MIT
Design Standards

Classrooms and Lecture Halls

T06 Thematic Folder
Issued 2022

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1. GENERAL

These design standards apply to all classroom and lecture halls, for new construction and renovations. If clarification is required, contact the MIT Project Manager for your project.

2. CHALKBOARDS

Each classroom should have two to three sets of vertical sliding, wall-mounted chalkboards. The preferred manufacturer for non-motorized chalkboards is Educational Equipment http://www.educationalequipment.com/. No substitutions will be considered.

Wall mounted (without pocket) is preferred. Each panel should be no greater than 11'-6" wide. Maximize the height and the width of the writing surface of the sliding panels. Take note: handle on bottom of sliding panel needs to be accessible when raised to the highest position.

Black for the Color of writing surface.

Chalkboard system to be satin or black anodized aluminum. Reference Rooms 2-190, 6-120 and 35-225 for black anodized aluminum. Avoid having the styles and rails of the chalkboard system custom painted to prevent future chipping.

If a pocket system is chosen, the writing surface of each sliding panel should be fully exposed when both panels are displayed. Be sure the sliding panels are at the same height as the kick panel when lowered into the pocket (Reference room 6-120). Handles on sliding panels should be staggered. The chalkboard tray shall be no higher than approximately 36" AFF. All aluminum styles and rails of chalkboard system and attachment screws should be fully accessible. If the chalkboard system is not recessed into the wall, screws to remove access panels can be located on sides of styles.

Whenever possible, the chalkboard tray should be one continuous piece. Chalkboard trays are manufactured in 24' lengths maximum. If a seam is required, it should occur where the vertical sections of the chalkboard systems meet. Classroom chalkboards are washed each evening with a generous amount of water. Over time, excess water will damage the surface of the kick wall immediately below the chalkboards. To reduce damage from excess water running down the wall below the chalkboards, an overlapping piece of aluminum is required to direct water away from the wall. See sample chalkboard tray detail below.

For areas with appropriate ceiling height, three vertical sections of sliding boards are acceptable provided that the chalkboards are mechanically operated. The preferred manufacturer for motorized boards is Claridge.

MIT prefers chalkboards over whiteboards. Whiteboards or glass boards can be used when specifically requested by a department (Reference rooms 4-152, 4-158 and 4-162).

Non-sliding chalkboards for side and rear walls shall be mounted with a tack strip and map hooks. To prevent chalk and water damage to neighboring wood trim, painted GWB and fabric wrapped walls, provide a physical barrier such as a vertical aluminum strip to separate chalkboard from other surfaces. Reference room 24-307.

Chalkboard Tray Detail:

- F.O. CHALK BOARD FRAME BEYOND.
- FIXED CHALKBOARD BACK PANEL.
- CHALKBOARD VERTICAL SLIDING PANEL (1 of 2).
- RUBBER BUMPERS.
- SEAL ALL JTS IN CHALK TRAY W/ CLR SILICONE.
- CONT BOX TRAY W/ END CAPS.
- T.O. TRAY EL: 3'-0"
- CHALKBOARD FRAME.
- CARRY FLASHING OVER HDWD CAP.
- CB VENDOR TO F&I FLASHING 4" H MIN, AND SLOPING TO TOP OF FACE TRIM, TO PROTECT WALL BELOW FROM WATER DAMAGE FROM NIGHTLY WATER APPLICATION TO BOARDS
- 1 x 3 HDWD TRIM W/ KERF AS SHOWN, ON 1/2" BLKG.
- 1/2" PLYWOOD.
- 3/4" HDWD VENEER PANEL.
- WALL ASSEMBLY PER PLANS.

INFILL WALL BELOW CB W/ 2 1/2" STUDS

1"

3. LIGHTING

3.1 Lighting Control Systems

Auto-Off, Manual-On vacancy sensors shall be utilized. Sensors shall be set to 15-minute timeouts. These are to be coupled with momentary wall mounted dimmer switches. These spaces shall also be provided with dimming controls.

All local room-level personal dimming controls must be Lutron or Sensor Switch. Lutron is the preferred manufacturer of these local room level personal dimming controls.

Daylight sensors shall be installed to provide daylight dimming in all applicable areas. Lighting fixtures coupled with daylight sensors must dim up and down as opposed to turning off and on.

All network lighting control systems must be Lutron. Lutron is the preferred manufacturer of these network lighting control systems. When a Lutron network lighting control system is specified, it shall be tied into the existing Lutron Enterprise control infrastructure. If there is an existing Lutron network lighting control system in a project building it is preferred to build upon the existing system in that building.

All network lighting control systems shall offer the following features:

- BTL certified BacNet integration for monitoring via the BMS
- System diagnostics and device failure alerts
- Current and historical lighting energy consumption data
- Current and historical space utilization data
- Ability to change occupied/unoccupied settings based on time of day
- AV integration capabilities via API, RS232, Telnet and/or Contact Closures

Basic lighting environment (for a flat floor classroom with single video projector) may not require a network lighting control system. Simple room-level stand-alone Lutron Vive light control is best to allow for future networking if desired

Specify switches to control chalkboard and general classroom lighting that are dimmable. Light fixtures above student seating will have dimming to achieve an adjustable range from high to low lighting output. Dimmable LED lighting is required. IMPORTANT: confirm the selected switch is compatible with LED lighting drivers (Reference rooms 5-232 and 36-372 for switch example). LED drivers shall have dimming range to 1%. Preferred LED drivers are Lutron Ecosystem for visibility compatibility and reliability. Gangs of light switches require custom engraved stainless steel switch plate(s). Switches to include: all on/off, chalkboard left, chalkboard right, and first row of lights on/off, general lighting high and general lighting low. All SS engraved plates (electrical and av) coordinated through architect. Review by MIT AV Services. Final approval of SS plates by Registrar's Office.

Complex lighting environment (for a flat floor classroom with two or more video projectors or a tiered lecture space) specify a Lutron Quantum control system. Lutron is the standard lighting control system on campus. An illuminated ON/OFF switch is required at each entrance. A second, single gang, multi-button switch plate is also required. The buttons on the multi-button plate to be engraved as follows: High, AV1, AV2, AV3 and Off. The buttons on the two-button plate(s) at the entrances are engraved as follows: High and Off. Electrical contractor to preorder

engraved buttons from Lutron to coincide with system installation. MIT AV Services or av integrator to coordinate with Crestron programmer so Lutron button label matches lighting preset labels on Crestron touch panel. If multi-button station is standalone, use white plastic plate cover with vinyl letters along top of plate to read: LIGHTS. Otherwise, all SS plates approved by Registrar's Office. See image below.

3.2 Classroom Lighting

Chalkboard lighting. Chalkboard lighting to be operated independently over each section of boards and shall be dimmable. Position light fixtures to wash the boards with minimal or no spill on adjacent projection screen(s). The goal/objective is to provide an even wash on the boards.

Consider mounting liner chalkboard lighting behind the projection screens to avoid light spill on adjacent projection screen. Reference room 35-225

One continuous linear fixture seems to work best at each chalkboard section. Choose a fixture designed specifically for chalkboard lighting such as Pinnacle architectural lighting Edge Ev3WW (3" recessed linear wall wash 3500K) or Peerless LED wall-wash model or similar fixture from Elliptipar. Review options for LED lighting. Fixtures can be flush mounted in a soffit, ceiling mounted or wall mounted via pendants. Avoid fixtures with housing that is reflective creating hotspots on the boards. Note size and placement of chalkboard lighting to avoid blocking the projected image along the top of the screen. Review elevations of chalkboards, projected image on screens and chalkboard lighting fixtures. HIGH IMPORTANCE.

General Classroom lighting. Dimmable linear downlights above the seating area is preferred. One example is the Axis Lighting Beam 4 LED (recessed linear – with regressed lens option – 3500K). Reference room 14N-325.Choose energy efficient fixtures with LED lamps that are easily accessible for re-lamping and for replacing LED drivers and boards/components. LED

technology is preferred especially over fixed seating installations. Architect and MIT (Registrar's Office, MIT AV Services, Open Learning and AV consultant) to review scope with lighting consultant. Review design and product cut sheets. Review design before plan is issued to electrical engineer.

Side and back wall chalkboard lighting. One option is Birchwood Lighting by Leviton Hailey LED – 3500K. Reference room 24-115.

Adequate light control during video projection and for note taking is required. Note location and height of light fixtures in relation to pole mounted video projector. HIGH IMPORTANCE

A light dimming system is required. Identify and confirm locations of Lutron On/OFF, 5 preset light stations and Lutron Quantum dimming panels with MIT. Coordinate lighting scenes and presets with Lutron field rep, lighting consultant and AV integrator so the system is fully programmed and operational when installed. MIT AV or av integrator requires all integration IDs prior to arriving on site for system programming. HIGH IMPORTANCE

Additional lighting required for lecture capture technology as needed (see AV system below). Source 4 LED light fixtures are the preferred option. Reference Lecture Halls 4-270, 4-370, 6-120 and 35-225. Ideal lighting range for lecture capture is 3500K CCT (Correlated Color Temperature)

Lighting system should include fixtures to highlight podium and panel discussion locations with or without video projection.

Provide standalone light above laptop niche as needed. Reference room 2-190.

4.   WINDOW TREATMENTS AND CONTROLS

Windows to have two motorized window shades from Draper Shade: www.Draperinc.com or Mecho Shade: www.Mechoshade.com.

Sunshade to be (2-3%) transparency and a blackout shade. PVC free fabric preferred. Reference room 24-121 for Draper InteliFlex I/O installations. Reference rooms1-190 and 37-212 for Mecho Whisper Shade/IQ system. Shade control through the Crestron Touch Panel requires a low voltage cable from the window shades to the Draper A/V Gateway or MNI (Mecho Network Interface) mounted at or near the AV rack. In lieu of RS232, A/V Gateway or MNI, a dry contact connection can be used to control the shades via the Crestron touch panel. Window blinds are not recommended.

In classrooms equipped with a Crestron touch panel, motorized window shades to be controlled from Crestron touch panel with redundant wall switch by Draper InteliFlex I/O Single Zone

switch or Mecho Shades IQ Decorator switch. Provide MIT AV Services or av integrator with shade motor groups and addresses prior to Crestron touch panel commissioning. Use Draper InteliFlex I/O switch or Mecho IQ Decorator switch for classrooms without Crestron touch panel control. All sunshades shall be controlled by one switch and all blackout shades controlled by another switch. Eliminate manufacturer aluminum side and sill channels. Build wood pockets at window sides. Reference examples in rooms 4-270, 4-370 and 35-225. Draper Shade fabrics: SheerWeave 4600 (3% Openness) & SB9000 or Avila Twilight (blackout). Mecho Shade fabrics: ThermoVeil Dense vertical weave 1000 series 2-3% openness & ThermoVeil 0700 Series opaque. IQ Decorator switch by Mecho Shades:

4.1   Acoustics

Background noise levels should be NC -20 to NC-25 to support lecture capture audio (see lecture capture technology below under Audio Visual System). If the room does not support lecture capture audio, NC-25 to NC-30 is the target number. MIT highly recommends design guidance by an acoustic consultant. HIGH IMPORTANCE

4.2   Power and Data

Power required at every AV connection location.

Ample power is required to support room capacity. A combination of perimeter wall and floor box locations works best.

Data is wireless. No hardwired data at student seats unless specified. Limited number of hardwired data ports for instructor at wall and floor box locations at front of room.
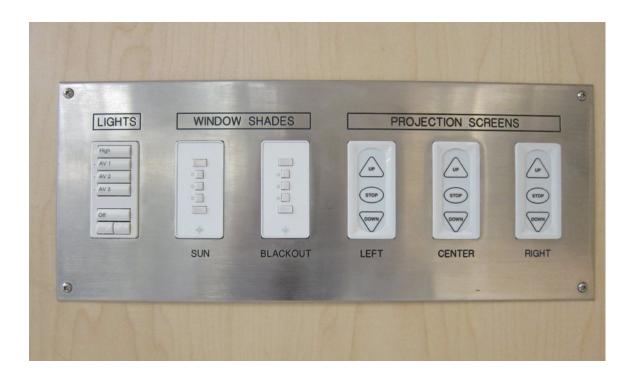
Coordinate with Information Services & Technology (IS&T) to identify locations and number of required WAPs (wireless access points). Estimate 1 WAP for every 25 students. Ceiling Installation preferred.

A network jack(s) is required in av booth or av closet for remote management of av system. Consult with MIT AV Services for exact quantity and location of network and electrical service in av booth and closet locations. Note: rooms may not have av booth or av closet.

4.3   Controls for Lighting, Window Shades and Projection Screens

Lights, window shades and projection screens to be controlled by lighted on/off switches. Multiple switches to be mounted in engraved stainless steel wall plate(s). All SS plates for electrical and av to be coordinated through architect and reviewed by MIT AV Services. Final approval of SS plates by Registrar's Office. Provide actual switches to plate manufacturer for accurate dimensional cutouts. Line voltage switches cannot be attached to stainless steel wall plates or share the plate with low voltage devices such as projection screen switches and av connection points. Provide blocking to accommodate location of wall plate screws. Countersink holes for screws and bevel edges of wall plates. Stainless steel wall plates to be 1/8" thick. See Lights, Window Shades and Projection Screen plates.

The conduit runs for these custom plate locations are stubbed and bushed behind the wall without a back box. The low voltage devices secure to the back of the plate on the provided threaded studs and the plate is secured to the wall, either screwed into the millwork or anchored in the dry wall. Specify Phillips oval head sheet metal screws to attach plate to wall. Plates should be designed to sit flush to the wall. Coordinate exact cut-out size and location of Crestron touch panel, stainless steel wall plate(s), thermostat and CO_2 sensor with architect, general contractor and av integrator for proper spacing and alignment.

4.4   Touch Panel Control for Audiovisual, Lighting, Window Shades and Projection Screens

MIT AV Services or av integrator to specify wall mounted Crestron touch panel to control AV system, lights, window shades & projection screens.

Provide redundant switches to control lights, window shades & projection screens. Multiple switches to be mounted in engraved stainless steel wall plate. Consult Registrar's Office for location of redundant switches plate. See Section 4.3 for stainless steel plate requirements.

5. SEATING

5.1   Fixed Lecture Hall Seating

The Concerto seat by KI is the preferred seat for lecture halls on campus. The Concerto is a fixed, tablet armchair (for fixed tables and chairs KI Torsion or Strive). Recent Concerto installations include maple seat backs with black frames. Reference rooms 1-190, 2-105, 2-190, 3-333, 4-270, 4-370, 6-120, 10-250, 26-100 & E25-111. Maximize the number of seats while not comprising seat width. Each seat should have the largest tablet possible. Tablet arms should have an unpainted edge with a clear lacquer finish-avoid painted edges on tablets. Tablets to have plastic laminate on both sides of tablet. Power and USB outlets are required at each student seat. Power and USB housing is located under the right armrest on Concerto seat. Add ~10% left hand tablets. Review attic stock with Registrar's Office.

LED step lights for KI Concerto panel:

Liteline WLTDS-1W30K-AL with electronic hardware driver HWB-DIM-EDC—24V-96W (Reference rooms 35-225 and 37-212)

Tivoli 12V LED Mode or Beacon Seat Light

Reference state and national code requirements for distance between rows of fixed seating with tablet arms. Provide a minimum of 12" from edge of open tablet to back of forward seat (if possible, maximize this distance to 14"). If long rows of seats are proposed, this spacing will allow unencumbered access to all seats in the row. HIGH IMPORTANCE

Preferred flooring for fixed seating environment is Stontec TRF resilient urethane floor by Stonhard. See Section 6.2. Marmoleum is the preferred option for smaller spaces. Avoid carpeting in the seating area. Acoustical engineer is required for analysis of the correct mixture of room finishes. Reference rooms 1-190, 2-105, 2-190, 4-270, 4-370, 6-120 and 35-225 for examples of rooms with hard flooring.

Fabric wrapped acoustical panels located ~6' or less AFF should be impact resistant.

Fabric wrapped acoustical panels should sit above wood and gypsum surfaces to avoid floor level wear and tear.

All seats should have excellent sightlines to chalkboards and projection screens. Avoid center aisle in audience seating if possible.

Note professor/student connection. Allow approximately 10-11' between front row of student seating and chalkboards.

Fixed jury-base student seating is preferred for rooms with fixed student tables. Review the KI Torsion and Strive chairs. Reference Rooms 9-354 (Torsion) and 4-231 (Strive).

LED step light for fixed table leg: Liteline WLTDS-1W30K-AL with electronic hardware driver HWB-DIM-EDC—24V-96W (Reference rooms 35-225 and 37-212)

If space allows, locate wheelchair positions at front of room by positioning fixed seats either forward or back in a row to line up with adjacent companion seat. This will provide a wheelchair location without losing a seat.

Reference Rooms 1-190, 2-190 and 10-250.

5.2   Classroom Tables and Chairs

Preferred table size is 18" D x 54" L x 29"H (this table will accommodate two students). If classroom layout permits, use 18" x 60". Plastic laminate for surface with durable vinyl edge, flip top as needed and wheels. Campus standard is Everywhere table by Herman Miller, Versteel Brattice is another option. Note table height for classrooms with a chair rail.

The preferred chair is Caper by Herman Miller without arms. Four legs with glides for hard surfaces. Height of chair is 32.5". Note chair height for classrooms with a chair rail.

All seats should have excellent sightlines to chalkboards and projection screens.

Note professor/student connection. Allow approximately 8-10' between front row of student tables or tablet armchairs and chalkboards.

Allow a minimum of 3'between student tables

Allow 4-6' at rear of classroom (6' to access chalkboard on back wall).

Form rows of 3-5 tables long without spacing between tables.

5.3   Classroom Tablet Armchairs

Classroom standard is Caper tablet armchair by Herman Miller (Reference rooms 1-273 and 1-277)

Node/Shortcut chair by Steelcase is another tablet armchair to consider (Reference rooms 14E-310). However, the Node requires additional square feet per chair.

Tablet arms should have an unpainted edge with a clear lacquer finish NO PAINTED EDGES on tablets (paint wears off after a few years of use). Tablets to have plastic laminate on both sides of tablet. Add ~10% left hand tablets. Review attic stock with Registrar's Office.

5.4   Other Classroom Furniture

Provide 1-2 movable tables for instructors at front of the room. Table size and manufacturer must match student table size so they are interchangeable. Good examples are Everywhere table by Herman Miller and Brattice by Versteel.

Provide a stand-alone lectern for lecture halls and as required for classrooms. See Surfaceworks Dewey Lectern (without storage cabinet). Reference rooms 2-190, 4-270, 4-370, 6-120, 35-225 and E25-111.

5.5   Seminar or Conference Room Chars

Vitra Visavis Visitor Chair. Plastic backrest with round perforations and chrome frame. Upholstered seat with Alta treated fabric at 100,000+double rubs. Vitra offers a small tablet version for the Visavis chair that can be used around a conference table. All chairs in the conference room would be outfitted with a tablet. Reference room 66-148.

6.   FLOORING

6.1   Classroom Flooring

Marmoleum is the preferred option for classroom flooring. Incorporate contrasting borders with welded seams. Avoid carpeting whenever possible. Acoustical engineer is required for analysis of the correct mixture of room finishes and HVAC. Reference rooms 4-159 & 4-163.

6.2   Lecture Hall Flooring

Preferred flooring for fixed seating is an epoxy or other hard, low maintenance surface. Linoleum such as Marmoleum is an option for smaller lecture rooms. Reference room 4-163 for example. Avoid carpeting in the seating area if possible. Acoustical engineer is required for analysis of the correct mixture of room finishes and HVAC. Reference 1-190, 2-105, 2-190, 4-270, 4-370, 6-120 and 35-225.

Preferred flooring throughout lecture hall is resilient urethane floor. Stontec TRF resilient urethane floor, by Stonhard, with 1/4" flakes, flat finish, Shenandoah Buff Color or approved equivalent. Completed thickness to be between 1/8" and 3/16" above concrete substrate. Apply to existing concrete, plus new vertical and horizontal concrete tiers. System consists of: Urethane Mortar (4 component high-solids urethane mortar); TRF Undercoat (two component high-solids, epoxy-bonding coat followed by application of 1/4" flakes); Stonseal GS7 Clear Flat: two-part non-reflective, waterborne, aliphatic polyurethane coating. Coordinate work with embedded items: stair nosing, railing sleeves, return registers on face of risers, escutcheon at handrail and seat bases.

7.   ADDITIONAL DESIGN CRITERIA

Provide fire alarm integration of AV controlled audio. Note: AV system cannot recall shutdown of lighting system or shades in the event of a fire alarm. These systems must have their own fire system protocols. AV system shutdown limited to amplified audio only.

Provide manual pull stations where required by Massachusetts Building Code.

Provide emergency lighting and exit signs where required for egress illumination.

Acoustical panels located ~6' or less AFF along walls should be impact resistant.

Provide acoustic fabric wrapped wall panels. Snap-Tex is the preferred system. Snap-Tex provides an excellent finished product with crisp edges and long seamless panels. Custom made panels can be considered but have size limitations. A white liner may be required between the yellow fiberglass insulation and the fabric. Reference rooms 4-159 & 4-163.

Spline ceilings are not acceptable.

Provide digital wall clock visible to instructor. Clock must have internal transformer and an infrared remote option (IRR option) with short electrical cord. Clock secured to wall to prevent theft. Mount clock on painted wood frame to hide cord as needed. Mounting location on rear wall of classroom. http://www.digitaldisplay.com/digital-clocks/digital-clocks/stand-alone-digital-clocks/ Choose model BSA-41240 for the 4" size numerals.

Coat hooks located on rear wall where applicable (classrooms).

Hooks for laptop cables: https://www.sugatsune.com/product/large-utility-hook-5/ Large utility hook, JF-70. mounted to stainless steel plate or on wall for laptop cables.

Stainless steel plate engraving, http://www.aristonengraving.com/

Labels on stainless steel plates for network jacks and electrical panel locations should be clear with black lettering.

Doors to classroom must have narrow vision panel. Reference rooms 2-131 and 2-190. Doors with large glazing require patterned film to restrict visibility. Reference rooms 3-270, 3-333, 35-225 and E25-111.

All doors to the classroom, av booth and av closet must have card reader technology.

Automatic door openers for ADA compliant access as needed.

All doors to have hold-open closers if not automated.

All doors to have kick plates (coordinate finishes for all door hardware).

All Registrar classroom doors to be keyed to FA7.

All audiovisual closet and cabinet doors to be keyed to FA6.

Hallway wall flag sign(s) identifying classroom entrance. Reference rooms 3-333, 1-132.

Lecture hall room number to be metal. Reference rooms 3-270, 4-270, 4-370, 10-250 and E25-111.

Provide stainless steel engraved "Please No Food or Drink" signs for all classrooms and lecture halls.

Location for panic/duress button (as required).

Locate trash and recycling bins outside of classroom or lecture hall. Consider a built-in counter for bins. Reference rooms 2-190 and 35-225.

Integrate hallway seating such as benches or Sedia Jump Seats near clusters of classrooms and entrances to lecture halls. Provide lighting above seats, electrical outlets and robust wireless connectivity. Reference rooms 35-225 and 37-212.

Integrate hallway writing surfaces near classrooms to support faculty/student interaction before and after class.

Chair rail on all walls in classrooms to prevent wall damage from tables and chairs. COORDINATE WITH TABLE AND CHAIR HEIGHTS.

8.   AUDIO VISUAL REQUIREMENTS

Refer to the MIT Design Standards Audiovisual Systems Thematic Folder, for audiovisual systems and the following.

Provide ceiling mounted video projector(s) with two forms of theft prevention integrated into the mount hardware. Utilize projector security mount (Chief RPMA1W) bar when available in conjunction with cable and lock. Contact MIT AV Services for AV lock

Use either a tile bridge (Chief CMS-440) or a ceiling mounted equipment storage box above projector. Ceiling box brands to consider include Legrand, FSR, and Chief. Use appropriate hardware if equipment to be stored in box equipment is rack-mountable.

Power at tile bridge shall be installed in tile bridge per manufacturer's directions. Coordinate with AV integrator. Duplex outlet is adequate.

Power at equipment box shall be fed in the provided service connection point integrated in the box. A data network drop, with one active port is required at all video projector locations. Data at tile bridge shall be installed in tile bridge per manufacturer's directions. Data at equipment box shall be terminated in a biscuit box, in or on the equipment box.

Conduit required between projector location(s) at ceiling, control panel on wall, interface(s), wall or ceiling mounted speakers and equipment rack. Minimum diameter 1" - 1.25".

Wall mounted Crestron touch panel control system for all video projector installations.

Sound system for program audio, typically wall-mounted flanking the video projection screen.

Ceiling speakers are also acceptable when proper installation of stereo surface mounted speakers cannot be accomplished.

Distributed speech for microphone use (as required for room size). One lapel (cardioid microphone) and one handheld (SM58) Shure brand, specific model and frequency to be coordinated at time of design.

Wireless microphones require a wireless access antenna to be wall mounted in room on either side of the stage area, or per manufacturer's recommendations. Conduit to each access antenna 1" minimum.

Coordinate frequency of microphones with adjacent rooms to avoid interference between rooms. Assistive listening system (as required for room size). See MIT Design Standards Audiovisual Systems Thematic Folder for more detail

At least two HDMI connection points required for laptop connectivity. Conduit minimum diameter 1.5"

Power required at any AV connection location shall be on the same electrical phase. This includes power for projectors, laptops adjacent to connection plate(s), floor boxes and AV racks.

Floor box location for laptop connections, power and data: FSR600-6-P-B floor box. The cover should be Style 5, hinged, and be made of quarter inch solid in anodized aluminum finish. The lid installation will have a hinge on the audience side. When opening the cover, it should flip towards the audience. Coordinate installation of floor box lid with flooring contractor to ensure floor box is flush with floor covering. Reference 35-225.

There shall be at least one duplex AC outlet installed in the 5-gang side of the box which should face the audience.

There shall be at least one dual port data network drop installed in the 5-gang side of the box which should face the audience.

The AV connections will use the continuous six-gang side of the box. Install the six-gang side so that it faces the front of house (chalkboard) side of the room. Power and data installed on opposite side of floor box.

Stainless steel wall plate for laptop connections, power and data. Plate to be 1/8" thick. Attach hooks to lower corners of plate to hang computer cables. All plates to be brushed stainless steel, bevel full perimeter of plate edges. Engraved lettering on plate to be black. Provide blocking in wall for devices and for oval head screws for attaching plate to wall. 1/4" high letters and HELVETICA FONT. All SS plates coordinated through architect and MIT AV or av integrator. Final approval by Registrar's Office.

Hooks for laptop cables: Sugatsune Item #: JF-70, http://www.sugatsune.com/products/productdetails.cfm?catid=8&subcatid=1&productid=JF%2D 45%2FJF%2D70%2FJF%2D110   Mounted to stainless steel plate or on wall for laptop cables. See Computer Connection plate below.

Provide rack plate for audio record output, laptop/device input (HDMI), line level input, microphone input.

Rooms with AV closets sized for easy rack movement. Provide adequate service loop cabling length to allow for service behind AV rack. AV racks for lecture halls sized appropriately to house equipment. Middle Atlantic MRK-4426 typically used for lecture halls. Reference 35-225.

AV Rack rooms shall have two quad AC outlets adjacent to the AV rack (s). Final location to be determined with design team.

AV Rack rooms shall have doors high enough to enable installation of AV racks and associated equipment.

Rack mounted touch panel for AV tech to operate within rack room. Rack touch panel should emulate the in-room unit and have all the same functionality.

Cooling and ventilation for av booth and av closet based on heat load of equipment installed within the space. Provide heat load to HVAC engineer for proper sizing of cooling systems.

AV booth and av closet require card reader access. All av booth, av closet and av cabinet doors to be keyed to FA6.

Four Network jacks required in av booth or av closet at rack location. One jack dedicated to Crestron Fusion for remote management of av system. Note: rooms may not have av booth or av closet

9.   LECTURE CAPTURE

9.1   General

Lecture capture technology to be installed as requested by Registrar's Office. Technology specifications and requirements defined by MIT Video Productions (MVP) and the Residential group within the Office of Digital Learning. Currently lecture capture preference is an Epiphan Pearl2 with 4k option. Cameras would be 1 fixed 4k camera for chalkboard capture and 1 automatic tracking camera for faculty capture, Provide conduit infrastructure to support future lecture capture installation requested by Registrar's Office.

At the heart of the system should be a central routing system which will feed into a lecture capture device. Current hardware recommended that works well with Panopto is the Epiphan Pearl series recorders (Pearl2 preference for capture.) Potential sources into the router will include computer signals using digital systems (HDMI with associated audio and video information) and presenter lapel and audience handheld microphone signals.

2 video cameras for presentation capture will need to be installed in the back of the classroom in order to capture the presenter and any chalkboard work that they do while teaching.

Recommended camera is one autotracking camera and one 4k fixed camera. Current (2022) models being recommended are the AVer TR3xx series tracking camera and Aja Rovocam for 4k capture of chalkboards. These cameras should be mounted as close to center on the back wall as is possible, given architectural constraints.

The routing system should also contain all the capabilities to display and amplify signals to the local audience through the traditional classroom AV destinations (projectors, flat panels, speaker system, etc.). Routing of LC to displays in the room is not necessary. Routing source signals to the recorder is necessary – ie, 1 to 2 PC feeds, depending on the classroom (ex -). Router should be network accessible (ie, private network for AV system).

9.2 Video

A high-resolution (1080i/p or 4k) capable camera(s) must be installed in the center wall at the back of the room for lecture capture. The camera(s) can either be used in a wide shot or can have tracking capability similar to the installations in E25-111 and E25-117. Use current technology. Ideally, this camera would also have the ability to recall specific presets for chalkboard capture as well.

A second 4k camera for chalkboard capture is recommended, mounted next to the tracking camera. This signal will be cropped in the Epiphan capture system to create close ups of the chalkboards for capture.

9.3 Control System

Provide control on the Crestron touch panel to allow the disabling of tracking by those presenters who do not wish to be tracked, or to disable video completely and capture audio over a computer driven presentation. The camera tracking capability should be activated only when the lecture capture system is initiated.

When a lecture capture session is completed, the tracking capability should be disabled to allow for non- lecture capture classes to proceed without the disruption of the tracking cameras.

A duplex electrical outlet and dual port Ethernet drop should also be installed at the camera location for local power and control.

HDCP should be disabled for lecture capture recording.

9.4 Audio

Audio should contain all in-room sources through a digital signal processor (DSP) device that will allow for a program output to a lecture capture device. Please provide both balanced line and

microphone XLR outputs at the rack from DSP mixer for encoding by a lecture capture device. In general, audio systems should provide for left/right speakers on the front wall for program audio and a distributed sound system for speech audio. An associated hearing assistance system should also be integrated into the system.

9.5   Lighting to Support Lecture Capture

Provide additional lighting required for lecture capture technology as needed (see AV system). Office of Digital Learning to approve light fixture and light fixture location. Source 4s are not used for automated lecture capture, but are used for MVP productions. Reference rooms 4-270, 6-120 and 35-225. Ideal lighting range for lecture capture is 3200 – 4600 Kelvin. Color temperature of lamps should be optimized and consistent for best video capture.

9.6   HDMI

System must be capable of transmitting a computer image source (up to WUXGA) for lecture capture. In-room sources such as a built-in computer (if installed), in-room document camera and other presentation materials should be routable to a device, which will allow for lecture capture.

Depending on complexity of system, 2 HDMI feeds may be required for lecture capture if multiple sources are used in a classroom (ex. 6-120 Physics classes which use two sources – one for presentation and one for experiment camera.)

9.7   In Room Connectivity

Provide a wall plate sized to accommodate video from camera, presentation source output, microphone and program audio mounted on the rear wall for possible DIY recording.   It would also be ideal if a secondary video input and balanced audio inputs could be added to this plate for additional camera connectivity for MIT Video Productions, as well as a connection for manual control of the in-room camera for local recording.

Run non-MIT network Cat6 Ethernet from points in back of classroom and left/right/center floorbox to AV rack for future connectivity (i.e., additional audio connections by MIT AV for Q&A pick up if desired in future installation work.)   The data jacks will allow the automated lecture capture camera to be routed to the center floorbox for potential Zoom input on faculty laptop. Floorbox determination dependent upon classroom orientation and use cases.

10. PROJECTION SCREENS

Motorized projection screens centered over each section of chalkboards. Non-tab-tension screens with a 16 x 9 aspect ratio to be used with less than a 133" diagonal. Tab-tension to be used over 133" diagonal. http://www.da-lite.com/

Matte white surface with black borders, built-in LVC (low voltage controller) vs. external controller to allow for integration into control systems

Design GWB pocket to conceal projection screen boxes (installer will use floating brackets to position screen boxes)

Review height of projected image, hanging chalkboard lighting and chalkboards. Coordinate elevations (projected image needs to be at a MINIMUM of 54" off the floor in flat-floor classrooms to ensure good sightlines)

Review if room layout permits building two wing walls (flanking chalkboards) for video projection screens. This layout will free up all chalkboards for writing. Correct angle of wing walls is critical for excellent sightlines. Determine if wing walls can support an appropriate size screen for the size of the room. Reference 10-250 and 4-163 for examples, Da-Lite Contour Electrol (Reference 4-231 and 4-237), Da-Lite Advantage Electrol. Reference Rooms 3-333 and 35-225.

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