

University of California, Berkeley

Classroom Technology Standards

Educational Technology Services
Teaching & Learning Spaces

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INTRODUCTION

This document refers specifically to A/V-IT technology installed in [General Assignment Classrooms](#) (GAC), which are managed by the UC Berkeley [Office of the Registrar](#) (OR). [Educational Technology Services](#) (ETS) is responsible for the design, installation, maintenance, and support of the A/V-IT technology in these spaces. Technology in these classrooms is managed using the following guidelines and processes.

TECHNOLOGY UPGRADES & IMPROVEMENTS

ETS is always looking for new ways to improve A/V-IT service in the GA classrooms. We listen first and foremost to the users: instructors and students. We also coordinate with our many partners to assess and understand the evolving needs around classroom technology.

TECHNOLOGY TIERS

The more than two hundred general assignment classrooms on campus come in many shapes and sizes. For A/V-IT purposes, however, the rooms are easily categorized into several groupings that we call technology tiers. What follows is an overview of each tier.

Basic Technology 4:3 (Analog or Digital input)

Number of seats: Fewer than 50 seats in seminar, learning studio, or traditional classroom layout.

Equipment:

AV Inputs: 1 (One) VGA for laptop, 1 (One) Component (or S-Video) input for combination VHS/DVD player 1 (One) Composite Auxiliary AV Input for external equipment on an Aux Plate.

Projector: Analog classrooms use 4:3 aspect ratio data grade Panasonic DLP Projector (PTD-6000 or similar). The minimum acceptable resolution is 1024 by 768 pixels.

Projection screen: Analog classrooms use a square 4:3 screen, typically 84" X 84" or larger.

Speakers: A pair of two-way JBL Control 25 loudspeakers for instructor laptop sound.

AV Switcher: Analog classrooms use an Extron System 5IP switcher that allows multiple types of AV inputs. Also provides amplification for a pair of speakers.

Sound reinforcement for public address: None.

Course Capture: None.

Equipment Mounting: Required equipment will be mounted in a hanging metal cabinet that is placed on a wall at the front of the room, out of the way of the lecturer's movements.

Exceptions: Fewer than <10 classrooms in this category utilize flat screen monitors (<50" dia) instead of a projector and screen due to the layout and viewing angles of the spaces.

Control System: AMX NXD 700i Touchscreen and NI-700 controller.
Interface example:

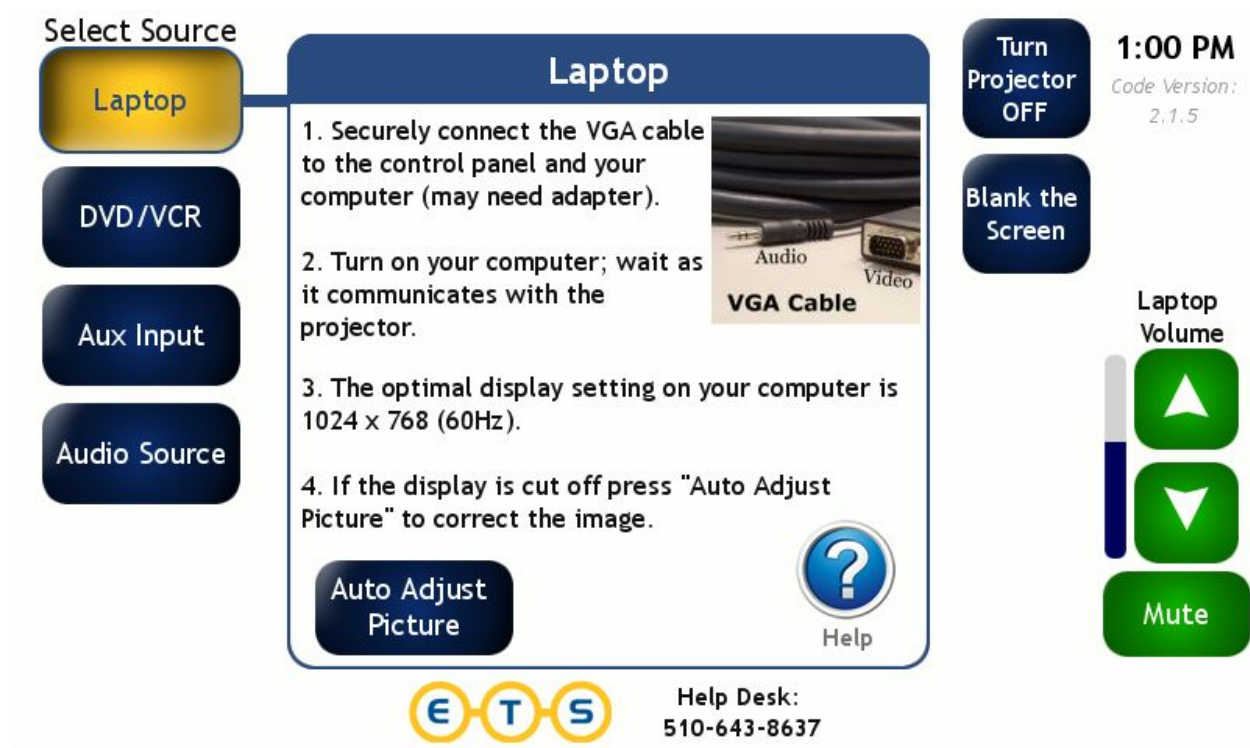


Image: Screen shot of the control system touchscreen interface for an analog classroom with Basic Technology installed. The source selection menu on the left includes buttons for Laptop, DVD/VCR, Aux Video, and Audio Source. The menu on the right includes Turn Projector OFF, Blank the Screen and Laptop Volume/Mute.

Enhanced Basic Technology (screen cast and/or audio capture)

Number of seats: Larger lecture halls with usually more than 50 seats, many with fixed seating.

Equipment:

AV Inputs: 1 (One) VGA for laptop, 1 (One) Component (or S-Video) input for combination VHS/DVD player 1 (One) Composite Auxiliary AV Input for external equipment on an Aux Plate.

Projector: 4:3 aspect ratio data grade Panasonic PTD-6000 (or similar) DLP projector. The minimum acceptable resolution is 1024 by 768 pixels.

Projection screen: A larger 4:3 projection screen. The size of the screen depends largely upon the room dimensions.

Speakers: Nearly every T2 room has a pair of two-way JBL Control 28 loudspeakers on the front wall for program. There are also multiple4 ceiling speakers for speech reinforcement.

AV Switcher: Extron System 5IP switcher that allows multiple types of AV inputs.

Sound reinforcement for public address: Separate higher powered speakers, typically mounted on either side of the projector screen, one for speech and one for program audio (e.g. LeConte 1,2,3,4; McCone 141, Etcheverry 3106, 3108, 3109, 3111, 3113).

Microphone inputs for public address: 1 (one) Wireless body pack. Almost exclusively the Shure ULX wireless system. 2 (Two) wired microphone inputs. We provide 1 (One) wired microphone for a backup or secondary voice reinforcement.

Signal Processing: A Rane RPM-88 8 input x 8 output DSP (Digital Signal Processor). This DSP provides mixing and signal processing for all AV sources, microphones, ALS and course capture audio.

Course Capture: Matterhorn course capture agents that receive the laptop video signal and program and speech audio for post processing as requested by faculty.

Assisted Listening System (ALS): Sennheiser SI1015-4000 Infrared receiver/transmitter. The ALS transmits program and speech audio over infrared to students with receiving devices usually provided on their own although the DSP office can provide these devices as requested.

Equipment Mounting: Required equipment will be mounted in a hanging metal cabinet that is placed on a wall at the front of the room, out of the way of the lecturer's movements.

Exceptions: The above description applies to most of the Type 2 rooms, but some are customized for each particular room. We have also started updating T2 rooms with HDMI inputs, switcher/scaler, and a 16:10 projection system (e.g. North Gate 105, Moffitt 145).

Control System: AMX NXD 700i Touchscreen and NI-700 controller.
Interface example:

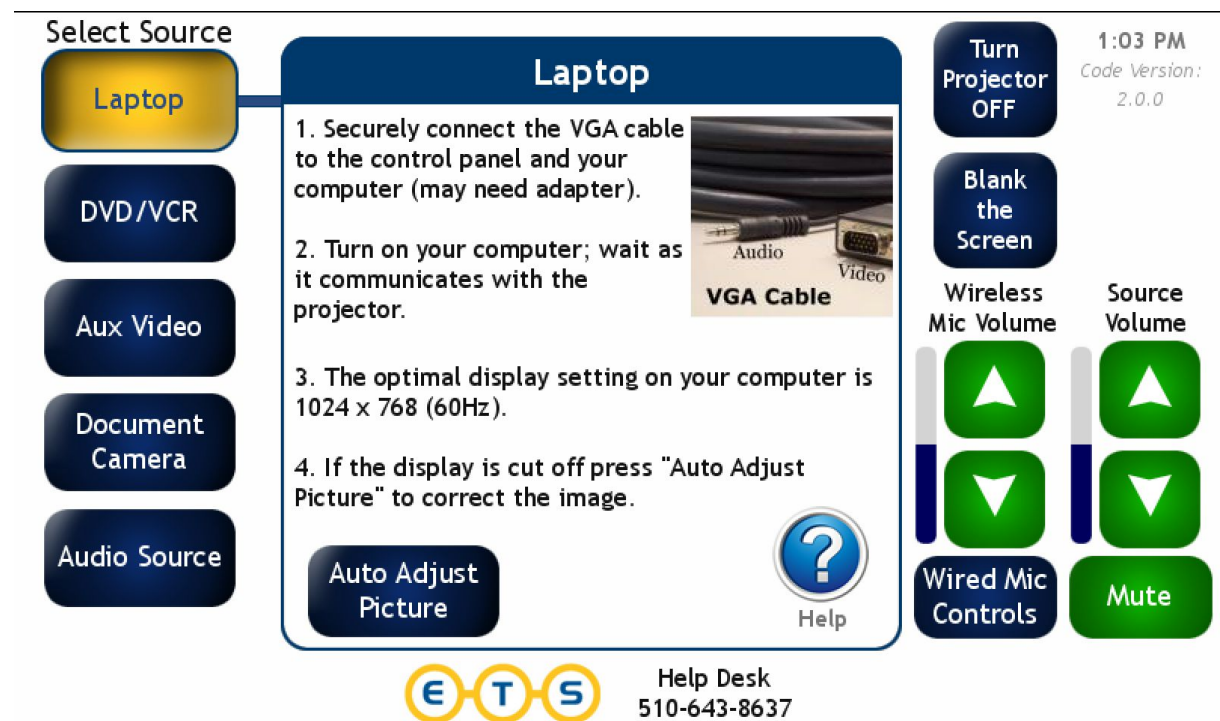


Image: Screen shot of the control system touchscreen interface for a classroom with Enhanced Basic Technology installed. The source selection menu on the left includes buttons for Laptop, DVD/VCR, Aux Video, Document Camera and Audio Source. The menu on the right includes Turn Projector OFF, Blank the Screen, Wired and Wireless Mic Volume Controls and Source Volume/Mute.

Course Capture Full Production Technology (operator with camera)

Number of seats: Auditoriums with usually more than 500 fixed seats. In some cases, the room is controlled by CTS staff (Wheeler, Pimentel, and VLSB). The systems have all the features of a tier Standard+Audio classroom, with additional customization specifically for department or class requirements.

Equipment:

AV Inputs: 1 (One), or more VGA for laptop, 1 (One) Component (or S-Video) input for combination VHS/DVD player 1 (One) Composite Auxiliary AV Input for external equipment.

Projector: Larger 4:3 aspect ratio data grade projector with higher Lumen rating selected specifically for the room requirements. Aspect ratio may be different in some rooms (Pimentel and Wheeler Aud).

Projection screen: A larger projection screen (usually 4:3). The size of the screen depends largely upon the room dimensions. In large learning spaces and lecture halls there is a built-in conflict between projection screen size and chalkboard availability. No matter what screen configuration is being used, there must be some chalkboard space available for the lecturer to write on at all times.

Speakers: Nearly every T3 room has a pair of loudspeakers on the front wall for program. There are also multiple ceiling speakers for speech reinforcement.

AV Switcher: Custom AV switcher(s) that allows multiple types of AV inputs and outputs.

Amplification: Separate higher powered amplifiers. One is dedicated for speech and one for program.

Examples. Pimentel, Wheeler Auditorium, VLSB 2050, 2060, 2040, Li Ka Shing 245, Stanley 105, Stanley 106, Dwinelle 155, North Gate 105, etc.

Microphone inputs for public address: 1 (one) Wireless receiver and body pack for lavalier mic. Almost exclusively the Shure ULX wireless system. 2 (Two) wired microphone inputs. We provide 1 (One) wired microphone for a backup or secondary voice reinforcement.

Signal Processing: A DSP (Digital Signal Processor) usually an Audia Nexia. This DSP provides mixing and signal processing for all AV sources, microphones, ALS and course capture audio.

Course Capture: Matterhorn course capture agents that receive the laptop video signal and program and speech audio for post processing as requested by faculty. Can have camera feed in some cases (Wheeler and Pimentel).

Assisted Listening System (ALS): Sennheiser SI1015-4000 Infrared receiver/transmitter. The ALS transmits program and speech audio over infrared to students with receiving devices usually provided on their own although the DSP office can provide these devices as requested.

Equipment Mounting: Required equipment will typically be mounted in a booth at the rear of the classroom, allowing for an operator to control video switching for projection and course capture, as well as audio switching. Equipment will also be available at the front of the room in a podium or on stage.

Exceptions: The above description applies to most of the Type 3 rooms, but most are customized for each particular room depending on the vintage and specific requirements of the room. Many times this is driven by the architect and/or program director. Examples of this are Tan 180, Stanley 105, 106, Latimer 120.

Special features: Many Type 3 rooms have the capability of sending and receiving

"overflow" of program audio and speech from other rooms. In some cases (Pimentel), the instructor is monitored and broadcast with a camera.

Control System: AMX touchscreen and controller normally customized for room requirements. Touchscreens are usually larger than tier Standard+Audio classrooms, and there can be one touchscreen for the instructor/user and one touchscreen for the operator in the booth. Other systems in the room can be included with the operator AV control (e.g. lighting).

Instructor/User Interface example:

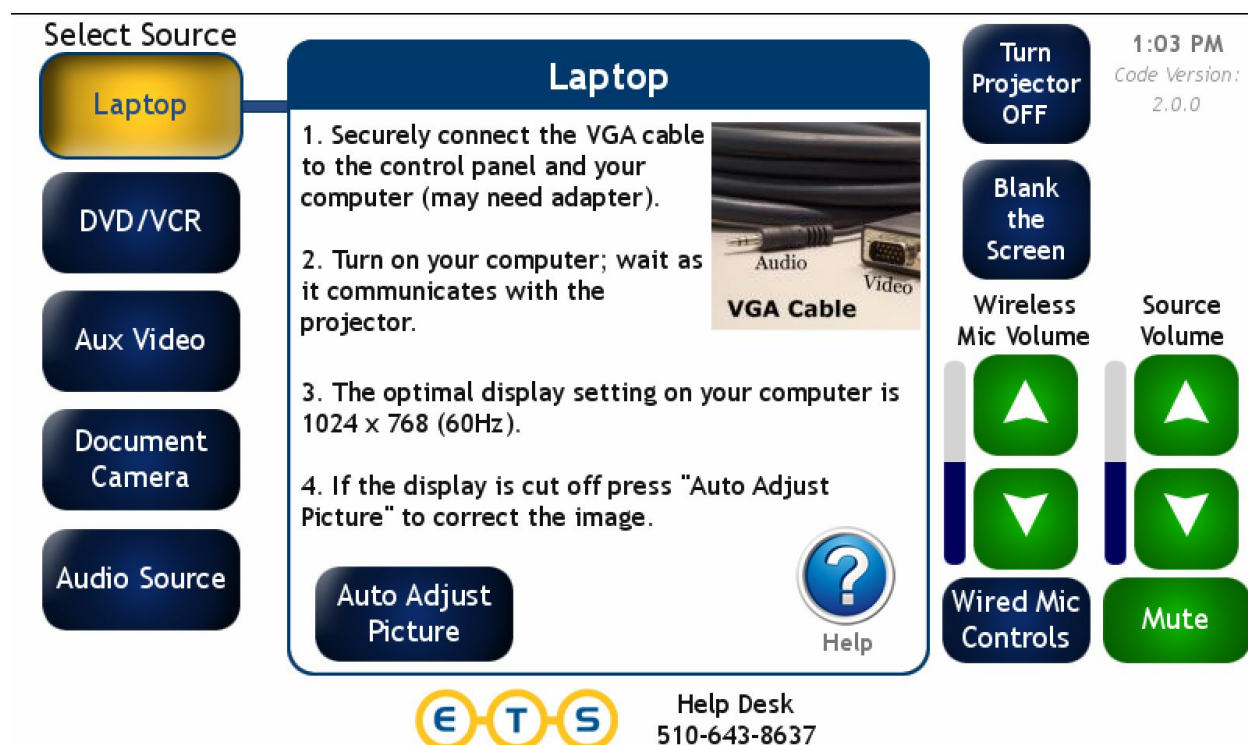


Image: Screen shot of the control system touchscreen interface for a classroom with Course Capture Full Production Technology installed. The source selection menu on the left includes buttons for Laptop, DVD/VCR, Aux Video, Document Camera and Audio Source. The menu on the right includes Turn Projector OFF, Blank the Screen, Wired and Wireless Mic Volume Controls and Source Volume/Mute.

Computer Facilities Technology

This section refers specifically to computer classrooms that are made available to all UC Berkeley classes through the ETS Instructional Scheduler, reserve@berkeley.edu. They are operated as GA classrooms, though they are not managed by the Office of the Registrar. This type of classroom can be reserved via the ETS website: <https://ets.berkeley.edu/computer-facilities/reserve>

- ❖ classroom spaces seating fewer than 60 people
- ❖ includes computer workstations and monitors for all students and an instructor, with headphones and speakers for program material at the instructor station
- ❖ equipped with a ceiling mounted projector at the 'front' of the room

- ❖ has at least 1 assistive technology workstation
- ❖ has at least 1 monochrome printer
- ❖ computers are Windows and Apple workstations with current tested operating systems
- ❖ standard software image as provide on the ETS web site. [Additional class specific software can be installed and updated for the course. Set-up and information provided at time of classroom reservation.] basic software provided with the option for custom software installations

Tier Multi-source Collaboration

- ❖ all of the features of tier Standard+Audio with multiple source control and flat screen displays
- ❖ touch panel control includes Presentation Mode and Collaboration Mode for instructor moderated A/V use or local student control

Tier New Standard 16:10

- ❖ As rooms with tier Basic or Enhanced Basic Technology technology are refreshed with new equipment, the room is upgraded to accommodate digital sources and displays.
- ❖ Projectors with 16:10 aspect ratios along with appropriate projector screens are installed.
- ❖ Blu-Ray player is the primary media player, and DVD and VHS players are removed.

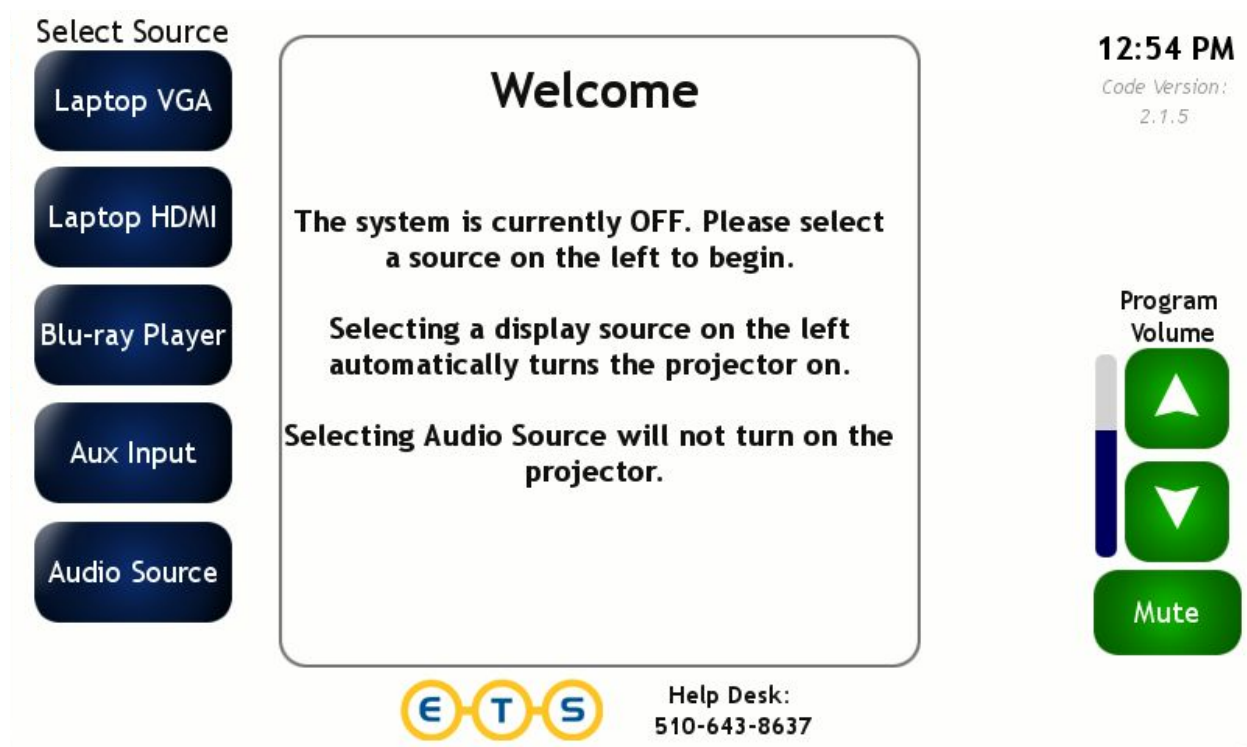


Image: Screen shot of the control system touchscreen interface for a digital classroom with Basic Technology installed (source selection menu on the left includes buttons for Laptop VGA, Laptop HDMI, Blu-ray Player, Aux Input, and Audio Source).

ROOM LAYOUTS

Seminar Rooms and Learning Studios:

- ❖ learning space seating <20 students
- ❖ utilizes technology tier Standard 4:3
- ❖ has flat floors for fixed seating, however newly renovated rooms may include tables and chairs on casters
- ❖ learning studios contain huddle boards and movable writing surfaces along with fixed boards

Classrooms:

- ❖ learning space seating 20-50 students
- ❖ utilizes technology tier Standard 4:3
- ❖ has flat floors for fixed seating, however newly renovated rooms may include tables and chairs on casters

Flexible Classrooms with Enhanced Technology:

- ❖ learning space seating 15-35 students
- ❖ utilizes technology tier Multi-source Collaboration
- ❖ has flat floors, moveable chairs and tables with minimized 'front of the room' orientation
- ❖ may contain huddle boards and movable writing surfaces along with fixed boards

Large-scale Classrooms or Lecture Halls:

- ❖ learning space seating 50-100 students in large classroom or lecture hall layout
- ❖ utilizes technology tier Standard+Audio
- ❖ may have flat or tiered/sloped floors with fixed seating
- ❖ flexible lecture halls include fixed, swivel collaboration seating (only Kroeber 155 as of spring 2014)

Auditoria:

- ❖ learning space seating 100+ students in auditorium layout
- ❖ utilizes technology tier Course Capture Full Production
- ❖ has tiered/sloped floors with fixed seating
- ❖ may have booth with operator

Computer Classrooms:

- ❖ classrooms with either PC or Mac computers for 20-60 students
- ❖ flat floor with fixed tables and moveable chairs
- ❖ wall control panel or remote control
- ❖ audio available via headphones and instructor workstation speakers or projector speakers
- ❖ have at least 1 assistive technology workstation
- ❖ have at least 1 monochrome printer
- ❖ standard software image as listed on the ETS web site
- ❖ custom software installation available

INSTRUCTIONAL TECHNOLOGIES AND EQUIPMENT

Flat-Panel Screens

- ❖ Classrooms are currently using Panasonic plasma or LCD technology with 16:9 aspect ratios. ETS continually monitors changing model numbers, energy efficiency improvements and cost effective display options to purchase and install the best display solution for each classroom.

Projection Screens

- ❖ All screens will be matte white, low gain, with wide viewing angles and no hot spots.
- ❖ Screens will be seamless
- ❖ The aspect ration of the screen is dependant on the display source. Rooms with standard 4:3 aspect ratio projectors will have an equivalent screen with standard definition content being displayed. Rooms with 16:10 aspect ratio (HD) projectors will have an equivalent screen with high definition content capable of being displayed.
- ❖ Any screen that is larger than 48 square feet will be tab-tensioned and motorized, with controls easily accessed at the front of the room.
- ❖ Screens should be placed no lower than 4' from the floor to maintain clear sightlines.
- ❖ The first row of seats should be no closer than 1.5 times the screen width ^[6].
- ❖ The furthest row of seats should be no farther than 8 times the screen height for general video viewing, no more than 6 times the height for graphical displays of data, and for detailed analysis, 4 times the height ^[6].
- ❖ The maximum horizontal viewing angle from any seat to the far side of the screen is 45 degrees. This means that the front row of seats cannot be longer than twice the width of the screen ^[6].
- ❖ The maximum vertical viewing angle at eye level from the first row of seats is 35 degrees to the top of the screen from the horizontal ^[2].

Data/Video Projectors

- ❖ A Monger seismically rated security projector mount shall be rigidly attached to the concrete ceiling.
- ❖ A Best Padlock shall be provided to fit said mount and will be keyed to the ETS key system. TBA projector shall be attached to mount. Projector will use TBA lens Locking security cover for projector will be provided.
- ❖ Centerline of projector mount shall be offset TBA to with reference to the existing screen centerline to compensate for projector offset lens design.
- ❖ Distance lens to screen TBA (Exact distance TBA due to possible ceiling obstructions). Height AFF of top of lens of installed projector shall be equal to height AFF of top of screen viewing area or TBA to account for differences in projector design.
- ❖ Projector technical specifications available from ETS Engineering.

Audio Systems

- ❖ JBL Control 25 (or other TBA depending on acoustics) (Color TBA) Typically on either side of projection screen (s) at an elevation of 2/3 of the screen height.
- ❖ In rooms requiring a voice reinforcement system, said system and controls shall be provided in A/V rack. Speaker mounting will depend on physical characteristic of the

room. Preference is for distributed ceiling speakers sufficient in number and quality for voice reinforcement. A wired lavalier mic and a wireless mic shall be provided.

- ❖ Rooms equipped with a voice reinforcement system shall also be equipped with an infrared Assertive Listening System as specified by ETS as per Campus Standard.

A/V Control Systems - combine with data connection info

- ❖ Atlas 300-21LDB-962 (or TBA) shall be rigidly mounted TBA (precise location to be determined during installation to allow for clearance). Top surface of rack will generally be 42" AFF. Rack will swing TBA for maintenance.
- ❖ Minimum equipment complement to include Control system such as SP Controls Smart Panel, Blu-Ray, or combo a Hi-Fi VHS player/DVD player. There is also a provision to connect a Laptop computer and an auxiliary audio/video input for portable equipment.

Podiums and Lecterns in Auditoria

- ❖ Specifications and standards are provide by the Office of the Registrar and classroom management

Security for A/V Components - earthquake proof, security screws and cables

- ❖ As needed. All security and safety equipment hardware for A/V components are approved, installed, and regularly checked by ETS-D&E

Document Cameras

- ❖ doc cams are installed in many tier standard+audio rooms, otherwise it is portable and stored in a closet for requests

VCR/DVD & Blu-Ray Players

- ❖ Blu-Ray player is installed if a room has hdmi then it has one of those installed, otherwise it's dvd; VCRs are being phased out across campus

Portable Equipment

- ❖ As needed. Prior arrangements with ETS must be made by the instructor or group

Equipment phasing out

- ❖ Overhead projectors are being phased out in favor of doc cams. ETS has a few overhead projectors on carts that can be requested, but will be completely EOL'd in the near future.
- ❖ VCR-only rooms are being converted to DVD/VCR combinations or Blu-ray only

Assistive Listening Systems

- ❖ ETS-D&E works with DSP to provide infra-red assistive technology in various classrooms across campus
- ❖ List of classrooms with assistive listening systems:
<http://dsp.berkeley.edu/listeningdevices.html>

Student Response System (Clickers) - aux support for programming and training

- ❖ Self-help kiosk support for students provided at the ETS-Moffitt Computer Facility
- ❖ bSpace/bCourses iClicker integration
- ❖ ETS iClicker getting started guide <https://ets.berkeley.edu/clickers>
- ❖ bSpace Preconfigured iClicker software:
<https://ets.berkeley.edu/help/download-iclickerbspace-pre-configured-software>

Classroom Capture

- ❖ The classroom capture program utilizes automated systems to record and distribute course lectures on the web. We have systems deployed in 50+ classrooms around campus.
- ❖ Approximately 2 - 4 weeks prior to the start of each semester, lecturers who are scheduled to teach in one of Berkeley's [enabled classrooms](#) are invited to participate in the program.
- ❖ Lecturers invited to have their courses captured can sign up for the program by using a simple sign up form; the invitation includes a link to this form.
- ❖ Screencast (capture of computer output along with audio) and/or audio-only recording is currently available from 40+ GA classrooms around campus. There is no cost for the screencast or audio-only options.
- ❖ In addition to screen and audio capture, some rooms are equipped to capture video as well. There are costs involved for video capture. Please contact us at webcast@media.berkeley.edu for more information. Audio-only or screencast is also available in these classrooms at no cost to the department.

Printing & Scanning

- ❖ Printers are on a three year refresh cycle with standardization on HP enterprise printers with high monthly duty cycles.
- ❖ Printing credit allowances are provided for each class.
- ❖ Currently no scanner stations in instructional labs, but can be added to a facility if requested.

Instructor Workstations

- ❖ Computers are configured exactly the same as student workstations
- ❖ Additional software or hardware installations are available by request

Computer Workstations and Software in Computer Facilities

- ❖ Computers are on 3 year refresh cycle based on the UC campus wide JACS standard
- ❖ The standard software image <http://ets.berkeley.edu/help/software-offerings>. Class specific software installed as arranged with ETS Tech Ops, Scheduler, and class instructor.

OTHER CONCERNS

Writing Surfaces:

- ❖ ETS partners with UC Berkeley Office of the Registrar to plan for an appropriate balance of white board or chalk board space and projected image display.

Network and Wireless Connectivity

- ❖ ETS works with UC Berkeley IST for all network needs.
- ❖ Campus shared services IT (CSS-IT) provides troubleshooting help desk support for any campus networking problems.
- ❖ ETS SCCS provides support for individuals having technical problems connecting to the campus WIFI network.
- ❖ Central campus IST is in the process of rolling out AirBears and AirBears2 campus WIFI coverage to most classrooms, with goal of 100% campus classroom coverage in next 4-5 years. A full coverage map is available on the Airbears website:
<http://ist.berkeley.edu/airbears/coverage>
- ❖ Classrooms may have Ethernet jacks installed for the following purposes:
 - One drop for the lecturer's laptop at the front of the room
 - One drop at the equipment for system remote control and monitoring at the front of the room
 - One drop at the equipment for web or podcasting, or in lieu of this use, then for future expansion
 - One drop at the booth

Electrical and Lighting

- ❖ ETS collaborates with UC Berkeley PP-CS for all electrical and lighting needs.
- ❖ Power outlets are available in all classrooms.
- ❖ Lighting controls should be available within easy access from the lecturer's position at the front of the room. Overall control at the entrance(s) to the room such that whoever enters or exits will not have to struggle to find the lighting control, or move through darkness to exit the room.
- ❖ To be as flexible as possible, lighting should be divided up into several zones, with each zone having independent level control for different functions. In larger rooms, these independent controls will often be ganged together in a group of electronically controlled pre-sets, such as:
 - Lecture Only, with all lights full up
 - Lecture with Presentation, with lighting dim for note taking, but bright on the lecturer
 - Presentation Only, with all lights down

HVAC

- ❖ ETS works with UC Berkeley PP-CS for all HVAC needs and makes every effort to design and construct an HVAC system that is sufficient for classroom A/V needs without conflicting with the goal of having an efficient, quiet, stress-free classroom.

Acoustics and Noise

- ❖ ETS partners with UC Berkeley Office of the Registrar to plan for room isolation, mechanical noise, and reverberation to provide learning spaces that minimize extraneous sounds to provide for good speech intelligibility in the classrooms.

Clock Systems

- ❖ For all built-in clocks on campus, maintenance and support is provided by Physical Plant Electrical, Lighting, and Support Services.

EMERGING TRENDS

Flexible Rooms

Spaces incorporating flexible furniture and technology features are in high demand, and UC Berkeley is committed to expanding the availability of classrooms with these capabilities. Many rooms have received upgrades to the furniture, including mobile tables, chairs and writing surfaces, and multiple display technology is increasing with the affordability of flat screen displays and ubiquity of student laptops.

Future Technology

ETS plans to expand the inventory of course capture capable classrooms, including automation of large room operations, tracking system, and production, and more standardization across room tiers.

Tier Standard 4:3 classrooms will be refreshed in the future with the following:

1. Change the AV switcher to Extron IN1606 Switcher/Scaler with DTP HDMI Transceiver pair for automatically scaling images (requires Cat6 infrastructure between the rack and the projector).
2. Update the system to provide an HDMI input on the Aux plate (the switcher/scaler facilitates this).
3. Install a wider aspect ratio 16:10 data grade DLP projector (e.g. Panasonic PTD-W640).
4. Install a 16:10 projector screen, typically 92" W x 57.5" H x 109" D or larger.

Tier Standard+Audio classrooms will be refreshed in the future with the following:

1. Change the AV switcher to Extron IN1606 Switcher/Scaler with DTP HDMI Transceiver pair for automatically scaling images (requires Cat6 infrastructure between the rack and the projector).
2. Update the system to provide an HDMI input on the Aux plate (the switcher/scaler facilitates this).
3. Install a Blu-Ray player in place of the old VHS/DVD combo player.
4. Install a wider aspect ratio 16:10 data grade DLP projector (e.g. Panasonic PTD-W640).
5. Install a 16:10 projector screen, typically 116" W x 72.5" H x 137" D or larger.