

MODEL CLASSROOM DESCRIPTIONS AND REQUIREMENTS INDIANA UNIVERSITY, BLOOMINGTON

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INSTRUCTIONAL AREAS

DESCRIPTION

Advanced Technology Classroom (Type IV)
Square Feet: Varies

DEFINITION

Intended to provide a good learning environment for incorporating the use of multimedia. Systems available consist of installed large display video projector(s), analog and digital storage devices, computer network connections, and touch screen systems controller. If Video origination is desired, now or for the future, see Video Origination Addendum.

WEB LINKS

For those who are accessing this material on the Internet, the following links are available:

- [Video Origination Addendum](#)
- [Media Equipment Closet](#)
- [Projection Booth, Large](#)
- [Projection Booth, Small](#)
- [IU Building Design Standards](#)
- [IU Electrical Standards](#)
- [IU Mechanical Design Standards](#)
- [Building Telecommunications Design Guidelines](#)
- Notes Regarding Classroom Technology, Renovation, and Construction

SPECIAL ROOM REQUIREMENTS

IU Design Standards

Architectural

- Evaluate width/length proportions of room; in most cases a slightly rectangular room with the teaching station at the narrow end of the room is most desirable.
- Coordinate design of front of room with technology requirements to promote effective technology use; in all cases, the front of room design must consider the need to use projection and marking surfaces simultaneously; select equipment needed at teaching station as part of this process.
- Coordinate seating arrangement with technology requirements; distance from the first row of seating to the screen shall be 1.5 to 2 times projected image width; furthest viewer should not be more than 4 times the image width
- Install chair rail if loose seating used
- Observe minimum ceiling height requirements. For stepped room, 12' minimum in front of room; 8' minimum at rear. For flat floored room, 9' ceiling height minimum
 - Locate main entrance(s) at the back of the room.
 - If occupancy >80, use stepped or sloped floor
- Construct near instructor station a securable Media Equipment Closet (MEC) (4' w x 6' d x 8' h minimum) or Media Equipment Cabinet for equipment rack(s).
- Evaluate need for Projection Booth and/or other means of mounting a projector(s) (with associated power and data connections); if a booth is constructed, see linked Projection Booth, Large or Projection Booth, Small requirements
- Provide sound containment for projector noise if projector(s) is not installed in a projection booth
- Install unistrut at appropriate location(s) for installation of projector(s) so that projector location does not interfere with image path of film or slide projection
- Provide complete blackout capability
- If blackout shades are installed, use low voltage (5 to 24 Volt) controls specified by the shade manufacturer.
- If motorized projection screens are installed, use low voltage (5 to 24 Volt) controls specified by the screen manufacturer
- It must be possible to control shades and screens by means of switches located near the instructor station and also by means of the technology control system.
- Provide acceptable acoustics. As a minimum treatment, use acoustic ceiling tile over audience area, but not over lecturer, and sound absorptive materials on the back wall of the room. Additional treatment may be required and must be determined by the consultant.
- Anti-static finishes (floor covering, upholstery)
- Floor covering durable (15-20 year life), easy to clean, cost effective to maintain
- If fixed seats are used, acceptable to use carpet (also consider carpet tile) in aisles and concrete under seats

IU Engineering Standards

Mechanical

- HVAC system capable of maintaining human comfort conditions summer and winter; 50% rh maximum in summer; 30% rh minimum in winter
- For rooms with outside wall exposure with heat loss in excess of 200 BTU/ft of wall, provide a "skin" heating system, preferably radiant fin tube controlled inversely with outside temperature
- Provide 15 cfm/person of conditioned outside air; for variable air volume systems, ensure outside air provision is maintained
- HVAC system and components shall not exceed NC35
- HVAC shall be extended to the Projection Booth or Media Equipment Closet if either is constructed in the classroom. Projection Booth and Media Equipment Closet should have independent temperature control (thermostat) or thermostatically controlled exhaust fan or vent.

IU Engineering Standards

Electrical

Conduit Requirements

The following installation of junction boxes and conduit will provide the connectivity among equipment items and locations described by this program.

- Install 24" x 24" x 8" junction box in Media Equipment Closet or Cabinet. Install these conduit requirements with labeled pull strings in each conduit:
 - $\frac{3}{4}$ " from junction box to screen controller, if motorized screen is used
 - $\frac{3}{4}$ " from junction box to shade controller, if motorized shades are used
 - (2) 1 $\frac{1}{2}$ " from junction box to Projection Booth, landed in a series of (3) 3 gang junction boxes mounted vertically on the wall of the booth above the projection shelf. Connect second 3 gang box to first with (2) 1 $\frac{1}{2}$ " conduits, connect third 3 gang box to second with (1) 1 $\frac{1}{2}$ " conduit. Depending on individual circumstances, 3 gang boxes may be mounted horizontally.
 - $\frac{3}{4}$ " from junction box to Projection Booth, if provided, landed in a separate single gang box for slide projector and AMX controls (optional)
 - $\frac{3}{4}$ " from junction box to Projection Booth, if provided, for lighting control scene controller
 - $\frac{3}{4}$ " from junction box to program speakers
 - $\frac{3}{4}$ " from junction box to master volume control box
 - (2) 2" from junction box to Media Connectivity Outlet Interface Box (IUPUI optional)
 - 2" from junction box to each projector
 - $\frac{3}{4}$ " from junction box to microphone inputs
 - $\frac{3}{4}$ " from junction box to architectural dimming system equipment in Electrical Equipment Closet (not the Media Equipment Closet)
 - 1" from junction box to low-voltage control panel in building Electrical Equipment Closet (not the Media Equipment Closet) (optional)
 - 1 $\frac{1}{2}$ " from each camera position to the Media Equipment Closet
 - $\frac{3}{4}$ " for IR Crestron control from junction box to ceiling side wall (optional)

- Install separate junction box in Media Equipment Closet for audio wiring. Install these conduit requirements with labeled pull strings in each conduit:
 - 1" from this junction box to a separate junction box in Projection Booth, if provided, for speaker wires, landing in a 3 gang box on wall of projection booth. Conduit size to be reviewed for zoned system voice reinforcement.
 - ¾" from this junction box to ceiling of front wall for hearing assistance IR device (e.g., Gentner TX37) (optional)
 - Shop drawings for audio system must include speaker layout, conduit routing, and wire fill and be reviewed by the technology specialists.

Power Requirements

- Separate all power cabling from low voltage wiring
- Consider provision of power to each student station (optional)
- Provide separate 20 Amp/120 Volt circuit for lighting control system
- Provide 20 Amp/120 Volt circuits for each of the following. All should have a common ground.
 - Equipment rack(s)
 - Projection booth
 - Floor and wall interface box(es)
 - Projector(s)
- All electrical power for media equipment (i.e., racks(s), floor boxes, equipment) shall be on a dedicated circuit on the same phase from the same breaker box.
- Motorized items, such as projector screen(s), shades, chalk/marker boards shall be on separate circuits from those dedicated for media equipment (e.g., rack(s) or other audio-visual technology circuits).
- Provide low voltage (5 to 24 Volt) circuitry for control of selected media, lights, screen, chalk or marker board both manually and through technology control system
- Provide 2-3 duplex power outlets on each wall (very large rooms may require more)
- Provide dedicated circuitry for classrooms

Lighting Requirements

Common to All Rooms

- Evaluate need for light over chalk or marker board¹; board lights should have their own on/off switch at teaching station
- Provide occupancy sensor to turn lights off [in some circumstances, also consider turning lights on]
- Design lighting control so that it is zoned from front to back with a minimum of two zones. Additional zones may be required depending on the size of the room

¹ The Classroom Committee on each campus has a preference as to whether writing surfaces in classrooms should be chalkboards or marker boards and must be consulted by design consultants before any selection is made.

and type of lighting installed. Zone 1 should control the lights over the projection screen; zone 2 (and other zones if applicable) the remaining lights.

- Use low brightness, directional lighting fixtures and lenses; the luminaires shall be capable of 10% minimum light output; consult recommendations of Illuminating Engineering Society and IU Engineering Standards; fixtures shall be 2' x 4' 3-lamp T8 with 3 x 6 cell parabolic lens

Basic Lighting

- Lighting design for classrooms shall use multi-level switching and/or dimmable fluorescent fixtures for general seating area. If multi-level switching is used, the switches shall be organized front-to-back by zone.
- Provide manual light controls at teaching station.
- Provide on/off switch at each door.

Advanced Lighting

- Provide architectural dimming system that interfaces with the technology package. Important design features are multi-zone, multi-scene, multi-station control.
 - Control locations shall include:
 - Single scene controller at each door
 - Multi-scene controller at presentation station; must be accessible at all times
 - Multi-scene controller in Projection Booth, if present
 - Label all controls clearly with engraved two-color plastic equipment labels
 - Manual sliders only; no LCD panels
 - Contact closure or serial (RS-232) type audio visual interface for communication with technology controller shall be located in Media Equipment Closet
 - If the master programming controller and the dimming panel are integrated, then the unit shall not be located in the Media Equipment Closet or Projection Booth. The programming control panel may be located in the Media Equipment Closet or Projection Booth if it is separate from the dimming control panel. The dimming control panel shall be located remotely, preferably in a location close to the classroom.
 - Provide light with independent on/off control at teaching station if required
 - If indirect/reflective lighting is used, then:
 - The lights cannot block pathway of projector(s) to screen
 - Fixtures need to have both down light and reflective light; reflective light must be able to be switched independently
 - Lights must still be zoned front to back such that the front zone eliminates the light wash on the projection screen
 - Provide infrastructure for future installation of extra lighting to support TV origination from the front of room (See Video Origination Addendum)

Audio Requirements

- Provide microphone inputs at front of room (number depends on size of room)
- Ground audio components to a common ground

- All audio system power from the same electrical phase and the same breaker panel
- Install program sound system
- Install voice amplification system
- Install assistive listening devices
- If distributed sound system is installed, minimum requirement shall be separate home runs for each time delay zone. Where audio mics are to be installed, consult with technology specialists.
- Install 2 or 3 gang switch box as required for master volume control. Should be located at teacher station and be aligned with light control.
- If Projection Booth
 - Install speaker with independent volume control for distributed sound
 - Install speaker with independent volume control for program sound
 - Install volume control for program sound (optional)

Telecommunications

IU Telecommunications Standard

- Install pathway according to IU Telecommunications Standard and campus specific addendums to bring voice, data, video coax, and fiber from source outside room (IDF closet) to a standard communications outlet in the following locations:
 - In Media Equipment Closet (one per equipment rack) or near Media Equipment Cabinet
 - Center front wall (optional)
 - In projector location(s) (data jack only) (optional)
 - In projection booth (optional)
 - In podium locations (2 data jacks at each floor locations, generally left, center, right) (optional)
- Install pathway according to IU Telecommunications Standard to bring a security jack to the security box in Media Equipment Closet or other identified location (IUB Security)
- Install pathway according to IU Telecommunications Standard to bring fiber to the fire protection system in buildings where the fire protection system has been upgraded; otherwise bring a standard communication outlet (phone) to the Media Equipment Closet (IUPUI Security)
- Consider provision of low voltage pathway for communications access (data jack only) at each student station; interconnect with Media Equipment Closet to create LAN (optional)

EQUIPMENT REQUIREMENTS

Room Equipment

- Choose all seating with consideration for ergonomic principles
- 10% of all seating shall be appropriate for left handed individuals

- Accommodate wheelchair users according to the following ratio:
 - 1 location for 4 to 25 station capacity
 - 2 locations for 26-50 station capacity
 - 4 locations for 51-300 station capacity
 - 6 locations for 301-500 station capacity²
- Equipment for teaching station (for verification or to suggest modifications, consult Interiors Department of University Architect's Office):
 - If tablet arm chairs chosen for classroom seating:
 - *Option A:* Table, 24" d x 60" l x 29" h, PVC edge, laminate work surface, 12" modesty panel with either T or C base, locking casters if needed, finishes to match building finish standards
 - *Option B:* Work Unit like Steelcase series 9000, 25" d x 60" l x 29" h; finishes to match building furniture and finish standards
 - If tables and stackable chairs chosen for classroom seating, teacher's station will match student tables and must provide clearance no less than 27.5"
 - For either tablet arm or table/chair seating, a table lectern in natural oak or stained to match architectural wood in building may be provided if requested by user
 - A full-height lectern may be provided for large auditorium classrooms if requested by user
- 18 lf of chalkboard; chalk rail 3' above finished floor; board 4' high; depending on room configuration, side wall may require board as well
- Projection screens: white matte preferred; minimum screen size should be 6' with actual size determined by room dimensions; consider installing additional screens
 - When the room is significantly wider than it is deep
 - If chalkboard space is limited when front screen is in use
 - When it is likely that more than one projection device will be used simultaneously
- 1 pencil sharpener at back of room (mounted securely, not on dry wall partition)
- Clock(s) with large, easy-to-read numerals and sweep second hand (locate clocks such that they are visible to students and instructor; clocks must be secured and in a cage to prevent theft and tampering)
- Receptacles for recycled paper and trash

Technology Equipment

Following is a representative, generic list of classroom technology items; specific selections shall be made in consultation with users and the university technology team.

- High intensity overhead transparency projector (4000 lumens)
- VHS VCR

² Note that stations for wheelchair users shall be marked to prevent their being pushed aside or otherwise be made unavailable for the intended user. In rooms with fixed seating, accessible tables should be fixed but with stackable chairs so stations may be used as regular seating when not in use by individuals using wheelchairs.

- Video Projector(s)
- Telephone
- Tuner/Demodulator
- Document camera
- UPS (sufficient to accommodate computing equipment for 30 minutes)
- Laser disc/DVD
- Audio Cassette
- Audio CD
- PC (optional)
- Unix or other high end workstations (optional)
- MAC (optional)
- 35 mm slide projector (optional)
- 16 mm projector (optional)
- Video camera (optional)
- External inputs interface

LOCATION REQUIREMENTS

Locate on lower levels of building; locate away from noise generating or conducting building features such as elevators, toilet rooms, machine rooms, service shafts, dock areas; locate away from vending areas (to discourage bringing food items into instructional areas); locate carefully in relation to major electric equipment items. If there are windows, windows facing north are preferable.