

**CLASSROOM DESIGN STANDARDS
UNIVERSITY OF MARYLAND, BALTIMORE COUNTY**

Revised August 29, 2000

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University of Maryland, Baltimore County
GENERAL CLASSROOM DESIGN GUIDELINES
Revised Draft, August 25, 2000

1.0 INTRODUCTION

Special appreciation and acknowledgement is given to Mr. Victor Aulestia, Director of Instructional Technology for the time and effort he committed to develop the January 3, 2000 Classroom Design Guidelines.

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The organization of this document is based on providing two sections of information:

- General Classroom Design Guidelines
- Specific Classroom Design Guidelines

To assist in the design, the selected Consultant is required to comply with both the General Design Criteria and Specific Design Criteria respectively.

It should be further noted that excluding section and subsection titles, changes from the original standards are represented in bold type.

2.0 OVERVIEW

The University of Maryland, Baltimore County Classroom Design Guidelines are intended to be used as the criteria for the design and construction of new and renovated classrooms on the UMBC Campus. **These guidelines are meant to supplement UMBC's Design Standards, which can be obtained from the Office of Capital Planning. Any proposed design which deviates from these guidelines must be reviewed and approved by the Office of Capital Planning.**

Designing a space for teaching and learning requires careful planning and organization. It requires close collaboration between the architect, mechanical engineer, electrical engineer, lighting designer, audio-visual specialist, and instructor. A well designed space is the result of careful coordination of information gathered from architectural and engineering disciplines as well as established instructional technology principles.

3.0 GENERAL CHARACTERISTICS

3.1 Location

The learning environment must be: located within a building with easy access by students and equipment, isolated from noisy gathering places, and concentrated on the lower floors of buildings to provide an easy avenue for students, as well as provide convenient access for the disabled and support services. The uses of adjacent spaces must be carefully chosen to avoid distracting noises and sounds. They should not be adjacent to mailrooms, reception areas, dining facilities, rest rooms, bicycle parking, loading docks, mechanical equipment rooms, and other similar noise producing areas. Care must be taken in their location in relation to the exterior environments as well as to direct air paths between rooms. For example, in rooms that rely on the presentation of materials through audio-visual equipment, south and west facing windows require a higher degree of blackout capability than do east and north facing windows.

Physical Access and Movement - The design shall take into account the flow of students both in and out of the space and within the space as well as the need for the instructor to move around in the front of the room.

The success with which a student receives information from an instructor or can effectively participate in class activities, is affected by factors of the room design, the shape as well as the its placement within a building. In spaces planned for extensive media use, the configuration can be one of the most significant factors contributing to the effectiveness of the display system, the student's comfort and ability to interact with the instructor and other students, and the strength and clarity with which the instructor's voice is heard.

For new facilities, consideration should be given during the site planning process for access and parking of vehicles which deliver and maintain audio-visual equipment. Items which need to be considered are ramps, level vehicle access points, and other provisions for the ease of movement of heavy or bulky equipment.

3.2 Entrances

The flow of students should be the major factor in determining the location of entrances. Entrances should be located to avoid student traffic passing through non-instructional areas. In addition, large numbers of students traveling in corridors and hallways can generate unwanted noise for rooms still in use. In determining the size of entrances and exits, building codes should not be the only criteria. The flow of students in and out of rooms can have a major impact on size of entrances and exits. The design of entrances, exits, stairs, corridors, and exterior paths should take into account between-class student traffic. For example, it is not realistic to assume that a room will be completely vacant when students begin arriving for the next class.

Provide vision panels in entrance doors. They could be tinted.

Provide door stops to protect the wall surface (specifically gypsum wall board).

Grills shall not be allowed in room entrance doors.

3.3 Seating, Capacity, and Support Space

The size of the room should be designed to accommodate the programmed number of occupants as well as provide for additional support space. The support space must take into consideration both the set up and use of audio-visual equipment, access for the disabled, layout of the instructor's materials, circulation space, and empty floor space needed to keep students from being seated too close to a chalkboard, projection screen, or video monitor.

In rooms with fixed theatre seating or tablet arm chairs, the seating should be secured to the riser for ease of floor cleaning.

There shall be no columns in any teaching space.

3.4 Floor, Walls, and Ceilings

Carpeting shall be provided in all rooms unless discipline specific related courses dictate otherwise.

Ceiling: If lay-in ceilings are used, 2' x 2' tiles should be specified and the Consultant shall comply with UMBC's Design Standards for tile standards and style.

Colors of finishes should be neutral on furniture and fixtures with accent colors used where it can be easily maintained or changed (paint).

The ceiling height is another important consideration when designing the space. For example, because a projection screen must be large enough to display images of adequate size, it must be placed high enough from the floor to provide unobstructed sight lines. This usually requires a ceiling height higher than the standard eight feet.

3.5 Orientation

The orientation of a room's surfaces play a major role in how sound is reflected from the sending end of a room to the rear of a room. Careful consideration must be given to the configuration of each wall surface, ceiling plane, and floor finish. In rooms that require fixed seating or fixed tables, floors should be tiered to provide good sight lines. The ceiling section over the sending end should be inclined toward the students, angled upward from the sending end, to project the instructor's voice towards the rear of the classroom.

3.6 Writing Boards and Projection Screens

Seating - Selection of built-in seating shall also take into account durability and availability of spare parts.

The number of left handed tablet arm chairs should total approximately 10% of the room capacity.

Visible seat numbers shall be incorporated into all fixed seating.

Writing Boards – Whenever white boards are specified, secure storage for markers within the room is required.

Projection Screens – Dual projection screens are required; location to be determined during design to allow faculty the capability to project the same image on both screens or on one screen with the latter providing the capability to concurrently use the writing surface.

3.7 Accessibility

All rooms must be designed to comply with the Standards for Barrier-Free Access, available from the Office of Risk Management and Physical Plant.

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

3.8 Noise control

Other important factors must be considered in the design. To avoid the noise generated by their operation and use, vending machines must be located as far away as possible. Trash and recycling containers should be located near the vending machines. Restrooms and drinking fountains should be located nearby and should be designed to handle student use between classes, rather than minimum code requirements which are based solely on room occupant load. To prevent unwanted noise transmission, restrooms should not share common walls, floors, or ceilings with instructional spaces.

3.9 Data

For future flexibility/connectivity, all new rooms should be provided with infrastructure capability to accommodate both wireless and wired connectivity.

All rooms to be pre-wired to accommodate verbal interactive capability between the students and the instructor. The methodology (hard wired or wireless to be determined on a project basis).

3.10 Telecommunications

Phones – All rooms shall be provided with campus phone connectivity that will provide access to AV Services, Campus Police, Physical Plant, and all campus phone numbers. The campus will investigate the ability to use a light versus a bell to indicate incoming calls on these phones.

The telecommunication systems shall consist of pathways and spaces which only house cabling and equipment provided by the university. Coordinate telecommunication requirements with UMBC's Department of Communications Services. Reference UMBC's Design Standards for Pathway Specifications.

Regardless of the type of room, it is essential to provide the infrastructure connectivity for the desired delivery system and this should include: copper (either level 5, 6, or 7 depending on what is current on campus), optical fiber (both single and multi-mode), and coaxial. With media in place, the need for flexibility is essential.

Regarding wireless capability, the design should allow for its placement providing hardwire to the room with a transmitter(s) located in the room. It would be the Consultant's responsibility to deal with room configuration issues. In the near term, wherever there is laptop use, hardwire connections should be provided.

Provide an active telephone jack in all rooms that is conveniently located to the technology console.

The pathway to just outside of each room should use cable trays. Conduits should then be used for entering larger rooms. Within each room, there are 4 methods of providing service and they are presented below in order of highest to lowest flexibility capability.

- Raised Floor
- Embedded channeling
- Hard conduit to specific locations
- Distribution to the walls

3.11 Natural Lighting

Natural lighting is desired in all rooms. Campus standard for black-out shades, if required, to be determined during design.

3.12 Electrical and Lighting

Line voltage (120v) electric clocks (digital and centrally controlled at Physical Plant) should be located in each room.

Use Low Voltage Electrical System since it provides more versatility/flexibility. This would also allow the use of motion detectors (automatic lights on and off) in each room. In rooms that have media control systems, the system should be programmed to automatically shut off the lights.

Fluorescent lighting voltage is 277. Lower light levels appropriate for projection in rooms is required and can be achieved with multi-tube fluorescent fixtures. First, zone the lighting so that fixtures in the instructor area are switched separately from those in the seating area.

Lighting fixture diffusers should be specified since different diffusers will greatly change the lighting pattern.

All fluorescent fixtures shall have parabolic lenses and placed parallel to the writing surface at the front of the room.

Incandescent light fixtures shall be dimmable and banked for lighting control.

RETROFIT of Spaces - Split the switching of the tubes in the fixtures over the seating area. For example, in a 3 tube fixture, put all the center tubes on one switch and the two outboard tubes on another switch. This will provide a low (1 tube), medium (2 tubes) and high (3 tubes) lighting level.

Lighting Planning - When incorporating both incandescent and fluorescent, there is a need for consistency regarding spectrum and lighting levels. All presets (including room technology) should have a manual override.

Lighting Control – Lighting controls should be conveniently located to the instructor station, clearly labeled, and should provide instantaneous response when pressed. In addition, lighting control should have a minimum of four options: full-on, two projection settings (medium and low), and full-off.

Lighting: Dimmable directional tungsten filament downlights should be used in teaching spaces in lieu of fluorescent dimming fixtures. Fluorescent tubes should be specified as 41k Kelvin.

3.13 HVAC

In existing rooms, consideration should be given to installing ceiling fans to enhance proper air circulation in the room.

HVAC Controls: Climate Control - Temperature and air flow as well as the associated acoustical control of HVAC systems are critical to the classroom or lecture hall. There should be centrally monitored and controlled (Physical Plant) HVAC systems in all instructional spaces.

Mechanical Services, General Requirements: A number of air changes should be specified based on the heating and cooling load of the space. In addition, fancoils in classrooms generate noise and therefore are not desirable since they create a disturbance to the class and are more maintenance intensive. It is recommended that baseboard heating (fin tubes) be used in classrooms below window areas.

Fresh Air Supply – The space should conform to ASHRAE 1997 code standard or the most currently acceptable edition.

3.14 Sundry Issues

Trash cans are to be provided in all rooms.

Keylocks - Although not-in-place, it is UMBC's goal to use a card key in lieu of key locks on AV and electrical service and equipment access.

Stainless steel in lieu of plastic switch and outlet plates as well as data and voice plates are to be used.

Metal pencil sharpeners should be installed.

3.15 UMBC's Design Standards

The selected Consultant shall comply with all requirements and services as set forth in UMBC's Design Standards. As it relates to instructional spaces specifically, the design consultant shall comply/satisfy the criteria set forth below:

- **Part I-D, Codes**
- **Division 6, Wood and Plastics; E. Interior Architectural Woodwork**
- **Division 8, Doors and Windows, including Addenda**
- **Division 08460, Automatic Door Operators**
- **Division 08710, Finish Hardware**
- **Division 08800, Glazing**
- **Division 9, Finishes**
- **Division 10, Specialties, D. Interior Signage**
- **Division 12, Furnishings – Classroom Seating**
- **Division 15, Mechanical**
- **Division 16, Electrical**
- **Division 17, Fire Protection Engineering**
- **Part III, Request for Deviation from Design Standards.**

University of Maryland, Baltimore County
SPECIFIC CLASSROOM DESIGN GUIDELINES
Revised Draft, August 25, 2000

To guide the renovation of existing classrooms and the design of new facilities, a standard description of classrooms has been developed based on the technology capabilities assigned to each room.

It should be further noted that excluding section and subsection titles, changes from the original standards for Classrooms are represented in **bold type**.

1.0 SPECIFIC CRITERIA

- **If only one entrance to a classroom is required, then it should be located at the rear (side wall) of the room.**
- **Where economically and physically feasible, a raised floor should be given strong consideration in providing flexible and accessible voice, data, and video capability/connectivity.**
- **For security purposes, consideration should be given to a Draper Revelation system with the projector being mounted above the ceiling with a drop down mirror for projecting the image.**

2.0 Types of Classrooms

There are five types of classrooms utilized at UMBC as summarized below and further described on subsequent pages.

2.1 TYPE I (Basic):

General purpose classroom **for less than 40 students** that has basic standard technologies, such as, an overhead projector, projection screen, marker (writing) board (white) or chalkboard, Ethernet, video jack (campus cable), phone jacks.

2.2 TYPE II (Basic Plus):

General purpose classroom **of less than 40 students** that includes video playback capabilities (Monitor/Receiver.VCR) and all of the items described in Type I.

2.3 TYPE III (Mid-Range Technology Classroom):

General purpose classroom **for 40 to 80 students** with installed video/data projector or data monitor or Plasma Screen, VCR, external computer/video/audio inputs and remote control, and all items described in Type I.

2.4 TYPE IV (Computer Classroom):

General-purpose classroom designed with either computer workstations or docking stations. Video/data projector, auxiliary computer/video/audio inputs and outputs. Instructor console provided with proper computer, VCR, touch screen system controller, and light control system.

2.5 TYPE V (Video Teleconferencing Classroom (VTC))

General purpose classroom designed to support use of interactive video for both teaching and learning. The room systems will produce origination of audio and video for two-way communication. Control systems to be sufficiently user friendly to enable operation by the instructor or assistant.

2.1 ROOM TYPE: I

SQ. FT.: varies

INTENDED USE:

Intended to provide a good learning environment that is prepared for use of mobile Technology.

Number of students to be less than 40.

SPECIAL ROOM REQUIREMENTS:

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 and the entrance at the rear of the room is most desirable.
- Coordinate design at front of room with technology requirements to promote effectiveness of technology use. In all cases, the front of room design must consider the need to use projection and marking surfaces simultaneously. Install **receptacles** at front of room for future TV/VCR installation
- Install chair rail if **movable** seating used.
- 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 .
- Provide complete blackout capability.
- Provide acceptable acoustics.
- Choose all finish colors with consideration of impact of **technical equipment, aesthetics, and artificial light on colors chosen.**
- Provide durable, easy-to-clean floor covering. **Carpet is preferred.**

Mechanical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Provide HVAC system capable of maintaining human comfort conditions summer and winter; 65% rh maximum.
- 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 **meet all required codes.**

Electrical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Separate all power cabling from low voltage wiring.
- Design lighting so that it is staged from front to back, not side to side.

- Provide light at teaching station that is independent of room light.
- Lighting design for classrooms shall use multi-level switching and be **dimnable for general seating. Lighting shall be controlled from the teaching station or nearby wall.** Board lights (if required) can also use either of these control schemes.
- If more than one switch, label all controls clearly with engraved two-color plastic equipment labels.
- Use non-**glare**, directional lighting fixtures and lenses. The luminaires shall be capable of 1% minimum light output. Consult recommendations of Illuminating Engineering Society and IU Engineering Standards.
- Evaluate need for light over chalkboard. Use focused light, if appropriate. Provide manual control at teaching station **or preset if dimming system is available.**
- Provide 3 duplex outlets each at front and back (left, center, right) and at least 2 conveniently accessible quad outlets each side.
- Provide dedicated circuitry for classrooms. Power should be clean at the panel with protection for equipment provided by surge strips on racks or carts.

Telecommunications:

- Install pathway according to UMBC Telecommunication Standard to bring voice, data, and video from source outside room (IDF closet) to standard communications outlet in the front; campus cable connection (receive/return) shall **also** be provided in the front.
- Telecommunications wiring shall be no closer than 18" **to** fluorescent lights and associated ballast.
- Depending on room size, consideration should be given to communication outlets and campus cable outlet in rear.

EQUIPMENT REQUIREMENTS:

- Choose all seating with consideration for ergonomic principles.
- Accommodate wheelchair users per current ADA criteria.
- If tablet arm chairs chosen for classroom seating, **provide oversize writing surface plus book storage beneath the chair: The teaching station shall be 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.**
- If tables and stackable chairs are chosen for classroom seating, teacher's station will match student tables and must provide knee clearance no less than 27.5".
- For either tablet arm or table/chair seating, a table lectern **to be provided** to match architectural wood in building.
- Overhead transparency projector (4000 lumens).
- Install a minimum of 18 ft. of chalkboard, with the board to be 4' high **and mounted so that the tray is 3 ft. above the finished floor. Boards to be located on front and side walls.**

- Provide assistive listening devices if sound/PA systems used.
- Projection screens: minimum screen size should be 6' with actual size determined by room dimensions. Consider installing additional screens under the following conditions.
 - **at intersection of front and side walls at a 45 degree angle.**
 - 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.
- Install 1 pencil sharpener at back of room (mounted securely, not on dry wall partition).
- **Install line voltage (120v) electric clock(s) with large, easy-to-read digital numerals that is centrally controlled at Physical Plant. They should be located so they are visible to the instructor.**
- **Provide a campus phone that will provide access to AV Services, Campus Police, Physical Plant, and call campus phone numbers.**
- Provide receptacles for recycled paper and trash.

2.2 ROOM TYPE: II

SQ. FT.: varies

DESCRIPTION:

Basic Plus Classroom

INTENDED USE:

A “basic plus classroom” is an upgrade from a Basic Classroom. It typically has a capacity of fewer than forty. If a room larger than approximately forty is to be upgraded from a Basic Classroom to another category, it should go directly to the Mid-Range Technology (Type III) classification because the larger size drives a need for projection.

The “Basic Plus Room” shall provide a good learning environment and be prepared for use of mobile technology. **This space is intended for fewer than 40 student with** installed TV/VCR and an overhead projector.

SPECIAL ROOM REQUIREMENTS:

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 and the entrance at the rear of the room is most desirable.
- Coordinate design at front of room with technology requirements to promote effectiveness of technology use. In all cases, the front of room design must consider the need to use projection and marking surfaces simultaneously. Install ceiling or wall mount (preferred) or anchor at front of room for TV/VCR installation.
- Install chair rail if loose seating used.
- Construct fold down shelf at rear of room for slide or film projection and provide appropriate electrical and data connectivity.
- 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.
- Provide complete blackout capability.
- Provide acceptable acoustics.
- Choose all finish colors with consideration of impact of **technical equipment, aesthetics, and artificial light on colors chosen.**
- Provide durable, easy to clean floor covering. **Carpet is preferred.**

Mechanical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- HVAC system capable of maintaining human comfort conditions summer and winter; 65% rh maximum.
- 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 **meet all required codes**.

Electrical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Separate all power cabling from low voltage wiring.
- Design lighting so that it is staged from front to back, not side to side.
- Provide light at teaching station that is independent of room light.
- Lighting design for classrooms shall use multi-level switching and be **dimnable for general seating. Lighting shall be controlled from the teaching station or nearby wall.** Board lights (if required) can also use either of these control schemes.
- If more than one switch, label all controls clearly with engraved two-color plastic equipment labels.
- Use non-glare, directional lighting fixtures and lenses. The luminaires shall be capable of 1% minimum light output. Consult recommendations of Illuminating Engineering Society and IU Engineering Standards.
- Evaluate need for light over chalkboard. Use focused light, if appropriate. Provide manual control at teaching station **or preset if dimming system is available.**
- Provide 3 duplex outlets each at front and back (left, center, right) and at least 2 conveniently accessible quad outlets each side.
- Provide dedicated circuitry for classrooms. Power should be clean at the panel with protection for equipment provided by surge strips on racks or carts.

Telecommunications:

- Install pathway according to UMBC Telecommunication Standard to bring voice, data, and video from source outside room (IDF closet) to standard communications outlet in the front; campus cable connection (receive/return) shall **also** be provided in the front
- Telecommunications wiring shall be no closer than 18" **to** fluorescent lights and associated ballasts.

EQUIPMENT REQUIREMENTS:

- Choose all seating with consideration for ergonomic principles.
- Accommodate wheelchair users according current ADA criteria.
- If tablet arm chairs chosen for classroom seating, **provide oversize writing surface plus book storage beneath the chair: The teaching station shall be 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.**

- If tables and stackable chairs are 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 is **to be provided** to match architectural wood in building.
- Provide overhead transparency projector (4000 lumens).
- Provide 25" to 31" TV monitor(s). **Location (away from traffic flow) and mounting height of both TV monitors and speakers are critical design criteria for safety reasons.**
- Provide VHS VCR.
- Install a minimum of 18 ft of chalkboard with the board to be 4' high **and mounted so that the tray is 3 ft. above the finished floor. Boards to be located on front and side walls**
- Provide assistive listening devices if sound/PA systems used.
- Projection screens: minimum screen size should be 6' with actual size determined by room dimensions. Consider installing additional screens under the following conditions.
 - **at intersection of front and side walls at a 45 degree angle.**
 - 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.
- Install 1 pencil sharpener at back of room (mounted securely, not on dry wall partition).
- **Install line voltage (120v) electric clock(s) with large, easy-to-read digital numerals that is centrally controlled at Physical Plant. They should be located so they are visible to the instructor.**
- **Provide a campus phone that will provide access to AV Services, Campus Police, Physical Plant, and call campus phone numbers.**
- Provide receptacles for recycled paper and trash.

2.3 ROOM TYPE: III

SQ. FT.: varies

DESCRIPTION:

Mid-Range Technology Classroom

INTENDED USE:

Intended to provide a good learning environment with significant use of Installed technology. It will have available a technology array consisting of a minimum of a large display video/data projector, VCR, Video Switcher, computer network connections, telephone, and external computer interface. Typically, this space is intended for 40 to 60 students, and under certain conditions 80 students.

SPECIAL ROOM REQUIREMENTS:

Architectural:

- Evaluate width/length proportions of room in order to determine the most effective location for the front of room.
- Entrance at the rear of the room is most desirable; if room size or configuration requires two entrances, at least one should be at the rear of the room
- Coordinate design at front of room with technology requirements to promote effectiveness of technology use. In all cases, the front of room design must consider the need to use projection and marking surfaces simultaneously. Determine equipment needed at teaching station as part of this process.
- Install bracket or other structure as needed high on back wall (in a small room) or in ceiling (in a larger room) for installation of video projector. **Note: For security reasons, consideration should be given to a Draper Revelation System with the projector being mounted above the ceiling with a drop down mirror for projecting the image.**
- Install folding shelf at back of room for slide projector.
- Construct Media Equipment Closet (3'w x 4'd x 8'h) with roll up door or Media Equipment Cabinet (dimensions will vary with room and equipment configuration) at front of room. Design of room will determine which to choose. Either must be securable for equipment to be installed in Closet or Cabinet.
- Install chair rail if loose seating used.
- 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.
- Provide complete blackout capability.
- Provide acceptable acoustics.
- Provide durable, easy to clean floor covering. **Carpeting is preferred.**
- Use anti-static finishes.
- Choose all finish colors with consideration of **technical equipment, aesthetics**, and impact of full artificial light on colors chosen.

Mechanical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- HVAC system capable of maintaining human comfort conditions summer and winter; 65% rh maximum
- 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 **meet all required codes**

Electrical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Install junction box and conduit to provide connectivity among equipment items and locations (MEC, video projector, equipment shelf on back wall) described by this program.
- Separate all power cabling from low voltage wiring.
- Provide separate circuits for lighting control system, video projector, and audio/video control system.
- Lighting design
 - lights staged or zoned from front to back.
 - minimum of two zones: one for front of room; one for general room light (larger rooms may require more zones).
 - light switches by entrance doors and at teaching station.
 - light at teaching station that is independent of room light.
 - dimmable incandescent fixtures preferred; multi-level switching acceptable if dimming not possible.
- Use non-**glare**, directional lighting fixtures and lenses. The luminaires shall be capable of 5% minimum light output. Consult recommendations of Illuminating Engineering Society and IU Engineering Standards.
- Evaluate need for light over chalkboard. Use focused light if appropriate. Provide manual control at teaching station **or preset capability**.
- Provide low voltage circuitry as needed to control selected media outlets.
- Provide 3 duplex outlets each at front and back (left, center, right); at least 2 conveniently accessible quad outlets each side; outlets at back of room are in addition to those at projection point in rear of room.
- Provide dedicated circuitry for classrooms with protection for equipment provided by surge strips on racks or carts.
- Provide boxes for microphone outlet and a two gang AC receptacle.

Telecommunications:

- Install pathway according to UMBC Telecommunication Standard to bring voice, data, and video from source outside room (IDF closet) to standard communications outlets in the Media Equipment Closet or Cabinet (MEC) (voice outlet should articulate with sound systems), projection point at rear of room (interface with house sound system) and front of room; campus cable connection (receive/return) shall be provided in the MEC.
- Telecommunications wiring shall be no closer than 18" to fluorescent lights and associated ballasts.

EQUIPMENT REQUIREMENTS:

- Choose all seating with consideration for ergonomic principles.
- Accommodate wheelchair users according to **current ADA criteria.**
- If tablet arm chairs chosen for classroom seating, **provide oversize writing surface plus book storage beneath the chair: The teaching station shall be 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.**
- If tables and stackable chairs are 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 **to be provided** to match architectural wood in building.
- **If fixed tables with movable chairs, provide tiered seating in rooms greater than 60 seats.**
- High intensity overhead transparency projector (4000 lumens).
- VHS VCR.
- Video Projector(s); **Note: For security reasons, consideration should be given to a Draper Revelation System with the projector being mounted above the ceiling with a drop down mirror for projecting the image.**
- Keypad interface.
- Tuner.
- External inputs interface.
- Installed sound system.
- Install a minimum of 18 ft of chalkboard with the board to be 4' high and mounted so that the tray is 3 ft. above the finished floor. **Boards are to be located on front and side walls.**

- Projection screens: minimum screen size should be 6' with actual size determined by room dimensions. Consider installing additional screens under the following conditions.
 - **at intersection of front and side walls at a 45 degree angle.**
 - 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.
- Install 1 pencil sharpener at back of room (mounted securely, not on dry wall partition).
- **Install line voltage (120v) electric clock(s) with large, easy-to-read digital numerals that is centrally controlled at Physical Plant. They should be located so they are visible to the instructor.**
- **Provide a campus phone that will provide access to AV Services, Campus Police, Physical Plant. and call campus phone numbers.**
- Provide receptacles for recycled paper and trash.

2.4 ROOM TYPE: IV

SQ. FT. varies

DESCRIPTION:

Computer Classroom

INTENDED USE:

This room will be designed with either a computer workstation or a docking station at every station so that students can either use a provided workstation or bring his or her own with the ability to connect to the network.

SPECIAL ROOM REQUIREMENTS:

Architectural:

- Securable.
- Tiered floors with communication cabling below.
- Locate front of room so doors do not conflict with teaching space.
- Locate instructor station at one side of the front of the room with ten feet between the student workstations and the whiteboard. Provide work surface at least five feet wide for instructor.
- Locate printers on furniture near door(s). Plan the print area so it is large enough to accommodate other possible peripherals such as scanners or color printers.
- Preferred room shape is rectangular but not completely square.
- Plan space for storage of printing and consulting supplies, trash and recycling receptacles, documentation.
- Minimum and maximum viewing distances will determine location of seating.
- General guideline for location of first row of seats is approx. 1.5 times projected image width.
- General guideline for location of seat furthest from front of room is no more than four times projected image width.
- Blackout capability (prefer no windows to outside at all).
- Allow 30-40 square feet per student station. This station size (which is greater than in a standard classroom) will provide for larger aisle width and front of room dimensions required in computer classroom.
- Orient all computing devices so student can view front of room with relative ease.
- Provide sound attenuation from adjacent spaces.
- Consider installation of extra acoustical material (needed when classroom is used as unscheduled cluster).
- Anti-static carpet.

- Install framing or support for ceiling mounted video projector. Appropriate distance for projection depends on projector selected and room dimensions and shall be determined during design.
- Locate computers to avoid glare from lights or windows. **Consider impact of furniture types.**

Mechanical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Provide dust control system.
- If sprinklers are required, provide wet sprinkler type system.
- Plan cooling at 25% more than is needed to accommodate total potential number of workstations the room is capable of housing in operation at one time with a temperature of 75° F.
- HVAC must support ambient noise level of not more than NC 35.
- HVAC: In renovations, evaluate heating and cooling requirements to account for the added equipment load.
- Provide outside air for ventilation according to ASHRAE 62-1989.
- Provide 15 CFM/person of conditioned outside air. For variable air volume systems, ensure outside air provision is maintained.

Electrical

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Provide 1 MCO outlet located near instructor station.
- Use UMBC Standards for Telecommunications Distribution Facilities.
- Provide voice, video, data, power, and audio outlets at front of room, and at location of electronic image display device providing connection to USM Interactive Video Network, University Computing Services, and campus network.
- Provide clean power for all outlets and separate circuits for room.
- Provide 3 duplex outlets each at front and back (left, center, right) and at least 2 duplex outlets each side. These outlets all are in addition to those at for workstations.
- Install low voltage raceway and cable connecting all workstations with nearest IDF. Integrate channels for electrical wiring and data cabling into furnishings, keeping surface free. Current implementations use 4000 wire mold on the backs of the table legs.
- Provide power and low voltage outlets on riser at front of room
- Provide adequate power to support total potential number of workstations the room is capable of housing with two duplex outlets per workstation preferred (one is minimum requirement).

- Provide non-glare fluorescent lighting. Indirect lighting is preferred over direct lighting. Bank lights and control banks from front to back. Dimmable lighting is best but differently switched fluorescent fixtures is acceptable. Consult recommendations of Illuminating Engineering Society.
- Provide switches for general room light at each door and at teaching station.
- Provide program sound reinforcement for multimedia presentations.
- Provide switch for video projector.
- Provide screen controls at teaching station.
- Provide security wiring.
- The following installation of junction box & conduit provides connectivity among equipment items and locations described by program. Install 20"x 20"x 6" junction box in ceiling space in classroom and install these conduit requirements
 - (1) 3/4" from junction box to speakers.
 - (1) 3/4" from junction box to IR repeaters.
 - (1) 2" from junction box to master volume control box.
 - (1) 2" between MCO (Media Connectivity Outlet), XLR, and Spare.
 - (1) 2" from junction box to MCO.
 - (1) 2" from junction box to Spare.
 - (1) 2" from junction box to projector.

Telecommunications:

- Install pathway according to UMBC Telecommunication Standard to bring voice, data, and video from source outside room (IDF closet) to standard communications outlets in the Media Equipment Closet or Cabinet (MEC) (voice outlet should articulate with sound systems), projection point at rear of room (interface with house sound system) and front of room; campus cable connection (receive/return) shall be provided in the MEC.
- Provide a data connection at each workstation location, two at the instructors station, and one at the front of the room. Delivery of data should conform to the most recent standards as established by the communications group.
- Provide communications from one hub to each station.

EQUIPMENT REQUIREMENTS:

- Work surfaces (number to match room capacity) at tables at a height of 26 2 inches for standard use and 29 2 inches (27" clear opening height) for handicapped access must be used, a minimum of 42 (minimum) to 48 (preferred) inches of work space should be allotted for each workstation. Each table should make provision for tower configurations or under work surface applications.
- Computer workstations (number to match room capacity, including one for instructor), should be arranged so as to eliminate glare. One computer shall have a large monitor to accommodate users with reduced vision.
- Consider installation of assistive listening devices to counteract high ambient noise created by workstations and peripherals.

- Provide a station (with computer) for lab administrator or instructor.
- 1 double pedestal desk (or equivalent).
- 1 extension for computer.
- 1 ergonomic chair.
- Workstation chairs (number to match room capacity) should be selected in accordance with ergonomic principles.
- Five-drawer filing cabinets (number to be provided by user).
- Printers (1 per four or five workstations).
- Lf counter (4 lf/printer at a density of 1 printer/10 computers).
- 1 high resolution (SVGA or XVGA), ceiling-mounted video/data projection device, chosen to be suitable for the room size and configuration and installed so as not to obstruct student view.
- 1 markerboard, approx. 80 square feet (i.e., 4' x 20').
- 1 projection screen, size to be determined when room dimensions known.
- 1 framing projector (optional).
- 1 bulletin board (4' x 6').
- Provide security for systems (consult project architect for contact with appropriate University office to approve security systems).
- 1 lockable double door storage cabinet.
- 1 unit providing 15 lf shelving.
- 1 overhead projector (optional).
- 1 VCR (optional)
- Sound system
- Containers for trash and recyclables
- **Install line voltage (120v) electric clock(s) with large, easy-to-read digital numerals that is centrally controlled at Physical Plant. They should be located so they are visible to the instructor.**
- **Provide a campus phone that will provide access to AV Services, Campus Police, Physical Plant and call campus phone numbers.**

2.5 TYPE: V
SQ. FT: varies

DESCRIPTION:

Video Teleconferencing Classroom (VTC)

INTENDED USE:

This room will support use of interactive video for teaching and learning. Room systems will produce origination of audio and video for two-way communication. Control systems will be sufficiently user friendly to enable operation by the instructor or an assistant. Professional staff will not be required to operate the systems. The classroom system will capture live video of all participants in the room, as well as transmit video sources such as document camera, scan converted computer video, VCR playback and record, and cable TV. Microphone pickup will allow participation by all people in the classroom. Local audio will have a mute function.

Display systems will allow users to see both outgoing video signals, local display from document camera, etc., and video signals from remote sites. Multi-point sessions will display voice activated signals from remote sites.

Network connections will be both pre-programmed through central scheduling systems and manually managed from the room. Room systems will be permanently installed, and all user equipment will be available with minimum setup. Room setup can be accomplished in less than 15 minutes, with the work being performed by non-professional staff.

SPECIAL ROOM REQUIREMENTS:

Architectural:

- Distance from cameras to people needs to allow good camera angle (minimum 10').
- Rectangular rooms are better than square.
- Allow 35 square feet per person.
- Use neutral colors for walls.
- Use solid, neutral colors for table surfaces (avoid white and wood grain).
- Use non-reflective, uniform texture, non-pattern backdrops.
- Avoid dark backgrounds and wood paneling.
- Avoid reflective objects (glass, mirrors, whiteboards) in the camera field of view.
- No outside windows.

Electrical:

Note: This information is provided as guidelines only. It is the responsibility of the selected Consultant to provide appropriate systems. At a minimum, provide the following:

- Use 4100 degree K color corrected temperature fluorescent bulbs.
- Lighting should provide proper color balance for video.
- 75-100 footcandles light intensity (750 to 1,100 lux).

- Provide even lighting, 3 ft ahead and above participants.
- Use light lenses to avoid shadows.
- Pay special attention to teaching areas for proper lighting.
- Avoid windows, use drapes when necessary.
- Lighting control - zone from front to back when appropriate.
- Provide adequate electrical outlets.
- Provide dedicated circuit for videoconferencing system.

Acoustics:

- Provide microphone placement so that all participants can be heard.
- Desktop, gated microphones are recommended.
- Ceiling mounted microphones are not recommended.
- Use drapes, acoustic ceiling tile, and acoustic wall treatments.
- Use anti-static wall-to-wall carpeting.

Telecommunications requirements:

- Install pathway according to UMBC Telecommunication Standard to bring voice, data, and video from source outside room (IDF closet) to standard communications outlets in the Media Equipment Closet or Cabinet (MEC) (voice outlet should articulate with sound systems), projection point at rear of room (interface with house sound system) and front of room; campus cable connection (receive/return) shall be provided in the MEC.
- Dedicated T1 circuit (through voice outlet).
- ISDN circuit (through voice outlet).
- Additional voice outlets as needed (telephone, fax, USM Interactive Video Network, teleresponse, diagnostic modem).
- 1 data outlet.
- Campus broadband video service.

EQUIPMENT REQUIREMENTS:

- CODEC and control system.
- Camera(s).
- Microphones.
- TV monitors: **Location (away from traffic flow) and mounting height of both TV monitors and speakers are critical design criteria for safety reasons.**

- Document camera.
- VCR with TV tuner.
- Computer video scan converter (NTSC).
- Auxiliary equipment cart.
- Furniture choices should be fixed student tables.
- Chairs for use at student tables.
- **Install line voltage (120v) electric clock(s) with large, easy-to-read digital numerals that is centrally controlled at Physical Plant. They should be located so they are visible to the instructor.**
- **Provide a campus phone that will provide access to AV Services, Campus Police, Physical Plant and call campus phone numbers.**