University of California at Berkeley
Dept of Electrical Engineering and Computer Sciences
Instructional Support Group
Electronics Support Group

EECS Instructional Facilities (for ABET May 2012)

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Content for:

ABET Self-Study Report (draft-eac-self-study-2012.docx, March 2012): "CRITERION 7. FACILITIES" table (p. 52-60)

References:

ABET Self-Study Report (draft-eac-self-study-2012.docx, March 2012): "CRITERION 3. STUDENT OUTCOMES" (p 33)
ABET Self-Study Report (draft-eac-self-study-2012.docx, March 2012): "CRITERION 5. CURRICULUM" table (p. 41+)
EECS Undergraduate Notes (http://www.eecs.berkeley.edu/Programs/Notes): Chapter 2

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CRITERION 7. FACILITIES

A. Summarize each of the program's facilities in terms of their ability to support the attainment of the program
educational objectives and student outcomes and to provide an atmosphere conductive to learning.

1.  Offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment
    that is typically available there.
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[Maybe Scott, Mark or Rosita could answer this.]

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CRITERION 7. FACILITIES

A. Summarize each of the program's facilities in terms of their ability to support the attainment of the program
educational objectives and student outcomes and to provide an atmosphere conductive to learning.
...
2.  Classrooms and associated equipment that is typically available where the program courses are taught.
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All classrooms on campus are capable of sound and video projection from a workstation or laptop for teaching purposes. In all classrooms, students can access the internet from their laptops via the campus wireless network. Some lectures are recorded for internet streaming and archiving. Classroom AV and seating resources are described in detail in http://registrar.berkeley.edu/Scheduling/attributes.html

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A. Summarize each of the program's facilities in terms of their ability to support the attainment of the program educational objectives and student outcomes and to provide an atmosphere conductive to learning.
...
3. Laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction.

The EECS Department has allocated approximately 10,000 sq ft to 17 laboratories in Cory, Soda and Sutardja Dai Halls for instructional computing and engineering courses. There is an overall ratio of 12 students per workstation in these laboratories.

Features that are common to all of the instructional laboratories include:

Physical Access: Most labs are open 24 hours, 7 days per week to students who have authorized cardkey access.

AV resources: All labs are capable of sound and video projection from a computer for teaching purposes. Some labs are recorded for use in WEB-based course materials.

Printing & scanning: All labs have access to printing from every computer. 17 networked printers are distributed amongst the labs. Several flatbed scanners and a slide scanner are available to the students.

Collaboration space: Areas in the labs are provided for laptop users (seating, table space, power, networking) and group collaboration.

Networked computers: We support 8 electronics laboratories, 9 computing laboratories and several related facilities in support of the EECS program educational objectives. Each lab has a networked computer at each station. The computers are running Windows, Linux, Solaris or MacOSX. The students login to their domain accounts and networked home directories, where they develop and store their portfolios of coursework throughout the semester.

Login servers: These servers are accessible by all students for programming and for running licensed application software:

2 Sun SPARC T5220 (8-core 1.2-GHz USPARC, 32 GB RAM) running Solaris 10
5 Sun SPARC V280 & V440 (1.1-GHz USIII, 8 GB RAM) running Solaris 10
2 Sun Fire X4600 (8-core Opteron 885, 32 GB RAM) running Solaris X86 in several virtual systems (“zones”)
3 Dell servers (dual 2.8-GHz Xeon, 6-8 GB RAM) running Linux
26-node cluster (dual 2.8-GHz Xeon, 16-32 GB RAM) running Linux
4 Dell servers (dual 2.8-GHz Xeon, 6-8 GB RAM) running Windows Remote Desktop Server
1 SVN server

Software: Here are some major software applications that are available to all students for coursework in our labs. Most software is also accessible via remote login access to our compute servers.

Adobe Creative Suite
Cadence tools (Icfb, Virtuoso, ..)
Eclipse
Final Cut Pro, iMovie
HSpice
IAR
ADS
Java,C, C++
Magick++
Mathematica
Matlab, Simulink (and dozens of toolkits)
Maya
Metrics
Microsoft Visual Studio
National Instruments LabView
Perl, Python, PHP, Ruby on Rails
Quanser QuaRCModelSIm
SolidWorks
Synopsys tools (Suprem4, TCAD, Medici, …)
Virtutech Simics
Xilinx, Virtex-5 FPGA

National Instruments, Abobe and Microsoft products are also licensed for use on students’ personal computers.

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Here is a summary if the instructional facilities that are provided for each area of study:

Software & Languages

Typical Courses:
CS61A (Structure of Computer Programs)
CS61B (Data Structures)
CS61C (Machine Structures)
CS10 (Beauty of Computing)
CS9[ABCDEFGH] (self-paced computer languages)
CS161 (Computer Security)
CS162 (Operating Systems & System Programming)
CS164 (Programming Languages & Compilers)
CS169 (Software Engineering)

Facilities:

These classes have 7 computer labs (150 seats) and at least a dozen login servers for programming and software project development. The computers run Solaris, Linux, Windows and MacOSX. Departmental IT staffs provide customized servers and software as needed for specific assignments and for the instructors to run auto-grading programs.

The large core classes (CS61*, CS10) have reserved lab sessions with individual instruction. CS10 uses the BYOB language, which was developed from Logo by EECS faculty to teach the fundamentals of computer languages.

The design courses (CS162, CS164, CS169) have students working in multi-disciplinary teams on semester-long projects in language design and object-oriented programming.

CS61C and CS169 make innovative use of the Amazon EC2 cloud and VirtualBox virtual computers. The instructor provides base machine images that provide a standard programming environment.

User Interface Design, Graphics, Animation

Typical Courses:
CS160 (User Interface Design)
CS184 (Computer Graphics)
CS39A (Computer Animation)

Facilities:

MacPro Lab (200 SDH): This 30-seat lab is used for animation and for general programming assignments. CS39A and independent student projects use Maya and Renderman to author and render complex animations. CS160 uses XCode and the iPhone SDK for iPhone application design.

The design courses (CS160, CS184) use our labs and collaboration spaces for several group projects. CS184 students use software such as OpenGL, GLUT, Xcode and FreeImage on the operating system of their choice. CS160 uses a dedicated lab with Windows workstations to develop projects in Human Computer Interaction. Students design dynamic user interfaces using input devices such as the Microsoft Kinect and programming tools including the Kinect SDK, C+, OpenGL and OpenNI. The software is also available for the students' personal laptops at no cost to the students.

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Parallelism, HPC, Big Data

Typical Courses:
CS61A (Structure of Computer Programs)
CS61C (Machine Structures)
CS294-1 (Behavioral Data Mining)
CS194-15 (Engineering Parallel Software)

Facilities:
The Icluster: This 26-node cluster is available to classes and individual students studying parallel processing (MapReduce), high-performance computing (MPI) and large-scale data mining (MarkLogic).

Parallel Computing Lab (330 Soda): This lab has 28 Dell T5500 workstations with NVidia Tesla graphics co-processors. Students work in the lab as well as via remote access to the workstations. Classes run Matlab, the Intel ICC compiler and other compilers.

Computer Architecture, Embedded Systems

Typical Courses:
CS149 (Embedded Systems)
CS150 (Components & Design Techniques For Digital Systems)
CS152 (Computer Architecture & Engineering)
CS250 (VLSI Systems Design)

Facilities:
The design courses (CS149,CS150) have strong laboratory components, with emphasis on a semester-long sequence of projects. They use LabVIEW Embedded,Matlab Simulink/Stateflow with Real-Time Workshop, Xilinx, Virtex-5 FPGA, Microblaze and Visual Studio in dedicated hardware labs (125 Cory, 119 Cory, 204 Cory).

CS152 runs Virtutech Simics, a full-system machine simulator, on our Linux workstations (330 Soda) and servers.

CS250 runs Synopsys tools on our Linux cluster (The Icluster) and servers.

Computer Algorithms and Applications

Typical Courses:
CS170 (Efficient Algorithms & Intractable Problems)
CS172 (Computability & Complexity)
CS174 (Combinatorics & Discrete Probability)
CS186 (Database Systems)
CS188 (Artificial Intelligence)
CS191 (Quantum Computing)

Facilities:
The CS17* courses focus on algorithms, combinatorics, probability, specific problems, and how they relate to practical issues such as compiler design. CS191 is cross listed with Physics and Chemisty classes. Matlab and Mathematica are available on the EECS instructional computers for all students in these courses. Some assignments are done in C, C++ or Java, which are also available.

In the design course (CS186), students are given their own SQL server instances to modify and recompile. The course includes solo and team-oriented programming projects based on Ruby on Rails, and extensions to the PostgreSQL open-source database system.

In CS188, students write machine learning algorithms, typically in Python, that classify handwritten digits and photographs.

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EE core courses	
Typical Courses:	EE20N EE40 EE105 EE117 EE120 CS150
Facilities:	[Ferenc]
Microelectronic Devices & Circuits	
Typical Courses:	CS150 EE105 EE113 EE119 EE130 EE131 EE133 EE140 EE141 EE142 EE143 EE143 EE144
Facilities:	[Ferenc] Microfab Facility (218 Cory): 8 stations, wet lab and clean room are used to manufacture and analyze integrated circuits. This is maintained jointly by instructional support staff and Nanolab research support staff. CAD tools: Students in these classes run HSpice, Cadence, Synopsys and Matlab on our workstations and login servers.
Signals & Systems	
Typical Courses:	EE120 EE121 EE122 EE122 EE123 EE125 EE126 EE128 EE129 EE192 EEC145B
Facilities:	[Ferenc]

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Robotics & Control	
Typical Courses:	EEC125 EEC128
Facilities:	[Ferenc]
Laboratory & Projects	
Typical Courses:	EC145L EE145M or C145M EE192
Facilities:	[Ferenc]
EE design courses	
Typical Courses:	EEC125 EEC128 EE130 EE140 EE141 EE143 EEC149 EE192
Facilities:	[Ferenc]
EE applications	
Typical Courses:	EE145B (Image Processing and Reconstruction Tomography) EE145L (Intro Electronic Transducer Lab) EE145M (Intro Microcomputer Interfacing Laboratory) EE117 (Electromagnetic Fields & Waves)
Facilities:	[Ferenc]

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B. Computing Resources: Describe any computing resources (workstations, servers, storage, networks including software) in addition to those described in the laboratories in Part A, which are used by the students in the program. Include a discussion of the accessibility of university-wide computing resources available to all students via various locations such as student housing, library, student union, off-campus, etc. State the hours the various computing facilities are open to students. Assess the adequacy of these facilities to support the scholarly and professional activities of the students and faculty in the program.

Computers: The EECS instructional support group provides about 20 logon servers for students in EE and CS courses, in addition to the 400 workstations in the instructional laboratories. Our computers run Windows, Linux, Solaris and MacOSX. All computers are networked and share home directories that are accessible from every EECS instructional computer, and via remote login. Each student can maintain a personal portfolio on our department WEB server. The labs also have accommodations for students' laptops. Using cardkeys, students have access the workstations in our labs 24 hours a day. The servers are also available 24 hours a day. At a given time, one third or more of the logged-in users are accessing our computers over the net from off-site locations. These resources are sufficient to serve the students in all EECS courses each semester.

In addition, the central campus computing support group provides general access computer labs that our students can also use at times during the day. The labs are listed in http://inst.eecs.berkeley.edu/share/b/pub/pdf/signs/Inst_facts.pdf and http://facility.berkeley.edu/facilities.html.

Single sign-on: The central campus computing support group provides an authentication service called CalNet that students and staff use to login to most on-line campus resources, including email, course registration, course WEB sites, libraries, human resources and many others.

Network Access: Most software that is required for assignments can be accessed remotely on our servers from anywhere on the Internet by students who have authorized login access. Students and staff can login via the campus wireless network (AirBears), which extends throughout the campus. The Residence Halls provide network access for students' computers, which allow them full access to our servers from the dorms. The libraries provide computers as well as network access for students' laptops. The central campus supports a VPN (virtual private network) that allows students to authenticate (using CalNet) from any computer and obtain access to campus services such as software licenses.

Adequacy: Those resources provide ubiquitous access to the facilities and computers that we provide for EECS coursework. The electronics lab activities are integrated with the computing infrastructure and supplement material covered in lectures.

Recent surveys of the students have indicated their general satisfaction with the facilities. However, the surveys also reaffirmed our observations that the wireless network was too slow in some locations and that the computers were too old and slow in some labs. To address those concerns, we have added wired network access (faster than wireless) for student laptops in several collaboration spaces, and we have started to upgrade several laboratories and servers. Instructional funding sustained a large cut at the start of our State budget crisis in 2009, and that prevented any equipment replacements for a couple of years. But we have regained some funding for it because of generous donations and because of austerity in other areas of the budget.

The EECS department funds 9 career staff specifically for technical support in the instructional engineering and computing facilities. The instructional staff is under a larger EECS IT group that provides network and disk storage services to the instructional computers. Additional EECS staff provides academic and administrative support to EECS students and faculty, including the upkeep of course WEB site content. This experienced staff works closely with faculty, research, and academic personnel to ensure ongoing review and planning for updating facilities, equipment, experiments, curricula, and student projects.

The central campus also has several senior technical groups dedicated to the support and improvement of the campus-wide on-line services. AirBears wireless capacity and continuity (the "wireless mesh") are being upgraded. A new partnership with AT&T will improve cell phone coverage in marginal areas. The campus course WEB portal (bSpace) is being upgraded (CalCentral).

CRITERION 7. FACILITIES

C. Guidance: Describe how students in the program are provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories.

The technical support staff gives hands-on training to the TAs in the electronics lab. Many electronics lab are supported by a career staff who are present during lab usage. [Ferenc, do you want to add to this?]