

Date: March 15, 2018
TO: Classroom Review Board
From: Julia Murphy
RE: Minutes of February 22, 2018

Members Present: Kristi Buffington, Pat Burns, Dave Carpenter, Matt Hickey, Jason Huitt, Stan Kruse, Blaire MacNeill, CW Miller, Julia Murphy, Al Powell

Members Absent: Tom Satterly, Tristan Syron, Simon Tavener

1. Approval of Minutes
The minutes from January 25, 2018, meeting were approved.
2. Review CRB Charter - Julia
The CRB charter, <http://www.acns.colostate.edu/committees/thecrb/#1463175786941-d988d2df-9b7a>, was originally written in September 1992 and revised in August 1998. See Attachment #1. Julia has asked that the charter be updated. A subcommittee headed up by Jason Huitt will review the charter and draft a revised version for the board's consideration and subsequent submission to the Provost. CW Miller, Matt Hickey, and Blair MacNeill will participate.
3. Temporarily Reallocate Plant Sciences W9 – Julia/Kristi
Kristi took the College of Agricultural Sciences' request to take one of their current labs and temporarily move that into one of the GA classrooms, Plant Sciences W9, for 3 years before the Space Committee. They did not approve the request. Kristi will go back to the department, Ajay Menon, and Ed Peyronnin, for further discussion. She will then have to go back to the Space Committee.
4. Classroom Technology Standards – Al
Al provided the technology standards document provided below as Attachment 2. This is the 12th iteration in 2 years. Doug Satterfield and Al created the first version for the construction of the stadium. No prior classroom standards documentation was available. The resulting document reflects CSU preferences as well as best practices determined after trial and error. Some changes are the direct result of faculty input. Facilities has the latest version for their construction bid processes. It is important that Classroom Support meets with architects and contractors for all departmental classrooms as well as general assignment classrooms to ensure technology standards are discussed to provide continuity for faculty.
5. Wagar 107B Echo360 Install – Al/Renee
At the January 25, 2018 meeting the Fish, Wildlife, and Conservation Biology requested to have first preference of Wagar 232 because they need lecture capture. As their classes are not big enough for that room Al recommended that we look at putting lecture capture in Wagar 107B so they would have that resource. The estimate is \$10,335 which includes equipment, install labor and programming. The topic was tabled until the April 26 committee meeting due to budget constraints. The project to move the 3D projector from BSB to the Biology Bldg was in the budget at \$11,995. Haselden Construction, the contractor on the Biology Bldg paid the

invoice. The funds are now freed up to do the Wagar 107B project. The board unanimously approved the install.

6. Budget – Renee

The remaining budget as of February 15 is \$35,589. With the approval of the Wagar 107B project, the available budget will be \$25,254. AI wanted to make note that the cost of adding Echo360 to the remaining rooms in the Clark A-Wing would be about \$20k. Further discussion is on hold for a future meeting.

7. Updates/Other

a. UTFAB – Blaire

Fine tuning numbers from their fee areas. Received residuals back from an earlier request so they have a bit more for the upcoming allotments. Trying to determine if they will need a fee increase.

b. UFFAB – Tom

Meeting tonight. Hearing the final 3 presentations. Will vote next week.

c. Facilities – Kristi

i. Ordering 50 tabletop podiums for classroom use. 50 purchased about 7 years ago are all gone.

ii. At the request of Brian Jones, the default setting for JH 222 has been reset to flipped classroom style. Users walking in were seeing the chairs all in rows and not really wanting to move 320 chairs. Probably should consider doing that in the stadium. Maybe even in the majority of flipped classrooms. Kristi - Facilities generally resets the chairs in rows after they clean. They will just need to know that about the default to flipped classroom style. AI – The standard lecture style setup probably best matches the activity that is going on those classrooms most of the time. A flipped classroom is how you teach not how you set up the furniture. Pat – If you flip a class, you typically only flip some of the class periods, not every one. Kristi – If we find somebody who wants that and everybody agrees then we'll let custodial know to leave it in that certain configuration when they put it back after cleaning.

d. CSS – AI

i. Survey Faculty on use of touch screen technology

Pat Burns would like an evidentiary basis that touch screen technology is used by enough of the faculty to warrant continuing to install the necessary hardware in classrooms. He will work with AI to create a 5-minute survey to survey the faculty about this as well as some of the other technology in the classrooms. Need to ask what new technology they would like in classrooms. Find out what they want, what they need, and what they're thinking about for future. Pat asked the board to forward any questions they would like to see on the survey and they will endeavor to use what they can while keeping the survey brief.

ii. Use of Blu-Ray players in classrooms

AI stated that the use of Blu-Ray players in classrooms is very heavy. The challenge created by using the players is that video discs, Blu-Ray or standard

DVD, can be played during class but due to copyright issues you cannot capture the disc in the lecture capture. Still looking for a way around this.

iii. Training for Faculty

AI has been working with Classroom Support, CSU Online, TILT, and Organizational Training and Development on the issue of helping faculty get comfortable with technology and trying to encourage them to use the capacity of the technology out there for them. Many faculty that use classrooms with touch screen monitors do not know what the monitors can do. After speaking to Lou Swanson, they are working on adding a "Help" button on the touch panels in classrooms that could take the user to a webpage that has references on how to use the technology in the classroom. It could be made available on the web for a standalone reference as well.

iv. Variable Height Lecterns

They are going to be installing variable height lecterns from Spectrum Furniture in the new Health Center and the new Vet Teaching Center. Cost is about \$600-\$700 more than the standard lecterns Facilities builds. One piece is an equipment cabinet. The other is the variable height piece. The height adjustment is electronic. Will have enough room for a touch panel and an arm for a monitor. Can be equipped as you wish. Use the equipment cabinet as the site for the document camera. The two pieces will be hooked together by a rod. Can have a CSU logo mounted on the front.

v. Round classrooms

AI provided more pictures of round classrooms from Washington State. He spoke to Tracy Able about round classrooms. The only room big enough on campus at present is Johnson Hall 222. Stan Kruse – losing JH 222 would not be favorably received. Pat – Keeping round classrooms on the agenda is the right thing to do. Kristi – Look at Shepardson remodel for a site.

e. TopHat – Jason

They are nearing a place where they are ready to start a conversation with faculty. They need to get on the COTL agenda. They have uncovered that if we go with TopHat faculty will be required to upload their PowerPoints to Tophat's platform, separate from Canvas, in order to put their interactive response questions in. Does not put data in the Unizin data warehouse. Could be a show-stopper. If they press pause on TopHat, it will give them additional time to work with i-Clicker. Pat – We are asking the wrong question. We are asking what clicker should we use? The question we should be asking is what is going to result in the best learning opportunity for students and ease of use by the faculty. Whatever Unizin does, we should probably do. That is where we're going to get the learning analytics. Two or three big Unizin schools are using TopHat and a few are using Turning. We need to be concerned with what will go into the Unizin data warehouse. Need to wait for Unizin to make a choice.

Spring 2018 Schedule:

Thursday, March 22, 4:00-5:00 pm, Morgan Library room 203

Thursday, April 26, 4:00-5:00 pm, Morgan Library room 203

Attachment #1

The Classroom Review Board is an administrative committee, appointed by the Provost/Academic Vice President.

The Classroom Review Board is comprised of representatives of various groups and organizations including: faculty members, the Council of Deans, Facilities Management, Academic Computing and Networking Services, Registrar's Office, RamCT Coordinators, College IT Administrators, the Institute for Learning and Teaching, the Committee on Teaching and Learning, students (University Technology Fee Advisory Board and University Facilities Fee Advisory Board) — all contributing expertise from different perspectives to the learning environment on the campus. Also the CRB has access to the information and expertise of the Office of Budgets and Institutional Analysis as needed. The CRB is chaired by the Associate Director for Computer Training and Support Services.

The Classroom Review Board receives assignments from the Provost and makes recommendations to that officer.

The Classroom Review Board is responsible for the following assignments from the Provost and is charged to:

- Identify and articulate the need for the best possible environments for learning provided by our classrooms and instructional laboratories and the equipment and other facilities that are, or should be a part of them, and make appropriate and timely recommendations.
- Give attention to projections of student numbers, their changing levels and nature of their preparation, new pedagogical techniques, and technological developments in the new design of the instructional environment and make recommendations.
- Continually assess the condition of all general assignment classrooms and instructional labs and make recommendations as to their improvement.
- Ascertain, insofar as possible, the future needs for general assignment classrooms and instructional labs in terms of size, location, ambiance and equipment; and, make recommendations.
- Collect physical and attitudinal data and store it in such a way that it can be useful in the present and future for the University Strategic Plan; for setting priorities; and, for making decisions in regard to our instructional facilities.
- Make recommendations in a manner that will be useful in long range facility planning, in the preparation of legislative requests, and for purposes of private fund raising through the Development Office.
- Create and administer policies concerning the general management of the general assignment classrooms, and receive from the Provost proposals from departments and colleges for changes in the use of general assignment classrooms and make recommendations in this regard.

(Sept. 1992, Rev. Aug. 1998)

Colorado State University Smart Classroom Standards

Version 12, 1-5-18

Background: Colorado State University currently has 165 General Assignment (GA) Classrooms, all of which are designated as Smart Classrooms.

Classroom Support Services (CSS), a division of Academic Computing and Network Services (ACNS), maintains and supports these rooms, and designs and installs equipment. CSS constantly evolves technology in the Smart Classrooms to achieve effective teaching for the benefit of CSU faculty and staff.

Information by section in this document:

1. Classroom Design & Equipment Overview
 - 1.1. Classroom description (please read)
 - 1.2. Large Classrooms
 - 1.3. Medium Classrooms
 - 1.4. Small Classroom
 - 1.5. Conference Room
 - 1.6. Lecture Capture Room
2. Standard Lectern Design
3. Lectern Power and Data Specifications
4. Equipment Specifications
 - 4.1. Inputs and Outputs
5. Video, Data Projector and Lighting Specifications
6. Control System Specifications
 - 6.1. Control Graphics
 - 6.2. Control Design
 - 6.3. Audio System
 - 6.4. Network design
7. Build Specifications
 - 7.1. Lectern Equipment Locations
 - 7.2. Wiring & Cable
 - 7.3. Terminations & Connectors
 - 7.4. Lectern Wiring and Cable Management
 - 7.5. Projector Mounting
 - 7.6. Projection Screen Specifications
 - 7.7. Lighting Specifications
 - 7.8. Equipment Security Specifications
8. Networks
9. Final System Checks & Testing
10. Other Diagrams and Specifications
11. Contact Information

1 - Classroom Design & Equipment Overview:

All technology-equipped CSU classrooms are referred to as Smart Classrooms.

1.1 – Description of General Assignment Classrooms

CSU classrooms are designed with consistent characteristics to make it easier for faculty to operate the classroom systems. These are the general characteristics each vendor should understand (details are provided in each section of these standards):

- Lecterns are two rack units wide, and a Crestron touch screen is mounted on the top of the lectern to control the room functions.
- The Crestron system provides controls for all equipment in the lectern and data projectors, cameras, projection screens, and lighting in the room.
- Cables for laptop connection, network and any other equipment are routed through a cable nook inset into the top surface of the lectern. Cables are provided so that no cables need to be provided by users.
- The typical lectern has a Crestron touch screen for control, a 20-inch touch screen monitor that can be connected to laptops, a document camera, a Blu-Ray player, an amplifier for the room PA system, and a hearing assist device.
- If the room seats more than 50 people, it needs to be pre-equipped for Echo 360 lecture capture, which includes a PTZ camera and wireless or ceiling mounted microphone.
- Large rooms all have wireless microphones for faculty to use in addressing students.
- Network connections for lectern equipment are provided on blocks mounted inside the lectern where they are readily available for service.
- Suspended lighting is mounted high enough to be fully clear of the projector and camera lines of sight.
- All equipment in the room with a network port is connected to the network. This includes cameras and displays such as monitors and projectors.
- All projectors are laser type; not lamp type.
- Whiteboards are installed on the front wall and sometimes also the side walls of classrooms. There must be a substantial amount of whiteboard space available to teachers even when the projection screens are fully lowered.

1.2 Large classroom, 100+ seats:

One or more motorized 16:10 powered projection screens, laser projector(s), ceiling PA speakers, lectern, touch screen control, LED monitors where appropriate.

- Projectors shall be laser type, capable of 1920 x 1200 resolution. Projectors must be capable of receiving control and video signals via CAT6AA cable.
- Display and touch monitors must be capable of at least 1920 x 1200 resolution.
- Projector connectivity is by industry standard (typically Cat6A STP) cable between the switcher's HDBaseT-compatible port and data projector.
- Larger rooms typically have 2 (two) projectors with ability for the user to put matrix different content on each.
- Where whiteboards are located behind screens, programming will allow user to power off each projector and screen individually in order to use the whiteboard; and to raise and lower each screen individually while leaving the projector powered on to illuminate the whiteboard.

- Projection screens are electrically powered with the housings recessed into the ceiling. Screens actuate automatically with projector power and can be overridden (retracted) via a touch panel control.
- A two-bay lectern built by CSU Facilities houses the A/V equipment unless an A/V closet is used; in that case, A/V controls, laptop, DVD player and document camera sources must still be user-accessible on the lectern.
- One vendor supplied touch-screen monitor shall be mounted on the desktop: **Sharp LL-S201A 20" LED touch screen**, and shall be mounted on an **Ergotron LX Desk Mount LCD arm, #ERG45241026**. The mount shall be located centrally on the lectern desktop to allow full range of motion across the desktop left to right, and adjusted limit circular rotation that can damage connecting cables and monitor connectors.
- Cable installation will include strain relief to protect both the cables and the monitor connectors.
- When needed, two to four video monitor locations will be located around the room for breakout collaboration sessions, with ability to share the content from any monitor with the whole room. This installation is determined on a room by room basis, as needed.
- Each video monitor shall be fed by a **Creston AirMedia**; wall plate connections shall be provided adjacent to each monitor; monitor output and input shall be routed back to the room matrix switcher to allow display of any source on any monitor or projector screen.
- Display sources to be located in or on the lectern:
 - Laptop (HDMI & VGA outputs, RJ-45 network connection also needed)
 - Wolfvision VZ-3 document camera
 - Blu-ray player with wired network connection and
 - Sharp LL-S201A touch screen display for computer.
 - Crestron AirMedia mounted inside lectern
- **Each room shall be pre-cabled with at least one camera mount** on the wall opposite the lectern to allow installation of a future camera for lecture capture; there shall be two industry standard (typically CAT6A STP) cables run between the camera mount and the interior of the lectern.
- Wireless microphone receiver, **Shure QLXD4 frequency G50**. Output is to be fed to room PA and any recording or lecture capture system.
- Microphone docking charger **Shure SBC200-US**
- Shure wireless rechargeable transmitter **Shure QLXD1-G50** with cardioid lavalier microphone **WL185** and battery pack **SB900**.
- If handheld mics are needed in addition to belt pack transmitters, they shall be **Shure QLXD2/B58, frequency G50**.
- **Crestron DMPS** unit with appropriate switching capacity for the equipment installed, with **TSW 760** touch panel mounted in lectern top, is standard for control. Preferred configuration is TSW-760-TTK-B-S Tabletop Kit AND TSW-560/760/1060-SMK Swivelmount Kit for flat surface.
- Extron switching / scaling may be added if needed, subject to CSU approval.

Auditorium installations often use additional matrix switchers and audio equipment. These installations require additional A/V rack spaces which are normally provided in an AV closet location.

1.3 Medium Classroom: 50 - 100 seats

16:10 powered projection screen, projector, touchscreen control on lectern, ceiling speakers for playback

- Projection screen shall be recessed in ceiling and electrically powered.
- The room may include one or more flat panel monitors as collaboration locations with the ability to share or work in a separate small group – fed by a wall plate adjacent to the monitor and a **Crestron AirMedia** unit at the monitor.
- A two-bay lectern houses the AV equipment.
- **Crestron DMPS** unit with appropriate switching capacity for the equipment installed and **TSW 760** touch panel mounted in lectern top, are used for control.
- **Crestron Airmedia** output shall be connected to the DMPS control unit or matrix switcher for classroom display. AirMedia integrated with Crestron DMPS controller may be used.
- Wireless microphone as specified above is installed.
- PA speakers may be wall or ceiling mounted depending on room design.

1.4 Small Classroom: Fewer than 50 seats

- Specifications are same as medium classroom.
- Lecterns may not be used in some rooms that are small enough to double as conference rooms; in those cases, the Crestron touch panel will normally be placed on a table.
- No wireless microphone is needed in small classrooms unless lecture capture is to be installed. If lecture capture is to be used in the room, a wireless QLX series microphone (belt pack and lavalier mic) and charger as specified above are required.

1.5 Conference Room

- Most conference rooms seat 6-12 people and use a video flat panel rather than a projector and screen. Standard video display is a wall-mounted video monitor, 65" or larger.
- Lecterns are generally not used in conference rooms, but there are exceptions. Check with CSU Classroom support to confirm.
- Crestron controls may be used if the amount of equipment to be installed justifies it; this decision is made on an individual room basis.
- Regardless of a Crestron control system, there must be a means of turning displays on and off and selecting inputs without using buttons on the monitor.
- Connections to the monitor are generally cabled directly via one HDMI cable from the conference table area to the monitor, or by providing a wall plate provided adjacent to the monitor.
- If not routed through a floor box, at least two HDMI connections to the monitor shall be enclosed in a sturdy floor trough, or shall be provided on a wall plate adjacent to the monitor. VGA connections are not needed in conference rooms.
- No wireless microphone is normally needed in conference rooms unless lecture capture or web conferencing functions are specified for them.

1.6 Lecture Capture Room (any size)

- A room of any size may be equipped for lecture capture, **but all rooms seating more than 50 students shall be equipped with lecture capture or pre-cabled and fully prepared for installation of microphones, camera and recorder.**
- Every lecture capture room will include certain design and equipment characteristics
- Each room will have a PTZ camera mounted on the wall opposite the lectern and presentation screen; the current model is the PTZ Optics PT12X-USB-GY-G2 (12X) or PT20X-USB-GY-G2 (20X) in 12X or 20X zoom depending on room size.
- A network port and an AC power outlet shall be located next to the camera.
- There shall be two CAT6A cables run between the camera mount and the interior of the lectern, with HDMI transmitter/receiver units on one cable for the camera signal.
- HDMI connections for the camera and for the video feed sent to the room projector shall be provided inside the lectern.
- Program audio out from the DMPS unit to a 1/8" jack shall be provided for the lecture capture device.
- The audio for the classroom microphone must be programmed as a constant level output, and must not mute to the lecture capture recorder when the mic is muted in the room PA system.
- Lights in the room shall be mounted so as not to obstruct the camera view of the presentation area.
- Ceiling mounted whiteboard lights are strongly discouraged. If they are used, they must not hang down from the ceiling far enough to intrude into the camera view or the projector image path.

2 - Standard Lectern Design:

Fixed lecterns are standard.

Classroom Lecterns –

CSU Classrooms are designed with a two rack-bay wooden lectern. Each room is configured to be a user friendly teaching station with an intuitive touch panel control system designed with ease of control over media teaching sources. Current lectern suppliers: CSU Facilities or Growling Bear Company of Greeley CO: 1-970-353-6964.

Lecterns will have a document camera mounted on the lectern top surface on the right side. All lecterns will have removable panels (normally hinged doors on the back side) to provide full access for service and maintenance.

(See Section 7.1 for lectern electronics) Open spaces in any rack shall be filled with blank metal panels to block user access to the interior rack space. If the electronic equipment fills only one rack, the open side of the lectern shall be equipped with rack rails on the front, to which a dark-tinted Plexiglas or Polycarbonate panel covering the open enclosure shall be mounted. If the electronic equipment also

requires all or part of the second rack space, a full front and back rack unit shall be installed with blank metal panels blocking access to the unused rack spaces.

3 - Lectern power and data requirements

- **Power controllers and/or backup power supplies** are not used in CSU lecterns or classrooms.
- **Power strips mounted to the rear of mounted equipment with surge protection** appropriate to the number of devices in the lectern should be provided in each lectern or equipment rack/closet. Two available outlets shall be provided.
- **Two 4-Plex 120V A/C boxes** per side (on the inner walls of the lectern) coming up through the rear of the lectern on flex from a combined 20 amp circuit.
- **Minimum of 8 - 100Mbps or greater Ethernet jacks** or directly terminated data cables shall be terminated in blocks on the inner side of the lectern where they are convenient to service. Network connections may not be terminated underneath the lectern.
- The network connections include one VOIP telephone connection on the last port of the network box, which provides a laptop network connection on a loop-through, per the standard CSU VOIP telephone (typically Polycom ip335). The laptop connection shall be available via a cable run out to the desktop from the lectern cable nook.
- **Locks:** lectern doors shall be equipped with CompX brand lock sets, part # C8053-C415A-14A, using key C415A.

4 - Equipment Specifications:

4.1 - Display Input Sources - source switching specifications: the Input signal path must handle a wide range of input resolutions up to 1920x1200.

Analog VGA sources (XGAup to WUXGA, 1920x1200)

- **One laptop interface** on the lectern with additional 1/8" stereo audio connection with 1/8" T-R-S connectors on each end---cable cannot be modified and must be adapted to the audio input if necessary. **DO NOT CUT OFF THE AUDIO CONNECTOR FROM THE CABLE!** Each cable run to the desktop must be replaceable independently of the cable runs to the displays.

HDMI / Digital Video Sources:

- **Blu-ray** at 1080p resolution.
- **Laptop HDMI** input on lectern.
- **PC** or spare – HDMI/DVI connection inside lectern.
- **Document Camera** installed on lectern.

Video Outputs:

- Four HDMI outputs to serve room display, lecture capture, Sharp monitor on lectern, and one spare. All shall be HDMI Scaled outputs.
- Large classroom (100+ capacity) should have matrix output to mix and match outputs to displays.

ASPECT

- Capability to vary aspect between actual input aspect and full screen with full screen being the default.

Audio Outputs:

- **One line-level**, variable stereo program output from analog and HDMI sources, combined with variable mic output to power amp.
- **Microphone** –two outputs, wireless mixed and level controlled.
- One audio output for Echo360 Pod recorder with program audio integrated on the HDMI video input to the recorder; one fixed mic audio output is required with a 1/8" analog plug for the mic input on the Echo360 recorder.
- **One additional** fixed stereo program (mic plus all other devices) output for lecture capture. This output will have program audio
- **Room program and mute function** must not mute the program or the mic audio feed to the lecture capture device.

5 – Video, Data Projector and Lighting Specifications:

Projector Design Specifications:

We install projectors at wide screen (16:10) resolution. Panasonic or Sony projectors are the current standard in all classrooms, but other brands will be considered. Laser projectors are required for new installations and remodels. Wall displays are usually 16:9.

- HDMI input must comply with the latest HDCP specifications.
- Ethernet connection is required on all projectors and wall displays.
- Crestron connection capability is required on all projectors.
- Projectors shall use the latest LCD or DLP technologies available on the market, capable of 1920 x 1200 resolution. (Lower resolution at 1280 x 800 may be set in classrooms depending on the project.) Wall displays are commonly 1920 x 1080; not 1920 x 1200.
- **Panasonic or Sony laser projectors are preferred**, with brightness in lumens:
 - 3500 ANSI lumens or higher for small size classrooms.
 - 6000 ANSI lumens or higher for medium classrooms.
 - 10,000 ANSI lumens or higher for large or auditorium sized classrooms.

Lighting:

- Ceiling mounted whiteboard lights are strongly discouraged. If they are used, they must not hang down from the ceiling far enough to intrude into the camera view or the projector image path. They must also be capable of being turned off from the lectern separately from all other room lighting.
- **No suspended lighting in any classroom shall hang down from the ceiling far enough to intrude into the camera view or the projector image path.** All lights must be mounted at least 12 inches above the centerline of the projector lens. Rooms may be retrofitted to install a camera at a later time.
- Light controls shall be configured so that the row of lights closest to the display screen can be controlled separately from the rest of the room lighting. Using the 50/50 model of light control to enable 50% lighting or no light is appropriate.

6 - Control System Specifications

6.1 - Control Graphics

CSU Classroom Support Services programs and supports classroom control systems. Crestron products are required for all new installations and upgrades. Control graphics shall conform to CSU design and visual practice.

The basic system in each lectern is comprised of:

- Controller – Crestron DMPS series with network port. If additional controllers are needed, CP3 units or switchers similar to Extron 1608 may be added.
- Touch Panel – TPW-760 – color touch panel.
- Integration capability with Crestron Roomview and Fusion must be included.
- Crestron program and Xpanel software are to be supplied to Classroom Support for each room.
- CSU Crestron shut down scheme code is available from Classroom Support and shall be included in the code for each room.

Touch Screen Design Samples (examples only, design changes periodically)

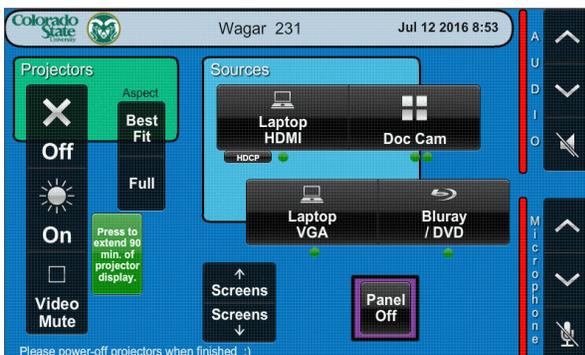


Current graphics and layout are available from CSU Classroom Support Services.

PLEASE CONTACT CSU CLASSROOM SUPPORT BEFORE FINALIZING TOUCH SCREEN CONTROLS.

6.2 - Control Design Specifications:

- Programming files, Xpanel files and as-built diagrams for all installations become property of CSU and shall be provided to CSU Classroom Support.
- All graphics, control screen layout and design, controls and functions in each classroom must be



reviewed and approved by CSU Classroom Support Services before project signoff.

- Final control and touch panel files are to be given to CSU as part the project signoff.
- Intuitive designs following CSU graphics practices are required, with user-friendly ability to control the room without prior instruction.

- All classrooms should have the ability to dim the lights nearest to the projection screens, with that control separate from the classroom lighting.
- All electric powered screens are to be controlled via the touch panel.
- Projectors are controlled via RS232 or Ethernet – with run hours, filter hours and reset for both provided in the programming and on the touch panel service page.
- Source / switcher selections shall be controlled either by RS232 or Ethernet.
- Program audio shall be volume controlled and muted separately from microphone audio.
- Audio controls and indicators for both program and microphone audio shall be easily accessible on all touch panel screens, including mute control.
- Blu-ray control pages are to be included with control via IR or RS232.
- A maintenance / service page shall be provided, with these features:
 - Panel setup access
 - Lift controls in rooms with projector lifts
 - Executive modes with executive mode on/off toggles for switcher control

6.3 - Audio System Specification:

Design Consideration - Evenly distributed and clearly audible sound is required for both audio program material and wireless microphone audio.

- Audio source selection – separate controls for program out and microphone volume, with mute button for each.
- Audio source and mic volume control – if not DMPS unit, A/V switcher via RS232 commands.
- Audio source amplification shall be a stereo power amp.
- Speakers shall be wall speakers or multiple ceiling speakers; speakers are not to be located immediately behind or above the lectern to minimize audio feedback.
- Microphone – Shure QLXD wireless system noted in section 1.1 above; for medium or large classrooms, two microphone systems (with one each belt pack and handheld transmitters) shall be provided.

6.4 Network Design

Design Consideration - No private vendor, building or project networks (separate from the building network) will be created or used for A/V functions and controls. Network connections for all systems, wired and wireless, must use the CSU campus network.

- CSU Classroom Support and ACNS will assign static IP numbers to all Crestron, Echo360 and AV equipment in classrooms.
- Any switches installed in AV systems must be pre-approved by CSU Telecom unit. (Please inquire before purchasing.)
- All wireless equipment installed in a classroom must connect to and use the CSU wireless system already in place; no new wireless network shall be created or set up in the classroom.

7 - Build Specifications:

7.1 - Lectern Equipment Locations:

- Standard Equipment rack is a **Middle Atlantic 4-post rack similar to the CFR series**, providing 14 RU of rack space. There will be two (2) racks in a large Lectern.
- Equipment racks are to be prewired and tested before being installed at the installation site.
- **Crestron Connect It TT-100** cable holder shall be built into lectern top to provide AC power, VGA and HDMI connectors, and a network Ethernet cable for laptops.
- User interface equipment (PC and Blu-Ray Players) is to be located at or near the top left side of the lectern rack mount.
- All other equipment including the A/V controllers: switchers, and audio amps, receivers and equalizers (if any) are to be located below the user access area and placed behind a hinged, lockable Plexiglas enclosure which uses the standard CSU key set.
- This cover may enclose only the part of the rack containing A/V equipment, leaving the PC and DVD player user-accessible.
- At least one rack unit (1 RU) of space shall be provided between equipment located in the rack to provide for proper heat ventilation and dissipation.
- Lectern back side main access panel/door shall not be located closer than thirty-six inches (36") from any fixed furniture or object to provide maintenance access.
- The document camera is to be located on the top of the lectern centered in the right half (flat area) of the lectern surface.
- **Any open rack space** in lecterns is to be blocked off by either blank rack panels or smoked Plexiglas.

7.2 - Wiring / Cable Specifications to be used in all installations:

- **All lecterns shall be access by a 2-inch conduit installed in the floor, or equivalent cable space shall be provided for cable runs to the lectern.**
- Shielded CAT6A Crestron DM or Extron XTP or equivalent. Cat5e cable is acceptable for short runs which are not parallel to AC power cables.
- RS 232 control: Belden 9451- 2 conductor, 22 AWG, stranded, shielded.
- Speaker: Belden 5200U or equivalent (audio), minimum 18 gauge.
- Quality Extron cables or equivalent for all HDMI and VGA lectern cabling.

7.3 - Terminations and Connectors:

- **RS232** –soldered DB-9 connectors with proper hoods are used for RS232 connections
- **CAT6A** cables are to be terminated with the EIA/TIA - T568B standard; connections are to be tested and verified for proper termination.
- In rooms with camera signals run to the lectern, the cable termination shall be an **HDMI connector**.
- All HDMI cables in lecterns and connected to AV equipment **must have locking connectors** (not screw-type locks).
- In rooms with lecture capture, the program video sent to the projector must also be available via an **HDMI connector** in the lectern.

7.4 - Lectern Wiring and Cable Management

- All video, data and control wires are to be labeled and numbered in correspondence with the system diagram
- An as-built wiring diagram is to be placed inside the Lectern on the rear equipment side door, and the computer file with that wiring diagram is to be provided to Classroom Support Services; a Microsoft Visio file is preferred.
- Proper wiring dress, maintenance loops, and cable separations are to be employed.

- Lectern is to be secured and bolted to the floor, normally using L-brackets.
- All wires connected from the lectern to ancillary equipment or connections are to be secured under a bolted down cable threshold or through provided conduits with cable sheathing.
- Wiring that is routed to above the ceiling from the lectern shall be inside an installed cable raceway; the portion traversing the wall shall resemble the color of the wall or be painted to match.
- Conduit cable pulls should not exceed 50% of the permissible conduit size.
- Nylon pull strings should be left in place after cables are pulled.
- Each lectern shall have eight (8) network jacks (see earlier specification) installed on an internal block.
- Each data projector location shall have 1 (one) network jack installed next to the projector for network connectivity.
- A/V closets shall have a number of network jacks installed; the number to be determined in consultation with Classroom Support and ACNS.
- All lecterns shall be equipped with **Altinex CNK241 Cable Nook complete** with two AC power outlets included.

7.5 - Projector Mounting

CSU recognizes and adheres to the ICIA / Infocomm Video Systems Installations Handbook standards and recognizes installers certified with the CTS and CTS-I certifications from this organization. A copy of this book is available from CSU Classroom Support Services.

- Projectors shall be mounted as high as practical in each room to reduce the potential for vandalism and unauthorized personnel tampering with the connections. Typical mounting height is level with the top of the projection screen.
- Ceiling tile replacement type mounts are typically used in rooms with drop ceilings - **Premier PPFMA Ceiling Tile replacement – secured to ceiling structure**. Standard 1.5” piping is used to drop the projector down to the proper mounting position to minimize any Keystone effect and subsequent electronic keystone adjustments.
- All cables are routed through the 1.5” pipe – including power; a power outlet mounted on projector mounting plate is standard.
- Projector mount is to be a universal mount by Chief manufacturing model **RPM-U Projector Mount (Key Code "A")**
- All projector HDMI Receivers are to be located either in the plenum or above the projector on the ceiling tile replacement unit.
- All cables not routed through conduit are to be above the ceiling grid on J-hooks.
- Plenum cable is to be used on all and any plenum air space ceiling or raised floor installations.

7.6 - Projector screen specifications: 16:10 Screen by Dalite is standard in all new installations – model varies depending on the size of the room. Recessed electric screens are preferred in new installations.

Manual screens are sometimes used in smart classrooms. Examples:

- Projection screens shall be mounted high enough to prevent line of sight problems for students sitting in the back of the classroom; in most cases, this means the top of the projector screen image area should be as close to the ceiling as possible.
- Projectors shall be mounted so that the placement of room lighting systems does not interfere with the projected image.

- Da-Lite screen, Model C w/CSR, 69" x 110", matte white, white case - #34734
- Da-Lite screen, Model B w/CSR, 57.5" x 92", matte white, white case - #36457

Screens are to be installed according to manufacturer specifications for model type and weight.

7.7 – Lighting Specifications:

- If suspended lighting is used in a classroom, the bottom surface of the lights between the data projector or camera must hang no lower than 12 inches above the center line of the data projector or camera installed in the room, whichever is higher.
- If it is not possible to hang suspended lighting at least 12 inches above the projector or camera, then recessed lighting shall be used for all lights located between the camera and the front of the room in a 60 degree field of view centered on the lectern.
- Light controls shall be provided on the touch panel in each classroom. This shall include the ability to dim the row of lights closest to the data screen independently of other room lights, in order to reduce glare on the screen.

7.8 - Equipment Security Specifications:

Lectern:

- Each lectern will have access panels allowing A/V maintenance and repair, secured by key locks using a CSU standard key set.
- As noted earlier, lectern access panels will be located no closer than 36 inches to permanently mounted objects such as tables and walls.

Video Projector:

- ¼" aircraft type cable securely connected to the projector and fastened in the ceiling with a padlock.
- Sonic Shock audio alarm also adhered to the projector and looped into the ceiling

Document Camera:

- Camera base shall be bolted through the top of the lectern or fastened to lectern with security cable.

8 – Networks

- **All equipment with network connectors purchased under these standards shall be IPV6 compatible.**
- An eight-gang network connection box will be easily accessible and located on an inside lectern wall.
- No private control network (separate from the building network) shall be installed within the classrooms.
- All equipment will be connected to a CSU building or campus network and must be accessible to control access via the CSU network.
- Any necessary network switches must be pre-approved by CSU Telecom.

- As noted in 6.4, all wireless equipment installed in a classroom shall connect to and use the CSU wireless system already in place; no new wireless network shall be created or set up in the classroom.

9 - Final System Checks and Testing:

- **Copies of receipts or purchase orders ITEMIZING SERIAL NUMBERS ON EACH DEVICE for all Crestron equipment installed must be provided to the CSU Classroom Support Supervisor for CSU to obtain credit with Crestron for equipment purchased.**
- All systems must be checked out fully for functionality, installation integrity and build documentation. **All controls and functions in each classroom must be reviewed and approved by CSU Classroom Support Services before signoff.**

Functionality Tests:

Touch Panel External Buttons Labeled
 Power On Projector
 Select Laptop - Check Video and Audio
 Select Doc Cam - Test Video and Controls
 Select Video Mute and test
 Audio up / down and mute work properly
 Switcher / Scaler is set to the Projectors' native resolution

Projector Alignment:

Screen Functional and properly positioned
 Image Properly fills the screen on all images
 Brightness and Contrast check
 Image Keystone set
 Image is sharp and in Focus
 Fan is set to High Altitude mode

Lectern Tests / Checks:

Little Light Functionality
 Check A/C Power in Cable Nook
 User Network Cable active at Cable Nook
 Plexi / Lexan or Rack Blanks installed in blank spaces
 Inside the Lectern: wired neatly and clear of extra parts
 Lectern Top Clean and void of leftover parts
 Wires Labeled and Block Diagram provided inside the Lectern

Other Diagrams and Specifications:

Sample System Block Diagrams (PDFs)

- Small Smart Class Room (Attachment 1)
- Larger Collaborative Smart Classroom (Attachment 2)

- Matrix Switching Multi Display Classroom (Attachment 3)

A/V Contractor

- RFQ for AV Contractors (Att. 9)

Lectern Specification Diagrams:

Large1 (Att 4) – Large2 (Att 5) – Large3 (Att 6) – Large4 (Att 7) – Large5 (Att 8)

10 - Classroom Support Services Primary Contact:

Colorado State University Classroom Support Services (CSS)

CSS Unit Supervisor

Albert Powell

Clark Building A-073, Campus 0921

Fort Collins, CO 80523-0921

Voice: 970-491-6226

Email: alpowell@colostate.edu

Classroom Support Services is a part of Academic Computing & Networking Services:

<http://www.acns.colostate.edu/Services/CSS>

Documentation prepared by:

Douglas Satterfield & Albert Powell

Please contact Albert Powell with questions concerning the information provided.

Classroom Standards Rev12 1/5/17