procedure. CMU also has a policy and guidelines for action if you believe you have been the victim of sexual harassment. For more information about the current policy contact the Student Affairs Office (x8-2075).
Registration Procedures

Each semester students must register for course and research units. Full-time students must register for at least 36 units each semester, and part-time students must take a minimum of 6 units each semester. You should consult your advisor on what course you are going to take and balance them with your research. Typically students take one or two courses of 12 units each, and commit the rest of their time to research during the semester.

Registration is done electronically through the Hub SIO—Student Information Online (https://www.cmu.edu/hub/sio). You should typically have no trouble signing up for the courses you want. Occasionally a course may require permission of the instructor to register, or be offered by different departments or schools (for example, CS) and online registration may be unavailable. The class instructor should be able to direct you to the appropriate person to process your course registration.

Ph.D. Degree Overview

Qualifying Exam

ECEs Qualifying Examination is intended to test a students ability to think, speak, and write. The exam itself requires students to read and understand three technical papers, which will then define the exams topical area. Students then write a review paper and orally present this review to a faculty examining committee.

Students must take the Qualifying Exam for the first time no later than the fifth semester after being admitted to the Ph.D. program, and must pass the exam no later than the sixth semester after being admitted to the Ph.D. program. Summers are not included in this qualifying exam timetable. For more information on the Qualifying Exam, please see http://www.ece.cmu.edu/graduate/phd/qualifying.html. For some insider tips on quals, see the section on “Taking your Ph.D. Qualifying Exam” below.

Prospectus

In preparation for eventually writing and defending a thesis, students are required to submit a prospectus (also known as a proposal). The prospectus is both an informal written description of the problem to be investigated in the students final thesis, as well as an oral presentation to the Prospectus Committee for its review and recommendations.

All Ph.D. students are required to prepare a prospectus within four semesters following the successful completion of the Ph.D. Qualifying Exam. This time clock begins with the semester following the Qualifying Exam and includes the spring, summer, and fall semesters. For more information about the prospectus, as well as more details about the timeline for this milestone, see http://www.ece.cmu.edu/graduate/phd/prospectus.html.

Thesis and Defense

Once a student has completed all the research that was agreed upon at the Ph.D. prospectus meeting, the student must write a Ph.D. thesis and orally defend it. The oral defense is a public examination open to all members of the Carnegie Mellon community.

The thesis and defense must be completed within six years of taking the Ph.D. Qualifying Exam, or else the student must re-take the Qualifying Exam. For more information about the
thesis and defense, see http://www.ece.cmu.edu/graduate/phd/thesis.html.

Other Ph.D. Program Requirements

- **Teaching**: Students enrolled in the Ph.D. program are required to complete two semesters of a Teaching Internship (TI). For more information on TIs, please see http://www.ece.cmu.edu/graduate/phd/teaching.html.

- **Course and Breadth**: Students who enter CMUs ECE Ph.D. program without an M.S. degree or with a CMU M.S. degree must take eight courses spread across at least three breadth areas. Courses taken at Carnegie Mellon to satisfy the M.S. degree course requirements may count toward the Ph.D. course requirements. Students who enter the Ph.D. program with an M.S. from another institution are required to complete four ECE or related courses across at least three breadth areas. For more information about Ph.D. courses and related courses, please see http://www.ece.cmu.edu/graduate/phd/course.html.

### Master’s Degree Overview

The Master of Science (M.S.) degree in ECE may be earned through one of three programs:

- The Professional M.S. program
- The Integrated M.S./B.S. (IMB) program
- The Ph.D./M.S. program

The Professional M.S. and Ph.D./M.S. programs are available to qualified students who have earned an undergraduate degree. Select undergraduate students in ECE at Carnegie Mellon may be admitted into the IMB Program. Typically, three semesters are needed to complete the M.S. degree. However, it is possible to complete an M.S. in ECE in one year. IMB students typically complete these requirements within 5 years of starting their undergraduate degree.

Students in the three programs must satisfy a set of course requirements to earn the degree. Students in the Ph.D./M.S. Program may count a project report and additional graduate project units toward the degree.

### Course requirements

A minimum of 96 units are required to obtain the M.S. in ECE degree. Of the 96 units, 60 units must be ECE graduate work (typically 5 courses), while for the remaining 36 units, other courses may be permitted. See http://www.ece.cmu.edu/graduate/masters/requirements.html for the specific requirements.

### Transfer credit from previous universities or colleges

One graduate-level course, or the equivalent of 12 units, can be transferred from another university as credit toward the M.S. degree as long as it has not been counted towards another degree.

### Course credit for continuing ECE B.S. graduates

CMU students who received their B.S. degree from ECE may use courses that were not used towards satisfying the B.S. degree to satisfy the M.S. degree course requirement.
M.S. Project report requirements

Students in the Ph.D./M.S. Program may exercise an optional research project report requirement that allows a larger number of research project units to be counted toward M.S. degree requirements. The final completion of graduate project units requires a formal report which clearly and succinctly states the objectives, assumptions, and accomplishments of the work. The M.S. Report must be approved and signed by two ECE faculty or faculty with an ECE courtesy appointment.

Quality Point Average (QPA) requirement

To remain as a student in good standing, the student must maintain a 3.0 QPA in course units and a separate 3.0 QPA in project units, which roughly translates to maintaining an average letter grade of “B” or better. Check http://www.ece.cmu.edu/graduate/masters/requirements.html for the specifics.

Applying to the Ph.D./M.S. program

Students in the Professional M.S. and IMB Programs who have identified a research project that they want to pursue in-depth, leading to a Ph.D. degree, may wish to take advantage of the project report. These students must complete one year (two semesters) in the Professional M.S. or IMB programs before they can apply to be admitted to the Ph.D./M.S. Program.

Taking your Ph.D. Qualifying Exam

There is nothing quite as stressful as preparing for your Ph.D. qualifying exams. Fortunately, the actual process of taking your exams can be as painless as a few hours with the dentist, and your mouth won’t even hurt afterwards. The qualifiers have gone through a number of procedural changes over the years (having been at one time a series of written examinations, metamorphosing into strictly oral exams in three areas, and finally crystallizing into the current system of a presentation followed by a question and answer session, coupled with a written research summary.)

EGO sometimes offers qual mentoring sessions. See http://www.ece.cmu.edu/~ego/qual.php for some useful information. In addition, here are some tips on preparing, culled from the experiences of those who have survived:

- **Get the latest info.** The Graduate Studies Committee (GSC) offers a Qual info session at the beginning of the semester. Watch for times and location; ask in the Graduate Office if you don’t see anything posted.

- **Back to basics.** Concentrate on basics and practice explaining them clearly and succinctly. There’s no point in knowing how to make a hologram if you can’t do a Fourier Transform or two. If you know the fundamentals, deriving more complex answers may take some time, but you’ll be able to do it if you remain calm.

- **What papers do I pick?** Your advisor and senior graduate students can help you out here. Is there a seminal work for the field that is a ‘must read’? How does this paper compare to similar papers on the same topic? The papers are designed to give the faculty a context for your work. Why is what you’re doing important, and why did you select a particular approach?
- **Prepare in advance.** Most people find that between one and two months of preparation is plenty. Any more than that and you may get bored of the material. If you feel you have a real weakness in an area, you might sit in on a course dealing with that area.

- **Practice. Practice. Practice.** A “mock” qualifier with your colleagues acting as a committee can be a great way to debug your talk and prepare yourself for unanticipated questions. Several iterations of a mock qualifier can make a tremendous difference in presentation quality and in your ability to think calmly and rationally. Include others who have already taken a qualifier because they will know what kind of questions are commonly asked. This process is almost a requirement for passing. Its importance can not be overstated!

- **Contact the Intercultural Communication Center.** For foreign students who would like hints on communication or particular American styles of giving a presentation, the Intercultural Communication Center can help you prepare with a series of talks and seminars. They offer a workshop on oral qualifiers as well as workshops on teaching and oral presentations. Contact them at x8-4979 or eslhelp@andrew.cmu.edu for more information.

Remember, that if you do fail the qualifiers on the first try, it may be more an indication of your lack of familiarity with the process rather than with the material. Take some time, regroup, talk to others and try it again. A number of people fail on their first try and have overwhelming success on the next. Above all, REMAIN CALM. Although the purpose of the qualifier is to assess your ability to do independent research, half the test is psychological, so an ability to remain calm and retain a positive attitude when you don’t immediately know the answer is as important as the scientific knowledge. Now get out there and pass!

**Teleconferencing and Videoconferencing for Ph.D. Proposals and Defenses**

Approval for teleconferencing or videoconferencing is required from the Department Head two weeks prior to the Proposal (see [http://www.ece.cmu.edu/graduate/phd/prospectus.html](http://www.ece.cmu.edu/graduate/phd/prospectus.html)) or Defense (see [http://www.ece.cmu.edu/graduate/phd/thesis.html](http://www.ece.cmu.edu/graduate/phd/thesis.html)). Please check with the ECE Graduate Office for the current policy.

**Teleconferencing and Videoconferencing**

Teleconferencing facilities are available in several ECE conference rooms. Check with the relevant Sponsored Research Assistant in your area (see Chapter 6). Contact the Graduate Office for any special requirements.

**Graduation: Are you Ready?**

In the beginning of your last semester of your M.S. or Ph.D., you should contact the Graduate Office to notify them of your graduation status. Early on in the semester, be sure to complete the graduation checklist to ensure that all of your degree requirements have been met. Your academic program advisor will give you all of the information you need regarding graduating, tips on finding a job, and just about anything else you need to know. Graduation information is available at [http://www.cmu.edu/hub/graduation/requirements/](http://www.cmu.edu/hub/graduation/requirements/). Please review this information at the beginning of the semester you plan to graduate.
Advisors and Funding

Professional M.S. students are self supporting. This chapter applies primarily to the Ph.D. students.

Advisors usually provide funding for Ph.D. students, approve course selections, and channel their student’s research energy. They can be a primary source of challenges, encouragement and critique, and can provide a strong role model. Your advisor is a professor with whom you will communicate with as a person, and it is this personal interaction with someone of technical competence and leadership that is often the most rewarding graduate learning experience.

Your Advisor and Your Funding

For Ph.D. students, admission into the department is based upon research interests as stated in one’s application and upon the availability of funding. Students are admitted to the department and assigned an initial advisor whose research interests closely matches theirs.

In the first few weeks of the fall semester, your assignment to an advisor will be finalized through a process in which you will become familiar with research and funding opportunities in the department and in which you will be able to express your preference for a particular advisor.

In most cases, advisors provide funding for their Ph.D. student’s tuition and stipend through a research assistantship. Advisors may also provide opportunities to attend conferences and seminars associated with the student’s research.

Faculty generally budget a student’s expenses over the standard duration of the student’s tenure at CMU. If, however, funding or advisor/student problems arise, and the advisor plans to terminate the student’s support or student status, the student will be notified in writing by a letter from the ECE Department Head (after consultation with the advisor) at least one semester prior to the pending termination in order for the student to have time to make adjustments and alternative choices. A copy of the letter is also sent to the ECE Graduate and Business Offices.

Summer support is provided for all research assistants by their research advisors except in the case where support is from external sources.

Changing Advisors

On arriving to the department, the student may want to choose or change advisors. The student will have the option of meeting with faculty members to see if they can find a match. While it is not common to change advisors, it may be possible to make the change if funding is available.

Graduate students may also wish to change advisors is in the middle of a degree program. This is a much more serious change since you have made a commitment to your advisor when you take on a research project that involves your advisor’s money as well as both your and your advisor’s time. Only major problems should shake that bond, but if such problems exist then
being up-front with your advisor is probably the best route. If your research is going nowhere, or you and your advisor can’t communicate with each other, then you shouldn’t hesitate to act in your best interest. People have experienced this before – don’t be afraid to ask around to see what options are available for handling this situation. Options include contacting the Graduate Program Office or meeting with the Department Head.

When changing advisors, you will need to submit a “Change of Advisor” form to the Graduate Program Office which both advisors need to sign. If you have questions about the advising procedure, you can contact Samantha Goldstein, the Doctoral Program Advisor.

Grievances

If you are having issues with your advisor that cannot be resolved directly, don’t hesitate to ask others for help! First, stop by the Graduate Program Office and see Samantha Goldstein, who will be happy to try to provide guidance or refer you to other resources. Fellow graduate students can also be a source of support and information, please see the EGO web page for some contact information of the executive board and officers: http://www.ece.cmu.edu/~ego. Officially, the progression of grievances goes from the Doctoral Program Advisor, to the Department Head, and finally to the Associate Dean and Dean of the Carnegie Institute of Technology. For more information on grievance resolution, consult the CIT policies on their website at: http://www.cit.cmu.edu/current_students/graduates/policies.html.

Types of Funding

Research Assistantships

Research Assistantships are the most common source of funding in the ECE department. This funding comes from sources outside the university such as government and industry. Faculty are awarded grants or contracts to perform research in certain areas, and built into these grants or contracts is research money for the support of graduate students. When student applications are reviewed, faculty, who have funding for graduate students, play a role in the admission process by viewing the stated interests of the students and then offering research funding for those with whom there is a good research match. Research Assistantships are advantageous because the student is guaranteed that the faculty has a genuine interest in the success of the student’s research, and because they do not require the additional hours that teaching assistantships require.

Company or Government Sponsorship

Students may be employed or sponsored by a company or government department and be sent to CMU to gain additional knowledge, in which case their funding is usually directly from the external source. This enables the student to have the financial freedom to choose their advisor, but it is of course wise to study under a faculty with similar research interests.

Fellowships

Fellowships provide partial funding for a student’s research and stipend and, due to their competitive and highly selective nature, are prestigious. Fellowships generally allow students greater freedom and flexibility in selecting a research area. It is often possible to obtain a fellowship after having started graduate study. Certain fellowships may require applicants to be U.S. citizens or...
permanent residents. Deadlines come quickly and pass even more quickly. Inform the graduate office and your advisor of your interest in applying for such funds and check out the Fellowship and Scholarships Office website: http://www.cmu.edu/fso/.
Teaching in the ECE Department

While faculty members are primarily responsible for organizing and teaching courses at CMU, they frequently make use of graduate student teaching assistants. Teaching assistants often help out by lecturing, grading papers, designing tests, and proctoring exams. This chapter contains useful information for teaching in the ECE Department. Regularly updated information is also available at: http://www.ece.cmu.edu/student/teaching.html.

Administrative Stuff

Before you set off to inspire undergraduates, there are a few administrative tasks to accomplish.

If English is not your native language, you must take the International Teaching Assistant (ITA) test offered by the Intercultural Communication Center (ICC) at least one semester PRIOR to your teaching assignment. A score of category 1, 2, or 3 is required to teach. See the ICC web page at http://www.cmu.edu/icc/, or contact eslhelp@andrew.cmu.edu, x8-4979, Warner Hall 308.

Non-native speakers who are not very comfortable with spoken English are strongly advised to also take a diagnostic English test soon upon arrival. This can help you find out if you will need to get help with your language skills before qualifying as a TA. For more information, see the ICC web page.

All students must complete a Teaching Assistant Preference form the semester PRIOR to teaching, see http://www.ece.cmu.edu/users/shared/forms/teachpref.php.

Teaching Classifications

Ph.D. Teaching Internship (TI)

- Two semesters of Teaching Internship are required for the ECE Ph.D. program
- Ph.D. students or M.S. students who intend to pursue a Ph.D. are eligible for the TI
- Students should discuss the appropriate time to apply for and fulfill their TI requirement with their advisor prior to applying for the TI
- TIs must register for 18-991 (12 units) in the Fall or 18-992 (12 units) in the Spring
- TIs are graded; a grade of “B” or better is needed to successfully complete the TI requirement
- TIs are assigned to work approximately 10 hours per week. TI is an unpaid assignment.
Ph.D. Teaching Assistantships (TA)

- Ph.D. students who have completed the two required semesters of TI are eligible to apply to work for a TA
- Students should obtain their advisor’s approval prior to applying for the TA
- TAs are assigned to work approximately 10 hours per week and are paid $18/hr in addition to their stipend

Professional Master Level Teaching Assistantships (MSTAs)

- MSTAs are paid an hourly rate of $15/hr
- MSTAs can expect to work approximately 10 hours per week
- MSTAs need to complete bi-weekly timecards to receive compensation for their assignment

IMB Teaching Assistants with MS and Full Time Status (MSIMB TAs)

- Full-time IMB students with graduate standing are eligible for the MSIMB TA
- MSIMB TAs need to be registered for 18-983 (0 units) in the Fall or 18-984 (0 units) in the Spring
- MSIMB TAs receive a scholarship equal to 1/3 of the tuition rate deposited into their student accounts during the third week of classes
- MSIMB TAs are assigned to work approximately 10 hours per week
- MSIMB TAs must register for and maintain 36 or more course units during the entire semester they are working as an MSIMB TA

**Teaching 101**

While there is not a required course for teaching, there are many opportunities to improve your communication skills and ask for support in your efforts. Remember that while this may be the first time you are teaching a course, there are many who have gone before you. You can almost always find people to offer advice or discuss exciting new ideas about teaching.

Eberly Teaching Center

The Eberly Center for Teaching Excellence, formerly the University Teaching Center, was established in 1982, to organize and conduct programs to improve the quality of instruction at Carnegie Mellon. The Teaching Center helps both faculty and graduate students to improve teaching practices. The Center offers both public forums and confidential consultations to discuss issues related to teaching.

The Eberly Center offers seminars on teaching, classroom observation and feedback, documentation of teaching development, and a monthly reading and discussion group. For more information on the multitude of resources, take a look at [http://www.cmu.edu/teaching/](http://www.cmu.edu/teaching/).
Departmental Teaching Seminars

The ECE Department, through the office of the Associate Department Head, generally offers three seminars during the fall semester and one seminar during the spring semester regarding teaching in the ECE department. In addition, all graduate students who interact with students in a teacher/student relationship are required to attend a sexual abuse training seminar. The teaching seminar topics range from policy and procedure to suggestions and helpful hints. Most of all, they provide a forum for teaching assistants with experience to answer questions of new teaching assistants.

Faculty

The faculty members with whom you work are a great resource. Not only can they assist with course policy and content, they can often help you through difficult times in your teaching career. Since they are familiar with the specific course and specific group of students, they are in a position to offer very specific, and often very helpful advice. Also, don’t hesitate to contact other faculty with questions. Many faculty members recognize the importance of excellence in teaching, and will be happy to answer your questions.

Associate Department Head

The Associate Department Head is ultimately responsible for course scheduling as well as teaching assignments. He can provide useful hints in teaching as well as guidance should a problem arise in your course. Remember to always address important issues with the faculty directly involved in your course before approaching the Associate Department Head for suggestions and advice.

Typical responsibilities

Typical teaching responsibilities are wide and varied – the faculty responsible for the course that you will be teaching will help you understand your specific responsibilities. Below are some of the more common responsibilities, however this list is not necessarily complete.

- Grading (homework, exams, labs, quizzes, reports)
- Monitoring and assisting students in a laboratory environment
- Preparing and teaching recitation
- Serving as a guest lecturer
- Assisting students during office hours
- Creating problem sets and solutions
- Developing labs and lab quizzes
- Answering students’ email questions and concerns
- Unofficially advising students
- Helping students learn to work together in groups (if this environment is fostered by the course you are teaching)
A word on time

A departmental teaching commitment is not necessarily a 9-5 job two or three days a week. The time requirement often fluctuates as the semester progresses. The guidelines for the time commitment serve only as a guideline; teaching assistants and teaching interns are encouraged to do what it takes to get the job done. As a course staff member, you serve as a course representative. It is useful to provide feedback to faculty on the direction of the course – both as you see it and as students see it.

Trying to balance your own course load, your research work (if applicable), as well as your teaching responsibilities can be a difficult task. If you come to a point in the semester when things become overburdening, it is in your best interest to talk to your advisor as well as the faculty member in charge of the course you are teaching. Together you can generally work out agreeable solutions.

Student Feedback

Your students can prove to be very useful! First, without them, there would be no reason for you to receive a paycheck. More importantly, they can help shape and develop your teaching ability. Student feedback can be obtained in a variety of ways:

- Informally: talk with your students
- Semi-Formally: guys should dress up in a suit and tie, gals should wear an evening gown; or a much easier method is to pass out your own hand made forms
- Formally: University teaching evaluations at the end of the year

Communications

Communicating with the faculty responsible for the course is a key to teaching in the ECE department. Knowing the expectations and desires of the faculty member will make your job easier. It is essential to discuss the progress students are making in the course, the pace of the course, and any student concerns, praises, or complaints with faculty members on a regular basis. It is often wise to set up weekly course meetings. Even if the course faculty are not present for each meeting, the teaching assistants in the course can meet to determine if there are any areas of the course which need special attention. Talking with faculty members about how to handle cheating, how to handle student disagreements in lab, as well as how to handle student gripes will help the course to progress smoothly.

Age before beauty

Remember that it is important to be a teacher first, not a friend. You may be around the same age as your students in many cases. It is up to you to set the tone for a student-teacher relationship, not a best buddy relationship. While you do not need to be cold, rude, or unconcerned with students, setting the tone for a student-teacher relationship will make discussing grades or lack of effort easier later on. It is much more difficult to enforce course policies with good friends.
ECE Departmental Resources

The department has some excellent resources to help you better accomplish your daily work. The people that have been in this department for some time as students, support staff, or faculty can make your acclimation to the work environment here smooth. This chapter aims to get you started in knowing who to ask and where to find basic resources that are needed to get started on your research. Also included are some general survival tips for those necessities of life—food, shelter, and transportation.

Admissions Office

- **Tara Moe** (HH1118; x8-6327; thaslam@ece.cmu.edu), Manager of Graduate Student and Visitor Admissions. She’s the initial point of contact for incoming students.
- **Allyson Briney** (HH1116; x8-5653; allysonb@ece.cmu.edu) Coordinator of Graduate Student and Visitor Admissions. You’ll need to see Allyson

Business Operations

- **Marian Kovalchik** (HH1114; x8-2531; msk@ece.cmu.edu) Assistant Department Head for Finance. Marian oversees the financial operations for the department.
- **Eftihia Barron** (HH1116; x8-8745; eftihiab@ece.cmu.edu) Finance and Business Associate. Contact Eftihia if you have questions about employment (e.g., as TAs), stipends, fellowships, financial aid, payroll, or employment verification.
- **Kevin Bosle** (HH A202; x8-9642; kbosle@ece.cmu.edu) Department’s Senior Buyer. When the time comes that you need a purchase order, he is the person to see.

Course Hub

- **Bara Ammoura** (HH D-A10; x8-6595; bammoura@ece.cmu.edu) Assistant for International and Distance Education
- **Joyce Dellovade** (HH D200; x8-4951; joyced@ece.cmu.edu) Course Management Assistant
- **Leona Kass** (HH D200; x8-4035; lkass@andrew.cmu.edu) Course Management Administrator
- **Shannon Lown** (HH D-A9; x8-5448; shannonh@ece.cmu.edu) Course Management Assistant
- **Lyz Prelich-Knight** (HH D-A8; x8-5087; lyz@ece.cmu.edu) Course Management Assistant
Student Relations

- **Susan Farrington** (HH1110; x8-6955; sfarring@ece.cmu.edu), Director of Alumni and Student Relations. Susan is also the Professional Advisor of ECE student organizations—EGO, MAC, SAC, HKN, IEEE, WinECE and Build18. She also interfaces with companies to provide students career opportunities and connections. She also runs ECE’s alumni programs.

Graduate Office

The graduate office is the place to turn to for questions regarding registration, course work, class schedules, and degree requirement guidelines. All information about program requirements is available in the graduate office.

- **Samantha Goldstein** (HH1116; x8-3200; srgold@ece.cmu.edu), Academic Programs Advisor.
- **Janet Peters** (HH1116; x8-3666; jmpeters@ece.cmu.edu), Advisor for Undergraduate and Professional Masters Programs.
- **Shauntae Yankasky** (HH1116; x8-6581; scyank@andrew.cmu.edu), Advisor for Undergraduate and Professional Masters Programs.
- **Laureen Kirby** (HH1116; x8-4205; lkirby@ece.cmu.edu), Education Program Assistant.

Administration

If academic or administrative issues arise pertaining to your graduate degree at CMU, the department administration is accessible to you.

- **Vijayakumar Bhagavatula** (110 Scaife Hall; x8-2478/3026; kumar@ece.cmu.edu) Interim Dean of the College of Engineering.
- **Ed Schlesinger** (HH1106; x8-8728; ed@ece.cmu.edu) David Edward Schramm Professor of ECE, and Department Head.
- **James Hoe** (HH1126; x8-7536; jhoe@ece.cmu.edu) ECE Associate Department Head, Professor of ECE and CS; Co-Director CALCM, ITRI Lab@CMU.
- **Debbie Scappatura** (HH1108; x8-2432; debbie@ece.cmu.edu) Executive Assistant.

Facilities

- **Alan Grupe** (HHA212; x8-2526; alan@ece.cmu.edu) Facilities Manager—ECE. Alan manages problems arising with facilities such as heating, cooling, lighting, furniture, and telephones. Send email to facilities@ece.cmu.edu for any of the above.

Tech Electronics

- **Adam Bolla** (HH 1301; x8-5309; abolla@ece.cmu.edu) Tech Electronics Manager.
Labs

- **Chris Bowman** (HH F206; x8-2471; cbowman@ece.cmu.edu) Director Nanofabrication Facility
- **Carsen Kline** (HH F206; x8-4205; kline@ece.cmu.edu) Process Engineer
- **Rick Burgett** (HH 1302; x8-4951; rburgett@ece.cmu.edu) Labs Manager

Machine Shop

- **David Belotti** (HH A108; x8-6321; dbelotti@ece.cmu.edu) Shop Machinist
- **Steve Hoffman** (HH A108; x8-2505; hoffman@ece.cmu.edu) Shop Machinist
- **James Schubert** (HH A108; x8-2505; jimshop@ece.cmu.edu) Machine Shop Foreman

Sponsored Research Administration

Be sure to introduce yourselves and go say hello to the sponsored research assistant who works with your advisor or on your research project. These are some of the most important people you’ll interact with throughout your stay here, if you are a Ph.D. student.

- **Charlotte Ambrass** (HH 2125; x8-6858; ambrass@ece.cmu.edu) Research Administrator
- **Meighan Harding** (REH 338; x8-8924; meighan.harding@ece.cmu.edu) Manager of Sponsored Research Administration
- **Judy Bandola** (HH 2126; x8-2224; judy@ece.cmu.edu) Sponsored Research Assistant. Judy is assistant to Professors Ken Mai, Wojciech Maly, Diana Marculescu, Radu Marculescu, Jeyanandh Paramesh, Rob Rutenbar, Andrzej Strojwas, Donald Thomas.
- **Tonya Bordonaro** (CIC 2105; x8-3729; tonyab@andrew.cmu.edu) Sponsored Research Assistant. Tonya is assistant to Professors David Brumley, Birgul Gligor, Priya Narasimhan, Adrian Perrig, Raj Rajkumar and Anthony Rowe.
- **Claire Bauerle** (PH B28; x8-7422; cbauerle@ece.cmu.edu) Sponsored Research Assistant. Claire is assistant to Professors Franz Franchetti, Gabriela Hug, Marija Ilic, Bruce Krogh, Charles Neuman and Bruno Sinopoli.
- **Jari Charaska** (REH 334; x8-3096; chraska@ece.cmu.edu) Sponsored Research Assistant. Jari is assistant to Professors Gary Fedder, David Greve, Mark Kryder, David Lambeth, Yi Luo, Tamal Mukherjee, Gianluca (Gian) Piazza, Daniel Stancil and Elias Towe.
- **Matt Koeske** (REH 347; x8-7293; koeske@ece.cmu.edu) Sponsored Research Assistant. Matt is assistant to Lou Anschuetz and Professors Jim Bain and Jimmy Zhu.
- **Adam Palko** (HH 2126; x8-2188; apalko@ece.cmu.edu) Sponsored Research Assistant. Adam is assistant to Professors Shawn Blanton, Rick Carley, Babak Falsafi, Xin Li, Larry Pileggi, David Ricketts and Jeffrey Weldon.
- **Marilyn Patete** (HH B211; x8-8162; marilyn@ece.cmu.edu) Sponsored Research Assistant. Marilyn is assistant to Professors Vijayakumar Bhagavatula, James Hoburg, Philip Koopman, Onur Mutulu, Rohit Negi, Raj Rajkumar, Ozan Tonguz and Byron Yu.
• Carol Patterson (PH B15; x8-7286; carol@ece.cmu.edu) Sponsored Research Assistant. Carol is assistant to Professors Tsuhan Chen, Soumya Kar, Hyong Kim, José Moura, Michael Reiter, Dawn Song, and Richard Stern.

Information Technology Services (ITS)

The ITS team is responsible for the IT support, lab equipment support and facilities support. You can find the contact information for the ITS staff at https://userguide.ece.cmu.edu/about/contact-us/. See Chapter 8 for more details about ITS.

Mail

Paper mail should be addressed to:

Your Name
Carnegie Mellon University
5000 Forbes Ave.
Department of Electrical and Computer Engineering
Pittsburgh, PA 15213-3890

Mail is typically routed to your office area. It is recommended that you pick up your mail every day, especially if you subscribe to lots of magazines or junk mail. Note that most mail cannot be forwarded from the department. So, when you leave the department it is your responsibility to contact individual companies and contacts to advise them of your new address.

Packages can also be received in the department. They should be addressed as above, however they should also include your office building and office number on the third line (along with Department of Electrical and Computer Engineering). You can pick up packages at Tech Electronics in HH1301.

Office/Desk Locations, Keys, and ID

For all access requests, the department asks that you send an email to ecekeys@ece.cmu.edu. Each request should contain the following information.

Full Name
Affiliation with ECE (e.g., visiting researcher, postdoc, staff, grad. student)
Room number or wing you’d like access to

Offices and desks are assigned according to collaborative research efforts and shared workstations that have been provided by advisors. All office assignments for incoming as well as currently enrolled students are decided by and coordinated with your advisor and the Admissions Office. If you would like to relocate your desk to another office, you should check with your advisor and/or the Admissions Office.

You can obtain a grad student ID from the HUB in Warner Hall (the flash cube-ish building near Forbes.) Be sure you have a little bus icon on your ID. With that little bus icon, you can ride the Pittsburgh public buses and the inclines run by the Port Authority for free (well, technically financed through a Port Authority fee deducted from your stipend).
The ECE Department maintains a photo board of graduate students on the ECE website https://www.ece.cmu.edu/directory/student/graduate/photo/. The board is updated with photographs of all currently enrolled Ph.D. and M.S. students. Watch out for emails from the department detailing the dates and times of the photo sessions. All graduate students are required to sign up to have their photos taken.
University and Local Resources

Security

Though CMU’s campus is generally quiet, CMU is near a major city. It is in your best interest to be aware of your surroundings at all times. Common sense will allow your visit to CMU to be safe. Simple things such as closing and locking your office door when you step out (for any length of time), leaving valuable items in secure locations, and not walking alone in unlit areas after dusk are some common reminders which campus police generally issue to CMU’s population. Certain buildings are locked at night and on weekends; you will need to swipe your CMU ID to get in. You can also call security at x8-2323 (412-268-2323) if you accidentally lock yourself out of your office.

Carnegie Mellon’s campus is protected by CMU Campus Police (www.cmu.edu/police) and is patrolled 24-hours a day, 7 days a week, 365 days a year. Patrol includes vehicle mobile patrols, foot patrols, stationary patrols at fixed sites and bicycle patrols. If you see a suspicious activity while on campus, contact CMU Campus Police at x8-2323. If you are off campus and see a suspicious activity, contact the Pittsburgh Police by dialing 911.

The Campus Police also conduct self defense classes for women at various times during the year. For more information see http://www.cmu.edu/police/programsandservices/rad-systems.html.

Transportation

CMU Shuttle

For many CMU students, the most common form of transportation to and from CMU is the CMU shuttles. The shuttles typically leave from the circle in front of Morewood Gardens on Morewood Avenue once every half an hour, covering the North Oakland, Shadyside and Squirrel Hill areas. Additionally, there are shuttles between the Carnegie Mellon campus and Google’s campus in Bakery Square and Pittsburgh Technology Center (PTC). The routes change between peak hours and off hours. Call x8-7433 for more information, or visit their website at http://www.cmu.edu/police/shuttleandescort. Officially, you need to show a CMU ID to get on the shuttle, but they’ll let you on if you tell them that you’re a new student.

Escort Service

In addition to the shuttle, an Escort Service operates from 6:30 p.m. to 6:30 a.m., with the last pick up at 6:00 a.m. The Escort Service is a transportation option that services the geographical areas surrounding Carnegie Mellon, to include Squirrel Hill, Shadyside, and Oakland. The service provides transportation from 9 designated campus pick-up locations to the intersection closest to the your residence. The pick-up locations are marked by official university signage, bearing the
word “Escort” and the stop closest for most ECEers will be Porter Hall’s lower Frew St. exit. The Escort Service is limited to a 1.5 mile radius from campus. Any riders who live within a designated Shuttle Route, must use the Shuttles while they are in operation.

SafeWalk

SafeWalk is a student-run volunteer organization that provides on-campus walking escorts to members of the Carnegie Mellon community between the hours of 10 p.m. and 2 a.m. Sunday through Friday. Escort requests are made by calling x8-SAFE (268-7233) during the hours of operation, or by simply approaching a SafeWalk team. For more detailed information about the service, see www.studentaffairs.cmu.edu/safewalk. SafeWalk can be reached via safewalk+@andrew.cmu.edu. Campus police can also be contacted in the event that you feel unsafe while on CMU’s campus. They can be reached at x8-2323.

One area of particular concern on CMU’s campus is walking on Frew Street, where CMU abuts Schenley park. While this is a well lit area, it is still a place of concern when walking alone.

PAT Buses and Airport Flyer — 28x

The Port Authority Transit (PAT) offers bus transportation covering all of Allegheny County. CMU students and employees need only display a valid CMU Identification to receive free rides on any Port Authority vehicle operating throughout Allegheny County (financed by a fee deducted from your stipend). This includes the Airport Flyer - 28x (see below) and the incline rides at Mt. Washington. Your CMU ID must have a valid picture of a bus with the dates current to be able to ride for free.

For non-CMU riders, individual Bus fares for zone 1 travel are $2.50. Bus passes good for all of zone 1 travel can be bought for $25.00/week, $97.50/month, or $1072.50 annually. For route information and more details on fares and passes check out PAT’s website at http://www.portauthority.org.

There is a PAT bus that runs from CMU to the Airport for $3.75, or free with your student ID, called the Airport Flyer — 28x. The bus has room for luggage and as it only makes limited stops is quite speedy. This is a good option if you don’t want to pay $5.00 a day for parking at the airport or your friends are too busy to drop you off. The bus departs across from Cyert Hall. The print schedules can be obtained from the University Center Bus Schedule Rack or by calling PAT at (412) 442-2000 or can be electronically accessed at their website http://www.portauthority.org.

Parking

If you drive to school everyday, you can get a parking permit at one of the parking lots, although there is typically high demand and there may be a waiting list. The permits run from September to August. Yearly rates range from $615 to $1620, depending on the lot. Call x8-2052 for an application, or see http://www.cmu.edu/parking/. There are also metered parking spots at many of the lots, with rates of 7 minutes per quarter to 15 minutes per quarter. Parking tickets, by the way, are $30 at meters, $40 in lots requiring permits, $75 in firelanes or loading zones and $200 at handicap spaces. The price is halved if the ticket is paid within 5 business days of its issue for all tickets except parking in handicap zones. There are also metered parking spaces on Frew Street and Schenley Drive, behind CMU’s campus. Many of these spaces have 10 hour meters, so you can park there all day. These spaces fill up quickly, so it is recommended you park early, before 9 a.m. Lastly the garage near the University Center has open spaces which use the Pay-As-You-Park...
system. When you enter the garage you’ll be given a ticket. When you’re ready to leave you take the ticket to one of the payment machines. The amount due varies by how long you were parked there.

If you are looking for free daytime parking, there are three places within a 10 minute walking radius in Schenley Park. The first has over 100 parking spaces and is along the back side of the golf course on Circuit Drive - (due to the secluded nature of this drive, more vandalism occurs to cars parked in this area than the other two areas which have higher visibility), the second is at the end of the Anderson Playground parking area (make the first hard right just after crossing the Panther Hollow Bridge going from Phipps Conservatory towards the Boulevard of the Allies) - these 30 spots fill up fairly quick during the school year, so unless you want to try your luck arrive before 8:30 a.m. The third spot is just past Anderson Playground. Drive under the Boulevard of the Allies and then bear right. This is a oneway road that eventually winds up to the Schenley ice skating rink, public tennis courts, and frisbee golf course. People park on both sides here and vandalism is low. If you own a nicer car - or a sports utility vehicle, a club is recommended. If you happen to come in late, the East Campus garage close to the University Center and the lot near the C-level entrance of Hamerschlag are open to the public after 5pm. Be careful though, as some of these spots require Hamerschlag/Porter/Wean Hall permits 24 hours a day.

**Fixing Your Car**

If you happen to own a brand new car still under warranty, you can skip this part. For the other 98% of us, your vintage automobile will probably need some sort of repairs over the course of your graduate studies (especially during the winter when the salt gets hungry and eats your car parts.)

One site for all sorts of nifty car information is [http://www.cartalk.com](http://www.cartalk.com), stemming from a National Public Radio show by two brothers who both went through lots of college then decided they wanted to be car mechanics. (Not that any of us are unsure about our career path...) They maintain a database (the Mechan-X-Files) of car mechanic recommendations and dis-recommendations. You can search for mechanics in online databases of businesses, such as Yelp, where you can also see reviews other people have written about them. Also, consider the type of repair you need (i.e. transmission, electrical, body work, etc.) and the manufacturer and year of your car. Many car repair shops specialize in certain repairs.

The Automobile Association of America (AAA) - [http://www.aaa.com](http://www.aaa.com) - offers emergency car service for a $49 membership fee. When misfortune befalls, they will change a tire, jump your battery, bring you gas, and even tow your car for 3 miles for the basic membership. (Nice if your car breaks down, say, in the Giant Eagle parking lot.) The upgraded $82 membership buys 100 miles of free towing. AAA offers additional benefits, such as hotel and financial discounts, tourist information and FREE maps.

**Eating**

Throughout your stay here at CMU, you will inevitably be faced with the question of what to do for lunch. There is a meal plan available for students to eat in the campus dining hall, but this is primarily designed for undergraduates who live on campus. It may or may not be convenient for graduate students who tend to keep odd hours. There is no need to fear, however, as it is possible to find a wide variety of food on and around campus. The most important sources of food are seminars with free pizza. Ask around and check the newsgroups to find the best pizza to seminar
interest ratio. Once you learn your way around, you might not ever have to worry about lunch again. Then again, there is more to life than pizza alone. For those other times, here is a list of places that might interest you:

**Margaret Morrison Street**

Located on Margaret Morrison Street are half a dozen or so food carts offering several choices of cuisine for very reasonable prices. Some favorites include the Moonlight truck which offers various Oriental dishes, and Sree’s which has a few selections of Indian dishes. Margaret Morrison Street is perfect for grabbing something quick to eat in your office.

**University Buildings**

The University Center has a cafeteria and a cafe on the second floor. Newell Simon Hall has a small food court with deli sandwiches, Chinese food and pizza. For a complete list of what the campus has to offer, check out the dining services web page at http://www.cmu.edu/dining.

**Craig Street**

When you’re ready to start wandering off campus, Craig St. has the closest collection of restaurants around and it’s only a 10 minute walk from Hamerschlag. If you’re looking for something quick, near the corner of Craig and Forbes is Subway, which offers the typical sub fare ($3-$6). Across the street is Union Grill if you’re looking for a heavier meal ($6-$10). But don’t stop there; a little further down Craig St. are Chinese, Indian, Mediterranean restaurants and more.

**Oakland**

Just a few minutes past Craig St. on Forbes Avenue you start to enter the University of Pittsburgh (Pitt) campus and the Oakland area. Several blocks on Forbes offer many different restaurants and several stores you also might want to look around in if you’re waiting for a table. Various side streets off Forbes also have lots of great places to eat. In fact, there are so many restaurants in Oakland, you’re sure to find whatever it is you’ve got a craving for. Atwood Street is definitely one you’ll have to take a walk down sometime. Shortly off Forbes is Dave & Andy’s where their daily homemade ice cream has been placed in the Top 10 for Pennsylvania. Further down Atwood is India Garden and Mad Mex. Both restaurants offer deals for students and have late-night specials on food and drinks.

**Squirrel Hill**

Although it’s a longer walk and uphill on Forbes, Squirrel Hill is another great neighborhood to find places to eat. It doesn’t have as much variety as Oakland, but has a unique set of restaurants. If you’re in the mood for some fresh bread, Panera offers a nice selection of sandwiches, salads, and soups($4-$8). Across from the Giant Eagle is Gullifty’s which has an extensive menu and some of the best desserts in Pittsburgh.

**Shadyside**

Getting to Shadyside also requires a bit of a walk. You have to take Morewood to a right on Fifth. A couple of lights down is South Aiken which will take you to Walnut Street. The restaurant
selection here is not as vast as Oakland, but Walnut Street offers a very relaxed, quaint atmosphere. The street is lined with specialty shops as well as restaurants. One of note is Pamela’s, which serves breakfast all day and is well known for its pancakes everybody—including President Barack Obama, who famously invited its co-owners to the White House to prepare a special Memorial Day breakfast—loves so much.

Delivery

A number of local restaurants participate in Wheel Deliver, a regional delivery service. Check their webpage (http://www.wheeldeliver.net/) for a list of participating restaurants or call (412) 421-WEGO ((412) 421-9346). Be cautious, however. Wheel Deliver is somewhat controversial for ordering food for group research meetings, as they apply a service charge which CMU has a policy of refusing to reimburse. Talk with your advisor first about whether or not he/she can reimburse you for this service charge.

Date Food

Okay, so maybe the Insider’s Guide can’t guarantee true love, but we CAN help you plan the menu.

There are all sorts of restaurant guides online. The Pittsburgh newspaper, the Post-Gazette, has a decent repository of dining reviews, http://www.post-gazette.com/more/life/dining/. You can search by name, location, or cuisine. There’s also a restaurant database at http://pittsburgh.citysearch.com as well as lists with reviews in the likes of http://www.urbanspoon.com and http://www.yelp.com.

There are a few local favorites (within a mile or so of campus) with meals around $12-$17 (not including alcohol). Bangkok Balcony on Forbes, between Shady and Murray, for example, is a popular choice. While not technically a date restaurant (more of a sports bar), Fuel and Fuddle (Oakland Ave., just off of Forbes, near the University of Pittsburgh) is definitely worth mentioning, and is usually busy. The Spice Island Tea House is a neat Pan Asian restaurant, located on Atwood St. near Forbes (also near the University of Pittsburgh).

Please keep in mind these are only a few of the many (and I mean, MANY) restaurants in Pittsburgh. So get out there and enjoy!

Shopping

The 3 neighborhoods mentioned above in the food section can cover most of your basic shopping needs and are all within walking distances. Sometimes you’ll need something more that you can’t find in one of the nearby neighborhoods and for that you’ll have to head further out into Pittsburgh and maybe even the suburbs. Most of these places are easily accessible with PAT buses, but it definitely helps to have access to a car.

Waterfront

The Waterfront out near Homestead is a rapidly growing shopping complex. Just a few of the stores are Lowe’s Home Improvement, Target, Gap, Best Buy, RadioShack, Office Depot, Barnes and Noble, Kaufman’s Department Store, and a super sized Giant Eagle grocery store. Additionally the Waterfront has several restaurants and a Dave & Buster’s for your entertainment needs.
Robinson Town Center

The Airport Flyer — 28x makes a couple of stops at Robinson Town Center, about a half hour ride on the way to the airport. This enormous area is home to the closest Ikea, Walmart, a Sam’s Club Wholesale store and many others. If you have a car and get to know the area a little bit, there is also a 24-hour Super Kmart, a small cluster of department stores and tons of places to eat.

Monroeville

A couple of miles out on Parkway East (I-376E) is the suburb of Monroeville. In addition to the Monroeville Mall, there are stores spread out all over William Penn Highway (US-22), the main road you’re on when you take the Monroeville exit from I-376E. And of course, plenty of food to be found.

McKnight Road

McKnight Road is a little bit harder to access by PAT since you have to catch a bus from downtown and they don’t run as often. It’s just a few minutes from downtown by way of I-279N and is just as vast as Monroeville. There are several strip malls along McKnight as well the Ross Park Mall, and just about every kind of restaurant you can think of.

Housing

When you need help finding an apartment or a house to live in, the CMU Housing Office can provide a good deal of assistance. They have apartment listings for all over Pittsburgh as well information and ratings of various real estate and rental agencies. Additionally, they have descriptions of all the neighborhoods around CMU, with prices ranges for apartments in those areas, can help you find a roommate, and offer all kind of advice on renting your own place. They can be found on the web at http://www.housing.cmu.edu/CommunityHousing/, and are located in Morewood E-Tower on campus. Other convenient places to check are Craig’s List (http://pittsburgh.craigslist.org/apa/) and the electronic bboards cmu.misc.market and cmu.misc.market.apartments. On these bboards people are often looking for roommates or sublets, and selling and buying furniture and other useful housing goods.

For people not familiar with the usual procedure, renting an apartment for the first time can be daunting. You can consult http://www.cmu.edu/policies/Landlord-Tenant/ for information about the overall procedure, explanation of various terms, FAQs and more. It outlines the basic rights and responsibilities of tenants and landlords, also has a few references for what to do if legal disputes should arise over security deposits, leases, repairs etc.

Health Services

Some kind of health insurance is required of all graduate students. It can be your own insurance company or you can purchase CMU health insurance. The CMU Student Health Center (x8-2157) is located in room 101 on the ground floor of the E tower of Morewood. It is staffed by a physician, nurse practitioners, and registered nurses who provide general medical care, allergy injections, first aid, gynecological care, and contraception as well as on-site pharmaceuticals. Health services also administers student health insurance. Examinations by Health Services staff are free.
of charge; however, fees for laboratory tests, diagnostic procedures, and referral to the emergency room or specialists are the student’s responsibility. There may be a fee for medication.

In addition, the CMU health service provides a special birth control program that covers the student for one full year. One low price will cover all examinations plus a full year of the birth control of your choice. Regarding pregnancy, health services provides consultations and then refers you to area doctors and clinics for testing and services. Two clinics in the area are the Women’s Health Services and Allegheny Reproductive Health Center. Treatment and tests for VD are done at the Allegheny County Health Department. Again, health services refers patients there. The Health Center also provides referrals and advice about local gynecologists, both supported and unsupported by the University Health Insurance plan.

Their hours are:

Monday, Tuesday, Wednesday: 8:30 a.m. - 7:00 p.m.
Thursday: 10:00 a.m. - 7:00 p.m.
Friday: 8:30 a.m. - 5:00 p.m.
Saturday: 11:00 a.m. - 3:00 p.m.

Appointments are required and can be made by calling the office. If you have a medical problem or accident that requires immediate attention at night or on the weekend, contact Campus Police at x8-2323 for transportation to the emergency room. More information on CMU health services as well as other programs that they offer can be found at:
http://www.cmu.edu/health-services/

Please note that you will be automatically enrolled in the basic health insurance plan (and charged for it!) unless you upgrade or sign a waiver. For more information see http://www.cmu.edu/health-services/student-insurance.

Counseling and Psychological Services

If you are depressed, anxious, or confused and would just like to talk to someone, you can make use of Counseling and Psychological Services (CAPS). CAPS offers therapy and counseling services, usually on a short-term basis. Help is offered in the form of individual, couple, or group counseling. The Center also offers some career counseling and sponsors workshops on topics such as: speaking on sexuality; career decision making; managing stress; effective studying; taking tests; and “sometimes it’s difficult to even say hello.” For more details on these workshops, see the staff at the center. CAPS is located in Morewood Gardens, E-Tower Room 230. Their hours are:

Monday - Tuesday, 8:30 am - 8:00 pm
Wednesday - Friday, 8:30 a.m. - 5:00 p.m.

The counseling center staff may be reached 24 hours a day, 7 days a week by calling x8-2922. Services are strictly confidential and free for full-time students. For further information, consult:
http://www.cmu.edu/counseling/
Women’s Center

In January 1990, the CMU Women’s Center opened its doors. Brought about by the efforts of several undergraduate women, it is located on Margaret Morrison Street (other end of the campus from Hamerschlag). The center sometimes hosts activities such as movie nights, potluck dinners and lunches, Coffee Houses and poetry readings. The center can be used for meetings; Society of Women Engineers and the Women’s Issues Collective hold some of their meetings there and occasionally some Pittsburgh community groups use the space. It can also be a good place for just lounging and relaxing during the hours the Center is open and staffed. It houses a library of books, pamphlets, journals, videos and CDs on women’s issues – topics range from sexuality to physical health to international action newsletters to information on career opportunities. For more information you can go to:
http://www.andrew.cmu.edu/user/women/.

Child Care

The Graduate Student Association (GSA) can point you to a few resources for child care. Resources include listings of local child care providers, social clubs, family day care homes, a child care committee, and a parent database.

There are also two main child care centers located at CMU, the Cyert Center for Early Education (http://www.cmu.edu/cyert-center/) and the Children’s School (http://www.psy.cmu.edu:16080/cs/). As with child care providers in general, space is limited so be sure to apply early. Keep in mind that graduate students are generally NOT considered to be full-time CMU employees, so tuition discounts may not apply.

Career and Professional Development Center

Even though you have just arrived, it’s not too soon to start thinking about your post-graduation prospects. The Career and Professional Development Center (x8-2064; http://www.studentaffairs.cmu.edu/career/) located in the lower level of the University Center(UC), provides services to graduate students including career counseling, occupational information, job referral, summer employment assistance, credentials services, career library, electronic bulletin board with career and vacancy information and, most importantly, campus recruiting. The Center holds an open house in September to help students become familiar with their offerings. The College Liaisons for Carnegie Institute of Technology are Lisa Dickter (dickter@andrew.cmu.edu) and Ashley Fowler (ashleyif@andrew.cmu.edu).

The Career and Professional Development Center always has up-to-date information on available openings at companies that are recruiting. Additional information can be found on the physical bulletin boards outside the ECE Graduate Office and/or in your office area. Some of the information may overlap with that found in the career office, but it’s a good idea to check all sources to be sure you’ve covered all the bases. Once you find out who will be interviewing, you will probably want more information on unfamiliar organizations; the Placement Office provides an extensive library of loose-leaf binders containing background information such as annual reports and descriptions on government organizations as well as companies.
Pittsburgh

There exists a wonderful document published by a group of Computer Science graduate students called The Guide to Living in Pittsburgh. The CS guide was written as an aid to new graduate students in the CS Department, and has been published semi-regularly by the Computer Science Community at Carnegie Mellon for over 25 years. Over the years, it has grown to include many things of interest to graduate students everywhere such as, finding a place to live, buying food, banking, entertaining yourself and shopping.
Computation Resources

It is virtually impossible to work in electrical and computer engineering without using computers in some way or another every single day. You will need computers to search for books and journal articles in the library, write papers and your thesis, access course websites, and much more. A good working knowledge of computer facilities is thus essential for your survival here. This chapter gives you some basic information that should be of interest, even if you aren’t a hacker.

**e-mail**

Most likely you will receive two email accounts: an ECE (department) account and an Andrew (campus) account. You should check both, as email communication may be sent to either, depending on the type and/or source. People usually set up mail forwarding from (the less preferred) one to the more preferred one so that all your email is in one place. Webmails can be accessed at webmail.andrew.cmu.edu and webmail.ece.cmu.edu. Many people choose to use an email client such as Outlook, Thunderbird or iMail for Macs. Directions for setting up email clients can be found at https://userguide.ece.cmu.edu/services/email/ and http://www.cmu.edu/computing/email/.

The CMU directory http://directory.andrew.cmu.edu/ can be used to find out email addresses of people within the university. If you are looking for the address of a CMU student, a good first try is the Andrew system since most students, faculty and staff—in fact, almost everyone on campus—have accounts there. Additionally, a program called finger can be used to look for an individual. finger is available at http://www.ece.cmu.edu/directory/finger.html.

**ECE Resources**

**General Overview**

ECE ITS (formerly known as ECE Computing Facilities) supports Windows, Linux and Apple OS X. The department provides several computing clusters that are used primarily by undergraduates for their coursework. The clusters with console access are located in labs on the first floor of Hamerschlag Hall. There is also a large group of compute machines which do not have console access. Again, these clusters are primarily for use by undergrads in course work and research simulations that have a negative impact on performance are usually requested to be moved elsewhere. All of these clusters support Condor, which provides a means of submitting jobs that do not require console access and which can be spread across the various machinesdepending on load. This allows for rapid execution of jobs that might otherwise be delayed by the load on one specific machine.

Compute cycles for grad students are handled differently by various groups. Some groups provide a farm of general use compute servers in addition to student desk tops, others provide
just a desktop machine. Your advisor or other members of your group can advise you on your situation.

ITS maintains a separate infrastructure for ECE. ECE has its own mail servers, news server, AFS Cell, Windows Domain, and so on. ITS maintains a web page at http://userguide.ece.cmu.edu. If you would like to contribute documentation, please send email to help@ece.cmu.edu.

There are some services that ITS does not offer, such as wireless network access. The wireless network is owned and maintained by Andrew Computing. ITS is more than happy to try and help solve problems on supported machines or help with visitors getting registered. Sometimes it’s a little hard to sort out what group owns which systems—when in doubt send e-mail to help@ece.cmu.edu.

Supported vs Unsupported Machines

Advisors have the option of placing machines on ITS support. If they choose to do so those machines get a suite of software installed, automatic updates to things like the OS and anti-virus software. They also get automatic backups of the data on those machines and replacement for failed hardware. If a machine is unsupported then the user—or their group—is responsible for all aspects of maintenance. If you are unsure if your machine is supported or not please check with your advisor or send email to help@ece.cmu.edu to find out. We want to make sure that you are aware of the status so that you can make proper backups where necessary.

One important thing to note about unsupported machines, in particular Windows based machines, is that you must keep your machine patched to the current level. Campus computing scans networks, including ours, for machines that are vulnerable to viruses or outside attack. If they discover one they will request that you remove it from the network until the situation is corrected. If a machine is supported, ITS will make any necessary corrections.

Safe Computing Practices

CMU does not operate a firewall, nor does the ITS. Some specific ports may be blocked, but in general your machine is attached directly to the internet and not everyone out there is your friend. Below are some basic guidelines for protecting your machine:

- Choose a good password and DO NOT share it with others
- Set the ACLs on your AFS space appropriately
- If you suspect that your machine has been compromised please contact help@ece.cmu.edu
- DO NOT open attachments that you are not expecting
- Be wary of installing downloaded software. Much of it contains spyware or other malicious software.
- If you are using a supported machine please let ITS apply patches and perform maintenance. ITS tests patches against our environment to prevent problems.

On a related note, you need to be conscious of what you install and any files that may be shared, etc. The University is fairly strict about copyright violations. For a complete listing of the University Computing Policies please visit http://www.cmu.edu/computing/doc/. ITS uses these policies as guidelines.
CHAPTER 8. COMPUTATION RESOURCES

Hardware

ITS supports PCs running LINUX and/or Windows as well as Intel-based Macs running OS X. If there is one (or more) in your office, you will most likely need an account. In most cases you will have received an account as part of your intake process. If not, or if your account does not work on a supported machine, please contact help@ece.cmu.edu. ITS does not manage accounts on non-supported machines.

The department owns a large number of Linux machines which are located in labs on the first floor of Hamerschlag Hall and which are used for teaching and IC layout projects. These machines are generally reserved for undergraduate purposes.

The computers in the ECE department are networked together with ethernet. This allows file transfer and virtual terminal connections between the machines. The ECE network is connected to the campus backbone, which allows connections to most other machines on campus and to the Internet. Our connection to campus is via a dual 10Gbs fabric interconnect.

In addition to the “production” network, ITS maintains an RFC1918 network. These are network connections that do not extend to the public internet. Many lab computers and printers are attached to this network to reduce exposure to various attacks and to allow the machine owners to pursue research in a much more controlled environment.

The department supports both Apple Macintosh and IBM compatible personal computers. Some research groups have migrated to Apple computers. Several research groups and many labs used for teaching have multiple multi-core PCs. These machines are connected to the campus network as well.

Documentation and Help

The first thing you do after getting an ECE account is check out the ITS User Guide at https://userguide.ece.cmu.edu. For simple tips on day-to-day computer use, other graduate students in your office as well as your research group are likely to be the best source of information. More serious problem reports or suggestions about computer-related matters should be mailed to help@ece.cmu.edu. Quick questions or problems which require immediate attention should be directed to x8-1732. ITS also maintains a “help desk” on the A-level of Hamerschlag Hall.

For general computing questions, that is, those not specific to the ECE domain, one of the most accessible resources is the Computing Services Help Center. The center is a comprehensive service for students, staff and faculty with questions about computing on campus. The center is staffed by Computing Services consultants weekdays during daytime and evening hours. Computing related questions or problems on hardware, software, facilities, seminars, and policies can be addressed.

The Help Center is located at Cyert Hall 119. Consultants are available to provide telephone or walk-in support at this location.
Walk-in Hours: Monday–Friday: 9 AM – 5 PM
Phone Hours: Monday–Friday: 7 AM – 7 PM
Telephone: x8-HELP (412-268-4357)

Questions about general applications, etc. can be addressed to the Computing Services Help Center (http://www.cmu.edu/computing/repair/help-center.html) at advisor@andrew.cmu.edu or 268-HELP. Questions about engineering specific tools or suites of tools are usually best answered by others in your group doing similar work. For problems related to your machine, software installations, and so on, please send e-mail to help@ece.cmu.edu. From there a trouble ticket is generated...
and distributed to the appropriate staff member(s).

Please note that you should send mail to help@ece.cmu.edu, not to individual staff members. Help is monitored on a consistent basis, we can’t always say the same for all the staff mailboxes. This also ensures that the right person gets your request. When submitting a request to help@ece.cmu.edu please use the following guidelines. First, indicate what machine or account you need help with, there are over 2000 devices in the department so “my printer” is not of much help to the folks in ITS. Also, please make only one request per message unless they are closely related. Different problems are often handled by different staff members so multiple requests in the same ticket can sometimes cause delays.

**University Wide Resources**

The University Computing Center provides general computer services to the campus community. It is located in Cyert Hall, which is behind Warner Hall (the large flashcube on Forbes which is the hub of all bureaucratic activity). It will be only on very rare occasions that ITS is unable to provide the support for your computer needs, necessitating a visit to UCC. To keep track of the computing resources available to the entire CMU community, you should visit [https://my.cmu.edu](https://my.cmu.edu).

The Andrew System

The Andrew system (named after Andrew Carnegie) is a campus-wide network of computers (UNIX, LINUX, PCs and Macs). These machines are used for both graduate and undergraduate course projects, and this will probably be the only time that you (an ECE graduate student) will need them. These machines are spread all over the campus and to remotely log in to one, you can ssh (secure shell) into the Andrew system (`ssh unix.andrew.cmu.edu`) with your Andrew ID. The ECE Department also supports ssh logins to its UNIX/LINUX machines, so you can also ssh into say `pegasus.ece.cmu.edu`.

Wireless Andrew

CMU has a wireless networking system called Wireless Andrew and the wireless networks are available under the name ‘CMU’ or ‘CMU Secure’. With a laptop or other wireless capable device you can have internet access just about anywhere on campus. Attempting to use your laptop or other wireless device for the first time should re-route your browser to an online wireless registration system.

PC and Mac Clusters

Academic Computing Services maintains several clusters of PCs and Apple Macintosh computers and printers. Just bring in your ID to use these computers. PCs are located in: BH 140, CFA 321, PH 217, WeH 5th floor, and CyH 100. Mac’s are located in: Hunt Library, BH 140, PH 217, UCC 100, MMP, and Morewood Gardens. Software for the PCs and the Macs is available online via [https://my.cmu.edu](https://my.cmu.edu).

**Frequently-Used Computer Services**

CarnegieMellon

The ECE Insider’s Guide
Text and Word Processing

Here are a few of the programs you are likely to use:

- *Emacs, VIM* are screen-oriented text editors. It is helpful to know one of these in the UNIX environment, especially while sshing remotely.

- *Microsoft Office* is available on many of the Macs and IBM PCs. Microsoft Word and Powerpoint are popular WYSIWYG (What-You-See-Is-What-You-Get) word processors and presentation softwares. You can get a discounted copy at student price ($49) at the bookstore in the University Center. Open source (and free!) alternatives to Microsoft Office are OpenOffice and LibreOffice, particularly useful for Linux, but also available for Windows. These can be downloaded directly from the internet.

- *LATEX* is a typesetting program based on Donald Knuth’s TEx program. You will almost certainly use LATEX to typeset academic papers and/or theses. Each conference has its own guidelines for paper submissions, and usually will have a “template”. Make sure to write or convert the paper into an acceptable format. There is no official support for LATEX within ITS at the present time. However, there’s usually tons of help available online. Just do a web search!

Printing

ITS provides access to a number of laser printers accessible wirelessly while you are on campus. See the userguide (userguide.ece.cmu.edu) for setting up printers. Some groups also have access to scanners and slide makers.

Newsgroups

Electronic bulletin boards (Newsgroups) are just like their physical counterparts except that they are only stored as electrons. Newsgroups exist for almost every area of interest. Each newsgroup is dedicated to a particular topic. For example, the cmu.ece.ego newsgroup is for announcements by the ECE Graduate Organization (EGO), while cmu.misc.market is for posting for-sale and want-to-buy notices. Newsgroups can be accessed through any internet browser. You can also subscribe to those from your Andrew webmail (webmail.andrew.cmu.edu) under the tab ‘Folders’.

Setting up Personal Webpages

Some people in the department have created their own webpages. You can find detailed information on how to do this at: https://userguide.ece.cmu.edu/services/personal-website-publishing/.

There is a mythical figure at CMU by the name of Harry Q. Bovik who has accumulated information on all sorts of topics of local interest - including cars, computers, insurance, homes, pets, and much, much more. Visit his home page at http://www.cs.cmu.edu/afs/cs/usr/bovik/www/.

Blackboard

Blackboard is a virtual environment used by many classes in CMU. In this system, you can access class materials including lectures and assignments, submit assignments, and check grades. There is also a facility for setting up an electronic discussion board to facilitate discussion with the

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1This guide was also typeset using LATEX.
teaching staff and/or other students. To log into Blackboard, you will need an Andrew ID and password. The Blackboard website is at http://www.cmu.edu/blackboard/

**Buying a Computer and Software**

If you would like to buy your own computer or software, you might want to check at the Computer Store, located in the University Center. PCs and Macs as well as software are sold at a substantial discount. In some cases the prices are part of special university agreements that require you to agree not to resell the equipment. Check at the computer store for current prices and rules. Although the computer store often has good deals on some software bundles and on computers, it is often overpriced for peripherals and accessories. Monitors, printers, memory, mice, keyboards, etc. can usually be found at lower prices online—check out http://shopper.com for a site that keeps track of the latest prices on computing merchandise. You can also check the newsgroup cmu.misc.market.computers for buying/selling computers, accessories and software.

CMU has licensing agreements with a number of companies. Details about these can be found at http://www.cmu.edu/computing/software/.
Libraries and Collections

There are three CMU libraries: the Roger Sorrells Engineering and Science Library, the Hunt Library (the main campus library) and the Mellon Institute Library (for the sciences). In addition, CMU students have access to and can borrow books from the Software Engineering Institute Library. The University of Pittsburgh Library and the Carnegie Library of Pittsburgh are both within easy walking distance.

Online Resources

Before ever going into any physical CMU library, you can explore it electronically. The library system has a new website http://search.library.cmu.edu. This contains links to library catalogs (http://search.library.cmu.edu/catalogs/), both of Carnegie Mellon and other libraries—local, as well as elsewhere state and nationwide.

As a grad student, you’ll be reading a lot of papers. Most of the papers are available online these days. Google Scholar (scholar.google.com), Microsoft Academic Search (http://academic.research.microsoft.com), DBLP (http://dblp.uni-trier.de/) are some databases that index ECE and CS related papers online. Other important databases are INSPEC, IEEE Xplore (http://www.ieee.org/ieeexplore) and ACM DL (http://www.acm.org/dl/). For a complete list of what is accessible online while on the CMU network, see http://search.library.cmu.edu/databases/. If you are off-campus, you can use a VPN (Virtual Private Network) connection to avail library resources just as if you were on campus. See http://eps.library.cmu.edu/off-campuswireless/ for instructions for setting up library VPN.

Libraries

Roger Sorrells Engineering and Science Library

The Sorrells library is where you’ll find most reference material for your research needs. It is located on the fourth floor of Wean Hall. Here you’ll find all the IEEE and other technical journals, math and engineering texts, and the Computer Science reading room. Arnette Loggins (x8-7217, aloggins@andrew.cmu.edu) is the librarian there. In addition, Missy Harvey (harvey@andrew.cmu.edu, x8-6107) is a librarian who provides research support to the School of Computer Science and the ECE Department. Suggested purchases of books and journals can be directed to Missy. The library provides a host of other electronic services including the IEEE/IEE electronic library via the Internet. Ask the desk attendant at any of the libraries for more information about these services or read one of the numerous documents the library provides on everything from inter-library loans to renewal policy.
Hunt Library

If you’re searching for more eclectic reading material, you’ll want to meander over to the 1970-era building called Hunt Library near Baker Hall. Here you’ll find the normal array of library services including a rare book room, literary books, daily newspapers from around the world, as well as an Andrew and Macintosh computer cluster (in the basement). It is unlikely you’ll need to visit Hunt Library for technical material, but it can be quite fun to peruse their lendable CD collection, music scores, photographic archives, and art reference books. The fifth floor of the Hunt Library houses the Hunt Institute for Botanical Documentation.

Mellon Institute Library

The Mellon Institute library hosts an array of biological science references as well as chemistry and physics texts and journals. Not surprisingly, it is located in Mellon Institute, located on Fifth Avenue near Craig Street, across from the Cathedral of Learning.

Software Engineering Institute (SEI) Library

The Software Engineering Institute (SEI) Library is located on the first floor of the SEI building on Fifth Avenue near Craig St. CMU students can access and borrow books from the library, but have to sign in and someone at the security desk needs to let them in.

Other Libraries in the Oakland Area

If you need to get a book from Pitt, you can either use the inter-library loan service from CMU (slow), or go down to Hillman Library in Oakland, the main Pitt library, (http://www.library.pitt.edu/) and sign yourself up for loaning privileges. You’ll have to prove you are a CMU graduate student (bring your valid Student ID), and you’ll get a Pitt library card valid for the semester. Pitt has many small libraries, so find out where the book resides and ask at Hillman for a map describing the particular library’s location.

The Carnegie Public Library is a great resource to have in our backyard. The Carnegie Library has a great kid’s collection, a large selection of CD’s and movies (VHS and DVD) that you can borrow for a week at a time, a large number of current periodicals, a patent center, a Pennsylvania Department (where you can pick up tax forms among other things), and many other good services—take one of their free tours to find out more.

One book that you may want to check out is entitled The Carnegie (there are usually about 10 copies of it). This book can be returned at any of the Carnegie Museums (the Science Center, Natural History Museum, or the Andy Warhol Museum) and it gives free admission for up to four people (see the inside cover of the book for details). It’s a pretty good deal if your family is in town and you want to show them the Museums but don’t have much money.

You can get a library card for the Carnegie Library at the main branch on Forbes avenue in Oakland, by showing that you reside in Allegheny county. Almost anything with your name and current Pittsburgh address will do—for example, a copy of your lease, a bank statement, a check with your current address, a driver’s license, a utility bill, etc. (Your CMU ID is not accepted as proof of residence).
Reserves, Recalls and Renewals

Professors often place material on reserve for a class. Information about reserves can be found at http://search.library.cmu.edu/services/reserves/.

In the event that someone checks out the only copy of the book you need, you can request it to be recalled. The current owner will be required to return the book within seven days, and you will be notified when it arrives. You can recall material online by clicking “Place Hold” button next to the item.

The lending period for most material for graduate students is currently 90 days. You can renew online (http://search.library.cmu.edu/services/borrow/).

If a book you want to borrow is already checked out, you can request another copy parter libraries via ILLiad or ezBorrow: http://search.library.cmu.edu/services/interlibrary/. 
Equipment and Material Resources

Many graduate students, in the course of their research, need to procure obscure and often bizarre materials and pieces of equipment. A rich variety of storerooms, shops and centers have sprung forth, like mushrooms, in the basements of various departments to cater to this need. The first step toward sampling this cornucopia of dessicators, TTL chips and solvents is to obtain the appropriate twenty digit “contract number” from your advisor which will allow you to charge the various and sundry items or services to your account. Indeed, in most cases, the charge number is the only way to obtain these items. Following is a summary of these resources, including the person to contact, location, hours, and description of the goods.

Tech Electronics

Hours: 9 a.m. - 5 p.m. Monday-Friday during summer
       9 a.m. - 11 p.m. Monday-Friday during the Fall and Spring semesters
Location: HH 1301
Contact: Adam Bolla (x8-5309, receiving@ece.cmu.edu)
Goods or Service: Tech Electronics primarily supports the undergraduate labs and classes with additional parts and equipment. They usually stock a variety of resistors, capacitors, switches, wire, wiring tools, circuit boards, integrated circuits, discrete devices, indiscrete devices, and transistors. If they don’t stock the electrical component that you need, there are plenty of parts catalogs which can be perused. This is also the place where you can sign out equipment such as digital multimeters and oscilloscopes, and overhead and portable projectors. They also handle all of the mail for the ECE Department, both incoming and outgoing, the upkeep of your mailboxes all around our department, and the day-to-day shipping and receiving of packages for the department. Incoming mail is usually routed to your mailboxes and packages are held for you at Tech Electronics. Occasionally, FedEx and UPS might deliver packages to your door.

The Physics Storeroom

Hours: 9:00 a.m. - 12:30 p.m., 1:30 p.m. - 5:00 p.m. Monday-Friday
Location: WeH 7415
Contact: Chuck Gitzen (x8-2753, cg1d@andrew.cmu.edu)
Supplies: General stock of lab supplies leaning toward electronics. They have a little bit of everything: ash trays, aspirin, band-aids, binders, chalk, garden hose, pens, Q-tips, electron tubes, office supplies, lab notebooks, tools and more. A catalog is available. The only form of payment accepted is an Oracle number.

**General Stores**

Hours: 7:30 a.m. - 11:45 a.m., 12:30 p.m. - 5:30 p.m. Monday-Friday
Location: Physical Plant Level 2 (Enter the Service Entrance from the road behind Wean that goes down and under Physical Plant.)
Manager: Lenny Libbon (x8-6418)
Goods: Plumbing hardware, shur-wipes, cleaning supplies, physical plant items, duct tape, and electrical outlets. No cash sales, contract sales only.
The General Store is part of physical plant and geared to supplying maintenance-related articles.

**The Machine Shop**

Hours: 8:00 a.m. - 12:00 p.m., 1:00 p.m. - 4:30 p.m. Monday-Friday
Location: A107 Hamerschlag Hall (Down the stairway center of Level A.)
Contact: James Schubert (x8-2505, jimshop@ece.cmu.edu)
Service: Jim Schubert of the Machine Shop has the skill and equipment to create excellent machined equipment for experiments. He urges graduate students to make a good drawing of what they want including dimensions and screw sizes; the more specific the drawing, the faster the project will be completed. Jim can give invaluable suggestions if you get stuck in a design. An extensive stock of materials is available for projects which means waiting for materials is not a problem. Turn around times vary with the shop's workload.

**Materials and Spectroscopy Services**

Location: First Floor Roberts Hall
Contact: Tom Nuhfer (x8-2691, tn06@andrew.cmu.edu)
Service: Carnegie Institute of Technology operates several labs in the various science buildings for use by CMU personnel. Many of the labs are run in conjunction with other departments. They provide central facilities for use by many people, including ECE graduate students, for optical metallography, electron optics, Auger spectroscopy, X-ray diffraction and fluorescence, crystal growth, heat treatment, fusion joining, melting and mechanical working, and mechanical testing. Their extensive stable of equipment includes electron microscopes, a plasma gun ion miller, many pieces of x-ray equipment, Mossbauer facilities and much, much more. These facilities will be of particular interest to students involved with thin-film fabrication and magnetic and semiconductor phenomena and devices. Qualified students can use the equipment while those who are unsure of themselves can get someone to do the work for them. Tom Nuhfer is directly responsible for spectroscopy and can point you towards the people who can help you with other areas.

**Shipping and Receiving**

Receiving: Everything you purchase for your research arrives through Shipping and Receiving. Shipping and Receiving then shuttles packages to campus; Tech Electronics is the local delivery point.

- **Hours:** 7:30 a.m. - 11:30 a.m., 12:30 p.m. - 4:00 p.m., Monday - Friday
- **Location:** 6555 Penn Ave. Near the corner of Fifth and Penn across from Mellon Park.
- **Contact:** Vernon Lentz (x8-3301, vl05@andrew.cmu.edu)
- **Service:** Shipping: Pack it, wrap it, fill out their form with your account number and they’ll ship it for you.

**Media Tech**

- **Hours:** 8:00 a.m. - 4:00 p.m., Monday - Friday
- **Phone Hours:** 8:00 a.m. - 10:00 p.m. Monday - Friday
- **Location:** Cyert Hall, Room A74
- **Contact:** Brian Fitzgerald (x8-8855) or Claudia Shade (x8-2430, itorders@andrew.cmu.edu)
- **Website:** http://www.cmu.edu/computing/class-event/
- **Service:** Media Tech provides resources for classroom technologies, media production, videoconferencing, AV & media consultation and AV facility design and consultations.

**University Center**

The University Center houses a number of different stores. Information can be found at: http://www.cmu.edu/university-center/.

**The University Store (Bookstore)**

- **Hours:** http://bookstore.web.cmu.edu/StoreHours.aspx
Location: Lower level of the University Center
Contact: x8-2966; http://bookstore.web.cmu.edu/home.aspx
Service: The University Store sells textbooks, stationery supplies, and a whole line of Carnegie Mellon gifts such as sweatshirts and stuffed animals, in case your parents have a birthday coming up.

Computer Store

Hours: http://www.cmu.edu/stores/computer/Hours.html
Location: Lower level of the University Center
Contact: x8-2636; http://www.cmu.edu/stores/computer/
Service: The University Store sells textbooks, stationery supplies, and a whole line of Carnegie Mellon gifts such as sweatshirts and stuffed animals, in case your parents have a birthday coming up.

The Arts Store

Hours: 8:00 AM - 4:00 PM
Location: Lower level of the University Center
Contact: x8-2969
Service: The Arts Store has all sorts of art supplies, everything from markers to paint to paper to pastels.

Entropy

Hours: 7:30 AM - 5:00 PM
Location: First (ground) floor of the University Center
Contact: x8-2117
Service: Entropy is basically a mini grocery store, selling groceries, frozen foods, bakery products, snacks, candy, ice cream, soda, dairy products, health and personal care items.

United States Post Office

Hours: 8:00 AM - 5:00 PM
Location: Lower level of the University Center
Service: This convenient USPS location was opened in August, 2003. They offer mail service through a variety of different services (different rates and speeds), and sells stamps and money orders.

FedEx Kinko’s

Hours: 6:00 AM - 8:00 PM
Location: Lower level of the University Center
Contact: x8-3737; kinkos@andrew.cmu.edu; http://www.cmu.edu/kinkos/
Service: Copying, printing, poster-printing, shipping and more.
Organizations and Programs

ECE Graduate Student Organization (EGO)

The ECE Graduate student Organization (EGO) is concerned with the quality of ECE graduate student life at CMU. EGO sponsors social events, organizes intramural sports teams, and manages facilities set aside for use by graduate students. EGO tries to make the transition to graduate life as smooth as possible (by producing this guide, for example). For the inside scoop on EGO, check out the web page: http://www.ece.cmu.edu/~ego. For info on all the fun you can have and details on the grad lounge, please see Chapter 12—Leisure and Play.

Organization

EGO is made up of graduate student volunteers. Officers are elected, and there are several appointed chairs. The officers and chairs for this year are listed on the EGO web page.

Meetings

EGO meetings are called every month or so as the need arises. The main purpose of these meetings is to get the officers together to discuss official business (treasury and committee reports, recruitment efforts, etc.), and to eat pizza. These meetings are open to all ECE graduate students, so feel free to come and voice your ideas! Meetings are advertised via email.

Events

EGO organizes and/or sponsors a wide variety of activities throughout the year, several of which are specifically scheduled to coincide with your arrival in the Fall. For more information on EGO events, see Chapter 12 of this guide and check out the EGO web page. Events and requests for volunteers are also typically sent to the ego-announce mailing list, which all grad students in ECE belong to.

Volunteers and the eQ

The purpose of eQ points is to get more students involved in the organization of events. We believe that graduate students, who share and enjoy the many social activities, should also participate in setting up these events. EGO is not about “the few officers for the many students”—all students in ECE are members of EGO and are expected to contribute their share of time. Being an active member of the department is an enriching and satisfying experience and part of the graduate student life. Besides, it’s fun!

The eQ points reflect on how much one has helped in the department’s social life. The more you volunteer, the more points you get. The best part is that your volunteering does not go in
vain—one can redeem points for rewards. To find out more about rewards, track your eQ points, and check out the point distribution for various volunteering activities, visit the EGO website. If you are wondering what eQ stands for - the ‘Q’ stands for queue. Before the rewards system came into place, volunteers for events were sought based on a queue. As volunteers were needed, the people at the head of the queue were asked to help out. As students helped, they were moved to the end of the queue. This way, it was hoped that all students would contribute socially to the department’s cause. The queue is no longer in place, but for legacy purposes, the name eQ is still in place.

There are many tasks, all simple and fun, that have to be performed to make our events happen. For example, you may be asked to take photos, or to buy cookies and chips (at our expense), or to help grill at a BBQ, or to run a volleyball tournament, or to select movies, or to coordinate rides to an event, or to scoop ice cream, or to post flyers.

If you have an idea for an event that you’d like to be held or an activity that you’d like to be subsidized, don’t hesitate to propose your idea to EGO officers by sending email to ego@ece.cmu.edu. EGO will help you set up the event and see that funding is appropriately distributed.

**Women in ECE (WinECE)**

Women in ECE or WinECE (http://www.ece.cmu.edu/~winece) is an organization for the professional development of the women students and alumni in the ECE Department. The primary goal of WinECE is to run social and educational programs for the women in ECE and to provide forums for sharing advice, experiences and resources.

WinECE started as an informal group of graduate women who organized career-oriented as well as social activities for the women students in ECE. Today, a committee of women students meets regularly to plan upcoming career-enhancing and networking events. They currently notify the ECE women students, alumni, and faculty of events via e-mail.

Participation in the planning committee is voluntary and dynamic. ECE women students are always welcome to join the planning committee and to stimulate the group with new ideas. The members of the planning committee encourage each other to take responsibility for decision-making and to develop as leaders.

**Graduate Student Assembly (GSA)**

The Graduate Student Assembly (GSA) (http://senate.web.cmu.edu/gsa/) is a campus-wide organization chartered to serve the needs of the CMU graduate student community. It consists of students from each department (some paid), and includes three representatives from ECE. GSA is instrumental in representing graduate interests to the university administration: past years’ agendas have included pressing for better library and parking privileges, shaping seminars offered by the Teaching Center, establishing award money for conference travel, and much more.

GSA sponsors periodic happy hours, and big parties in the Spring and Fall. These activities are well attended by graduate students and provide an excellent opportunity to have a good time and meet graduate students in other departments. Other efforts every year include organizing and planning the graduate student orientation, initiating blood drives, sponsoring seminars, and funding other graduate student organizations. GSA always needs more people. If you’d like to get involved, don’t hesitate to attend a meeting or talk to one of the department’s GSA reps. For the names of the ECE reps, check out the EGO website.
CHAPTER 11. ORGANIZATIONS AND PROGRAMS

Technical Organizations

Several technical organizations exist on campus to promote technical stimulation among CMU students. While many of these organizations primarily cater to undergraduate students, graduate students are welcome to become involved and share their knowledge in most of these organizations.

Eta Kappa Nu (HKN)

HKN (http://hkn.ece.cmu.edu/) is the Electrical and Computer Engineering honor society. Admission occurs during the Junior or Senior year of one’s undergraduate career, and is also offered to all graduate students following completion of their first year of graduate study. Their events and activities range from fund raising to service to social. Take a look at their website for more information.

Institute of Electrical and Electronics Engineers (IEEE)

The student chapter of IEEE sponsors events ranging from technical talks and tours to social gatherings and outings. If you’re a first-year graduate student, the ECE department will pay your membership fee. For more information, contact ieee@ece.cmu.edu or look at http://www.ece.cmu.edu/~ieee

National Society Of Black Engineers

The National Society of Black Engineers (NSBE), with more than 10,000 members, is the largest student-managed organization in the country. NSBE’s mission is to increase the number of culturally responsible Black engineers to excel academically, succeed professionally and to positively impact the community. For more information, see http://www.cmunsbe.org/

Society of Hispanic Professional Engineers

The Society of Hispanic Professional Engineers (SHPE) CMU Student Chapter strives to increase the number of Hispanic engineering and science students at Carnegie Mellon University through the development of programs with industry and the university. The activities are designed to increase career awareness, encourage relationships with professionals, develop leadership skills, and promote academic excellence. Also, SHPE sponsors cultural and social activities. For more information, see http://www.cmushpe.com/

Society of Women Engineers

SWE is a professional society whose main goal is to promote women in engineering as a profession. This group sponsors technical events, like career-oriented seminars given by visitors from industry, and social events, like the CIT/MCS Winter Ball. In addition, they hold a workshop for female high school students to acquaint them with the opportunities in engineering. For more information, see http://swe.cit.cmu.edu/.

Graduate Women’s Gatherings

Graduate Women’s Gatherings are opportunities to meet that focus on issues of particular concern to graduate women. See http://www.cmu.edu/graduate/professional-development/graduate-women/.
Women in academia face distinct challenges. This is particularly true for women in the sciences and technical fields, where they have been, and remain, under-represented. The Graduate Women’s Gatherings are designed to address graduate women’s issues.

**Departmental Seminars**

There are a variety of programs offered by individual academic departments. The ECE department seminar series (http://www.ece.cmu.edu/news/seminar/) is held Thursdays during Fall and Spring semesters. Additionally, some research groups within ECE have been sponsoring seminars of their own. The SCS Distinguished Lecturer Series brings established speakers to Wean hall once a month on Thursday afternoons. The Robotics Institute and the School of Computer Science (SCS) also organize weekly seminars which are relevant to ECE fanatics.

**Other Organizations**

There are many other organizations on campus, many of which are listed on the web at Carnegie Mellon Student Activities page (http://www.studentaffairs.cmu.edu/StudentActivities/) or off the Student Affairs page (http://www.studentaffairs.cmu.edu/).
Leisure and Play

While graduate school is a lot of work (you didn’t know that?), there are many opportunities within the department, college, and university to have some fun. From canoing to sports outings, and volunteer service to the theater, graduate students have many opportunities to get involved in extra curricular activities.

ECE Graduate Organization (EGO)

Events

EGO (http://www.ece.cmu.edu/~ego) organizes and/or sponsors a wide variety of activities throughout the year, several of which are scheduled to coincide with your arrival in the Fall. Various events include regular social activities such as happy hours, dessert socials, and BBQs in the summer, special events such as Pirates’ tailgate parties, Penguins’ games, poker tournaments, CFA (Carnegie Mellon’s College of Fine Arts) drama productions and musicals, ice skating, bowling, trips to amusement parks and white water rafting and official department activities such as organizing department parties and picnics, visitor tours and writing this guide!

One of the major events in the Fall semester is the ECE fall picnic. The picnic is a great opportunity for new graduate students to get to know the faculty as well as the other graduate students while enjoying lots of food, drink, and sports entertainment. In the early part of the Spring semester, the department sponsors a winter party. Besides a break from academics, the winter party provides an outlet for the artistically talented as well as those who aspire to be artistically talented. The winter party includes a variety show (complete with music and skits), hors d’oeuvres, as well as music and fun. It is a semi-formal occasion (probably one of the only times your advisor and your friends will see you all dressed up).

EGO also organizes regular happy hours with a variety of refreshments and munchies. These offer the chance to get away from your work and meet with other department members. The fun usually takes place on Friday afternoons. Happy hours are announced by email and listed on EGO’s public Google calendar on their website which you can subscribe to.

EGO organizes many events throughout the year. Some past events include: discount outings to Kennywood (an amusement park), Sandcastle (water sports) tailgate parties for Pittsburgh Pirates baseball games, ice cream socials, dessert blowouts, ice skating, white water rafting, paintball, and bowling. Our Social Czar is in charge of social events and activities. In addition to our yearly events and regularly scheduled social activities, EGO is always looking for new ways to have fun. If you have any suggestions for events you would like EGO to sponsor, please email EGO at ego@ece.cmu.edu.

EGO events are entirely run and organized by student volunteers - we need you! All students in ECE are a member of the eQ, a list of EGO volunteers. For more information on how to volun-
teer and earn eQ points (more on eQ points in Chapter 11 — Organizations and Programs) email EGO.

Graduate Student Facilities

EGO maintains your graduate lounge to give you a place to unwind. The lounge is on the fourth floor of Hamerschlag Hall, and features a pool/ping-pong table, a foosball table, a microwave, a stereo, a DVD player, and a large screen TV, along with a scenic view of Oakland and Schenley Park. For security reasons, the lounge is kept locked at all times and can be accessed by swiping your card. If you have suggestions about improvements to the lounge, email EGO.

In addition to the lounge, EGO-operated soda and juice machines are located in the first floor south hallway of Hamerschlag and in the lounge in Porter Hall. The bargain prices at these vending machines are made possible by grad student volunteers who stock the soda machines. This is an easy, quick job and a good way to earn eQ points—send email to ego@ece.cmu.edu if you would like to help fill the machines every week or two.

In addition to the open resources, EGO also maintains other sports equipment such as softball bats, bases, and balls, cricket bats, balls, and accessories, volleyball sets and volleyballs, soccer balls and soccer cones, frisbees, and more. You can check out EGO sports equipment free of charge just for being an ECE student. Email EGO to find out more.

Intramurals

Graduate students actually do leave their books and participate in athletics. In past years ECE’s teams have often proved triumphant, bringing home the cup of victory (metaphorically speaking) in such wide and varied sports as floor hockey, basketball, volleyball, football, and softball. So be a part of it! Organize a new team or join an existing team. All teams are co-ed, all are invited. People participate regardless of the skill level. So even if you cannot distinguish a soccer ball from a softball, fear not. There is always room! The ECE department has recently fielded teams in sports such as indoor and outdoor soccer, floor hockey, ultimate frisbee, volleyball, basketball, ping pong, softball and football. In some cases more than one team was fielded creating an instant and intense rivalry. In other sports, notably football, the arch-villainous CS department gives us friendly competition (or so they like to think). If you can’t find a team for the sport you’re looking for, don’t hesitate to organize one yourself, the registration procedure is really simple. For more information, see the web page for CMU intramural sports at http://www.cmu.edu/athletics/recreation/intramurals/.

Other Sports

Carnegie Mellon offers a variety of intramural sports, club sports, and group exercise classes (http://www.cmu.edu/athletics/groupx/). Most courts and classes are located in the University Center. Exercise classes require a pass, called a “punch card” that can be purchased at the equipment desk. The Graduate Student Assembly (GSA) sometimes sells discounted punch cards for graduate students.

Pittsburgh has an active Ultimate Frisbee community, which organizes everything from highly competitive club teams to rookie friendly pickup games. There’s a web page at http://www.pittsburgh-ultimate.org. Carnegie Mellon has a men’s team called Mr. Yuk (http://www.andrew.
CMU has a Cricket Club (http://www.cmucricket.org/) and Pittsburgh has a Cricket League (http://www.pittsburghcricket.com/). There are a couple of local Soccer leagues. League rules and descriptions are on their web page at http://www.pawest-soccer.org/Adult/. There’s an ice skating rink in Schenley Park and a frisbee golf course right next to it. There are tennis courts on campus (and in Schenley Park), as well as squash and/or racquetball courts on campus. Equipment for the courts on campus can be checked out from the UC equipment desk using your ID card.

Pittsburgh has a number of professional sports teams, including the Pittsburgh Pirates (baseball), Steelers (football), Penguins (Hockey) and Power (Indoor Arena Football). EGO and GSA purchase a block of discounted tickets to Pirates games every so often.

**Drama**

CMU drama department was once the home for several people that you might recognize from television or movies. It continues to produce new names, and you can see their work before they become famous. Drama productions include mainstage shows at Kresge Theater in the College of Fine Arts (CFA) and the new stage at the recently built Purnell Center building. Mainstage events tend to be pricey, and are usually pretty good. Some of the smaller shows are often senior or masters projects, mostly one-acts, and are usually free. You can find schedules at http://www.drama.cmu.edu/. EGO sells partially subsidized tickets to some CMU dramas.

If you feel like doing some acting yourself, the University of Pittsburgh has an improv night on Fridays at 11:00 p.m. in the Pitt Studio Theater, in the basement of the Cathedral of Learning. See the Friday Night Improvs website (http://www.fnipgh.com) for details.

Pittsburgh has a pretty good cultural district (http://culturaldistrict.org/) in downtown that includes several first rate professional venues including the Benedum and Byham theaters, which occasionally host touring Broadway shows. Smaller, less expensive productions often run in the Stephen Foster memorial theater on Forbes Avenue next to the Cathedral of Learning. Also check out the Pittsburgh Public Theater website at http://www.ppt.org, they have discounted student tickets for selected productions. For an extensive listing of general cultural events see the Pittsburgh Cultural Trust website http://www.trustarts.org/.

**Museums**

Pittsburgh doesn’t have as many museums and galleries as larger cities, but there’s still a pretty good selection. The Frick Art Museum, featuring free admission, is located at 7227 Reynolds Street (371-0600). The Carnegie Science Center (Downtown), the Carnegie Museum of Art (4400 Forbes Avenue), the Carnegie Museum of Natural History (4400 Forbes Avenue), and the Andy Warhol Museum (117 Sandusky Street) offer free admission for up to 4 people if you first check out a copy of The Carnegie from the Carnegie Public Library on Forbes Avenue.

Your Carnegie Mellon Student ID will get you FREE admission to the Carnegie Art Museum, Carnegie Science Museum, Carnegie Science Center and Andy Warhol Museum.

**Movies**

There are several commercial movie theaters in the nearby area, including Squirrel Hill Manor, AMC Loews in Waterfront, and South Side Works Cinema adjacent to the Cheesecake Factory.
right off the Hot Metal Street Bridge. The Harris Theater (809 Liberty Avenue, downtown), and
the Melwood Screening Room (477 Melwood in Oakland) show less mainstream films at decent
prices. The Harris and the Melwood are operated by the Pittsburgh Filmmakers (http://pfm.
pittsburgharts.org/). The Carnegie Museum of Art on Forbes Avenue in Oakland often shows films
of artistic merit in its screening room. Schedules are available from the museum information desk.
The Carnegie Science Center has an Omnimax theater.

The Carnegie Mellon Activities Board (AB) (http://www.activitiesboard.org/) show films Thurs-
day through Sunday during the semester in McConomy Auditorium in the University Center.
Admission is only a dollar with your student ID, making this one of the best movie deals around.

During the Summer, Pittsburgh City Parks shows free movies outdoors on Flagstaff Hill every
un-rainy Wednesday and Sunday evening starting at dusk. See Cinema in the Park (http://www.
city.pittsburgh.pa.us/parks/cinema_in_the_park.htm).

Amusement Parks, Zoo, Conservatory, and Aviary

One of most convenient Pittsburgh Attractions is Phipps Conservatory (http://phipps.conservatory.
org), located next to CMU in Schenley Park. Phipps has an excellent display of greenery year
round, a butterfly garden exhibit in summer and stunning flower shows during the holidays and
in spring.

The Pittsburgh Zoo & PPG Aquarium (http://www.pittsburghzoo.com) is located in Highland
Park, about twenty minutes drive from CMU. Pittsburgh Aviary (http://www.aviary.org) was at
one time the only private, not-for-profit, free-standing aviary in North America. The Aviary is
located on Arch Street on the North Side.

Kennywood Park (http://www.kennywood.com), located West Mifflin about half an hour from
CMU, is a traditional amusement park offering rollercoasters, games, and water rides. Kenny-
wood has been designated as a National landmark. Sandcastle (http://www.sandcastlewaterpark.
com/) is a water park featuring water rides, an outdoor bar, and a go-cart track. GSA traditionally
sponsors trips to Kennywood and/or Sandcastle during the summer.

More Fun Stuff

Pittsburgh has an excellent symphony orchestra and a strong opera company. Concert schedules
are available at http://pso.culturaldistrict.org/pso_home. Student discount is usually available.

The Pittsburgh Dance Council regularly brings excellent artists to Pittsburgh, and there is a
small (but entertaining) local music scene. For an extensive listing of general cultural events try
http://www.trustarts.org. They have a database that is searchable by venue, event, and date.

Information can also be found in a local entertainment paper The Pittsburgh City Paper (http:
//www.pghcitypaper.com). The student affairs office also maintains a page of entertainment links at
http://www.studentaffairs.cmu.edu/pittsburgh/pithome.html. CMU maintains a searchable calendar
Quick Links

Here is a compilation of useful websites including those listed throughout the document.

ECE Departmental Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Website</td>
<td><a href="http://www.ece.cmu.edu">http://www.ece.cmu.edu</a></td>
</tr>
<tr>
<td>Faculty, Staff and Grad Student Directories</td>
<td><a href="http://www.ece.cmu.edu/directory/">http://www.ece.cmu.edu/directory/</a></td>
</tr>
<tr>
<td>Graduate Studies Committee</td>
<td><a href="http://www.ece.cmu.edu/graduate/gsc.html">http://www.ece.cmu.edu/graduate/gsc.html</a></td>
</tr>
<tr>
<td>Graduate Programs Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/">https://www.ece.cmu.edu/graduate/</a></td>
</tr>
<tr>
<td>Ph.D. Program Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/phd/">https://www.ece.cmu.edu/graduate/phd/</a></td>
</tr>
<tr>
<td>Master’s Program Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/masters/">https://www.ece.cmu.edu/graduate/masters/</a></td>
</tr>
<tr>
<td>Qualifying Exam Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/phd/qualifying.html">https://www.ece.cmu.edu/graduate/phd/qualifying.html</a></td>
</tr>
<tr>
<td>Prospectus (Proposal) Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/phd/prospectus.html">https://www.ece.cmu.edu/graduate/phd/prospectus.html</a></td>
</tr>
<tr>
<td>Thesis and Defense Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/phd/thesis.html">https://www.ece.cmu.edu/graduate/phd/thesis.html</a></td>
</tr>
<tr>
<td>Master’s Requirements Overview</td>
<td><a href="https://www.ece.cmu.edu/graduate/masters/requirements.html">https://www.ece.cmu.edu/graduate/masters/requirements.html</a></td>
</tr>
<tr>
<td>Teaching Overview</td>
<td><a href="https://www.ece.cmu.edu/student/teaching.html">https://www.ece.cmu.edu/student/teaching.html</a></td>
</tr>
<tr>
<td>ECE Seminars</td>
<td><a href="http://www.ece.cmu.edu/news/seminar/">http://www.ece.cmu.edu/news/seminar/</a></td>
</tr>
<tr>
<td>ITS UserGuide</td>
<td><a href="http://userguide.ece.cmu.edu/">http://userguide.ece.cmu.edu/</a></td>
</tr>
<tr>
<td>EGO Qual Resources</td>
<td><a href="http://www.ece.cmu.edu/~ego/qual.php">http://www.ece.cmu.edu/~ego/qual.php</a></td>
</tr>
</tbody>
</table>

University Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU Website</td>
<td><a href="http://www.cmu.edu">http://www.cmu.edu</a></td>
</tr>
<tr>
<td>Campus Maps</td>
<td><a href="https://www.cmu.edu/about/visit/campus-map.shtml">https://www.cmu.edu/about/visit/campus-map.shtml</a></td>
</tr>
<tr>
<td>Virtual Guided Tour of the Campus</td>
<td><a href="http://www.cmu.edu/tour">http://www.cmu.edu/tour</a></td>
</tr>
<tr>
<td>Parking on Campus</td>
<td><a href="http://www.cmu.edu/parking">http://www.cmu.edu/parking</a></td>
</tr>
<tr>
<td>Campus Police</td>
<td><a href="http://www.cmu.edu/police">http://www.cmu.edu/police</a></td>
</tr>
<tr>
<td>Shuttle and Escort</td>
<td><a href="http://www.cmu.edu/police/shuttleandescort">http://www.cmu.edu/police/shuttleandescort</a></td>
</tr>
<tr>
<td>SafeWalk</td>
<td><a href="http://www.studentaffairs.cmu.edu/safewalk">http://www.studentaffairs.cmu.edu/safewalk</a></td>
</tr>
<tr>
<td>The Hub</td>
<td><a href="http://www.cmu.edu/hub">http://www.cmu.edu/hub</a></td>
</tr>
<tr>
<td>Student Information Online</td>
<td><a href="https://www.cmu.edu/hub/sio">https://www.cmu.edu/hub/sio</a></td>
</tr>
<tr>
<td>BlackBoard</td>
<td><a href="http://www.cmu.edu/blackboard">http://www.cmu.edu/blackboard</a></td>
</tr>
<tr>
<td>Library</td>
<td><a href="http://search.library.cmu.edu">http://search.library.cmu.edu</a></td>
</tr>
<tr>
<td>Off Campus Library VPN</td>
<td><a href="http://eps.library.cmu.edu/off-campuswireless">http://eps.library.cmu.edu/off-campuswireless</a></td>
</tr>
<tr>
<td>Hub (Graduation)</td>
<td><a href="http://www.cmu.edu/hub/graduation">http://www.cmu.edu/hub/graduation</a></td>
</tr>
<tr>
<td>CMU Directory</td>
<td><a href="http://directory.andrew.cmu.edu">http://directory.andrew.cmu.edu</a></td>
</tr>
<tr>
<td>2012-13 Academic Calendar</td>
<td><a href="http://www.cmu.edu/hub/calendar.html">http://www.cmu.edu/hub/calendar.html</a></td>
</tr>
</tbody>
</table>
### Organizations

<table>
<thead>
<tr>
<th>Organization</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGO</td>
<td><a href="http://www.ece.cmu.edu/~ego">http://www.ece.cmu.edu/~ego</a></td>
</tr>
<tr>
<td>Student Affairs</td>
<td><a href="http://www.studentaffairs.cmu.edu">http://www.studentaffairs.cmu.edu</a></td>
</tr>
<tr>
<td>Graduate Student Assembly (GSA)</td>
<td><a href="http://senate.web.cmu.edu/gsa/">http://senate.web.cmu.edu/gsa/</a></td>
</tr>
<tr>
<td>Eta Kappa Nu</td>
<td><a href="http://hkn.ece.cmu.edu/">http://hkn.ece.cmu.edu/</a></td>
</tr>
<tr>
<td>Institute of Electrical and Electronics Engineers</td>
<td><a href="http://www.ece.cmu.edu/~ieee">http://www.ece.cmu.edu/~ieee</a></td>
</tr>
<tr>
<td>National Society of Black Engineers</td>
<td><a href="http://www.cmunsbe.org">http://www.cmunsbe.org</a></td>
</tr>
<tr>
<td>Society of Hispanic Professional Engineers</td>
<td><a href="http://www.cmushpe.com/">http://www.cmushpe.com/</a></td>
</tr>
<tr>
<td>Society of Women Engineers</td>
<td><a href="http://swe.cit.cmu.edu/">http://swe.cit.cmu.edu/</a></td>
</tr>
<tr>
<td>Student Activities</td>
<td><a href="http://www.studentaffairs.cmu.edu/">http://www.studentaffairs.cmu.edu/</a></td>
</tr>
<tr>
<td>Eberly Center for Teaching Excellence</td>
<td><a href="http://www.cmu.edu/teaching/eberly/">http://www.cmu.edu/teaching/eberly/</a></td>
</tr>
<tr>
<td>WinECE</td>
<td><a href="http://www.ece.cmu.edu/~winece/">http://www.ece.cmu.edu/~winece/</a></td>
</tr>
<tr>
<td>Graduate Women’s Gatherings</td>
<td><a href="http://www.cmu.edu/graduate/">http://www.cmu.edu/graduate/</a></td>
</tr>
<tr>
<td></td>
<td>professional-development/graduate-women</td>
</tr>
</tbody>
</table>

### Entertainment

<table>
<thead>
<tr>
<th>Activity</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intramural sports</td>
<td><a href="http://www.cmu.edu/athletics/recreation/intramurals/">http://www.cmu.edu/athletics/recreation/intramurals/</a></td>
</tr>
<tr>
<td>GroupX</td>
<td><a href="http://www.cmu.edu/athletics/groupx/">http://www.cmu.edu/athletics/groupx/</a></td>
</tr>
<tr>
<td>Pittsburgh Ultimate Frisbee</td>
<td><a href="http://www.pittsburgh-ultimate.org">http://www.pittsburgh-ultimate.org</a></td>
</tr>
<tr>
<td>CMU Cricket Club</td>
<td><a href="http://www.cmucricket.org">http://www.cmucricket.org</a></td>
</tr>
<tr>
<td>Pittsburgh Cricket League</td>
<td><a href="http://www.pittsburghcricket.com">http://www.pittsburghcricket.com</a></td>
</tr>
<tr>
<td>PA-West Soccer League</td>
<td><a href="http://www.pavest-soccer.org/Adult/">http://www.pavest-soccer.org/Adult/</a></td>
</tr>
<tr>
<td>CMU Drama Events</td>
<td><a href="http://www.drama.cmu.edu/">http://www.drama.cmu.edu/</a></td>
</tr>
<tr>
<td>Carnegie Mellon Activities Board (AB)</td>
<td><a href="http://www.activitiesboard.org/">http://www.activitiesboard.org/</a></td>
</tr>
<tr>
<td>Cinema in the Park</td>
<td><a href="http://www.city.pittsburgh.pa.us/parks/">http://www.city.pittsburgh.pa.us/parks/</a></td>
</tr>
<tr>
<td></td>
<td>cinemainthepark.htm</td>
</tr>
</tbody>
</table>

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**Carnegie Mellon**  
The ECE Insider’s Guide
<table>
<thead>
<tr>
<th><strong>Quick Links</strong></th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday Night Improvs</td>
<td><a href="http://www.fnipgh.com">http://www.fnipgh.com</a></td>
</tr>
<tr>
<td>Pittsburgh Cultural District</td>
<td><a href="http://culturaldistrict.org/">http://culturaldistrict.org/</a></td>
</tr>
<tr>
<td>Pittsburgh Cultural Trust</td>
<td><a href="http://www.trustarts.org/">http://www.trustarts.org/</a></td>
</tr>
<tr>
<td>Pittsburgh Public Theater</td>
<td><a href="http://www.ppt.org">http://www.ppt.org</a></td>
</tr>
<tr>
<td>Pittsburgh Filmmakers</td>
<td><a href="http://pfm.pittsburghharts.org">http://pfm.pittsburghharts.org</a></td>
</tr>
<tr>
<td>Loews Theaters</td>
<td><a href="http://www.loewstheatres.com">http://www.loewstheatres.com</a></td>
</tr>
<tr>
<td>Pittsburgh Zoo</td>
<td><a href="http://www.pittsburghzoo.com">http://www.pittsburghzoo.com</a></td>
</tr>
<tr>
<td>National Aviary</td>
<td><a href="http://www.aviary.org">http://www.aviary.org</a></td>
</tr>
<tr>
<td>Kennywood</td>
<td><a href="http://www.kennywood.com">http://www.kennywood.com</a></td>
</tr>
<tr>
<td>Sandcastle</td>
<td><a href="http://www.sandcastlewaterpark.com/">http://www.sandcastlewaterpark.com/</a></td>
</tr>
<tr>
<td>Pittsburgh City Paper</td>
<td><a href="http://www.pghcitypaper.com">http://www.pghcitypaper.com</a></td>
</tr>
<tr>
<td>Pittsburgh Post-Gazette</td>
<td><a href="http://www.post-gazette.com">http://www.post-gazette.com</a></td>
</tr>
<tr>
<td>Student Affairs Entertainment Links</td>
<td><a href="http://www.studentaffairs.cmu.edu/pittsburgh/pithome.html">http://www.studentaffairs.cmu.edu/pittsburgh/pithome.html</a></td>
</tr>
</tbody>
</table>