University of Massachusetts Amherst
Audio-Visual Program Guideline - Auditorium
Version 1.0

Sloped floor large auditorium with fixed student seating and fixed instructor’s station. Seating capacity 150 seats or greater.

Distinguishing characteristics:
- Three projection systems (dual left/right and single centered)
- Optional video conferencing

Support Spaces: - Equipment Closet at front wall behind instructor, to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Fixed Furnishings: - Fixed student seating.
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Lighting Requirements: - Preset lighting control system, dimmed system to allow for darkened projection screens but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights. Additional low voltage control from A/V system.

Telecommunications Requirements: - Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
- Wireless Ethernet access for students.

**Other Requirements:**
- Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility and permit open microphones.
- Electrically operated blackout shades and room darkening shades at any exterior windows, with low voltage control from A/V system.

**Audio-Visual Requirements:**

**Writing Surfaces:**
- Small grey or off-white dry marker surface at one side of front wall.

**Video Systems:**
- Front projection screen(s) at front wall, one or more screens as required to permit dual side-by-side images or single centered image. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10.
- Three video/data projectors, fixed in position below ceiling or at rear wall. WUXGA (1920x1200) resolution, high brightness projectors.
- Connections (two each of VGA, DVI, and audio) at instructor’s station to support one or two portable notebook computers.
- Blu-ray disc player and high resolution document camera at instructor’s station. Additional connections (composite video, Y/Pb/Pr component video, and audio) to support a portable media player. Further additional connection to support audio-only MP3 player.
- High definition video camera on pan/tilt mount at rear wall, allows image magnification of instructor, also supports lecture capture.
- Desktop camera for use with small objects, portable, may be connected as required.
- Touch screen control panel may serve as confidence monitor, allowing instructor to see projected images without having to turn around and look at the projection screen.
- Video switching to permit any image source to be displayed upon any or all projectors. Digital switching and distribution, HDCP compliant.
- Closed caption decoding for video playback sources, may be defeated if not required.

**Audio Systems:**
- Gooseneck microphone at instructor’s station and two lavalier wireless microphones. Four wired microphones with floor and desk stands, may be connected to instructor’s station for panel discussions. Automatic microphone mixing equipment for unattended instructional use.
- Ceiling loudspeakers for speech reinforcement of instructor.
- Two-channel (stereo or dual mono) program audio playback employing loudspeakers at front wall.

- Permanently installed wireless assistive listening system for hearing-impaired listeners.

**Content Distribution Systems:**

- Lecture capture system to University standards, captures presentation content (single channel) plus instructor’s speech and image.

- Connections at front and rear for use with portable recording equipment. Defined location within the room for portable mixing and switching equipment for live production and streaming.

**Control Systems:**

- All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.

- Touch screen control panel at instructor’s station. Panel for control of all audio-visual equipment as well as lighting and window shades.

- Installed personal response system.

- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.

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**Optional Distance Education Systems:**

- One or more high definition video cameras on pan/tilt mounts at front wall, capture images of students. Lecture capture camera captures images of instructor. Automated preset camera positioning for routine operation, positioning also by instructor.

- Microphones at aisles within seating area, may be connected as needed. Students wishing to speak come forward.

- High definition video codec for compressed digital transmission to far end locations. Dual channel codec, supports separate camera and content channels. Far end image displayed on side projection screen.

- Large flat panel video display built into face of front row student table, for display of far end students or instructor to local instructor.

- Support staff establishes communications links to far end sites, but otherwise all operation is by the instructor. Nothing requires the assistance of a technician.

- High level lighting, 75 foot-candles horizontal and vertical, for use during distance education activities. To illuminate participants but not projection screens. Distance education
fixtures separately controlled, and may be dimmed or extinguished when not required.
Stepped floor classroom with deep horseshoe-shaped seating plan for student interaction. Student seating at fixed tables, and fixed instructor’s station. Seating capacity between 80 & 150 seats.

Distinguishing characteristics:
- Deep U-shaped seating
- Two projection systems (center and side)

Support Spaces:
- Equipment Closet at front wall behind instructor, to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Fixed Furnishings:
- Continuous student tables with power.
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Lighting Requirements:
- Preset lighting control system, dimmed system to allow for darkened projection screens but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights. Additional low voltage control from A/V system.

Telecommunications Requirements:
- Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
**Other Requirements:**
- Wireless Ethernet access for students.
- Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility.
- Electrically operated blackout shades and room darkening shades at any exterior windows, with low voltage control from A/V system.

<table>
<thead>
<tr>
<th>Audio-Visual Requirements</th>
<th>Writing Surfaces:</th>
<th>Grey or off-white dry marker surface at front wall, full width of front wall.</th>
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<tr>
<td>Video Systems:</td>
<td>Two electrically operated ceiling mounted front projection screens at front wall in front of writing boards. One screen on room centerline, the second screen at side opposite instructor's station. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10.</td>
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<td>Connections (two each of VGA, DVI, and audio) at instructor’s station to support one or two portable notebook computers.</td>
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<td>Blu-ray disc player and high resolution document camera at instructor’s station. Additional connections (composite video, Y/Pb/Pr component video, and audio) to support a portable media player. Further additional connection to support audio-only MP3 player.</td>
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| Audio Systems:            | Gooseneck microphone at instructor’s station and two lavalier wireless microphones. Automatic microphone mixing equipment for unattended instructional use. |
|                           | Ceiling loudspeakers for speech reinforcement of instructor. |
|                           | Two-channel (stereo or dual mono) program audio playback employing loudspeakers at front wall. |
Content Distribution Systems:
- Lecture capture system to University standards, captures presentation content (single channel) plus instructor’s speech and image.

Control Systems:
- All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.
- Touch screen control panel at instructor's station. Panel for control of all audio-visual equipment as well as lighting and window shades.
- Installed personal response system.
- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.

Optional Distance Education Systems:
- One or more high definition video cameras on pan/tilt mounts at front wall, capture images of students. Lecture capture camera captures images of instructor. Automated preset camera positioning for routine operation, positioning also by instructor.
- Microphones fixed at student tables, one microphone for each pair of adjacent students. Microphones may be voice activated or push-to-talk, as selected by the instructor. Microphones also provide amplification between students at opposite sides of the room.
- High definition video codec for compressed digital transmission to far end locations. Dual channel codec, supports separate camera and content channels. Far end image displayed on side projection screen.
- Large flat panel video display built into face of front row student table, for display of far end students or instructor to local instructor.
- Support staff establishes communications links to far end sites, but otherwise all operation is by the instructor. Nothing requires the assistance of a technician.
- High level lighting, 75 foot-candles horizontal and vertical, for use during distance education activities. To illuminate participants but not projection screens. Distance education fixtures separately controlled, and may be dimmed or extinguished when not required.
Flat floor flexible classroom with student seating at loose tables, and fixed instructor’s station. Seating capacity up to 80 seats.

Distinguishing characteristics:
- Supports single class activity or breakout into smaller groups

Support Spaces:
- Equipment Closet at front wall behind instructor, to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Movable Furnishings:
- Student tables.

Fixed furnishings:
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Lighting Requirements:
- Preset lighting control system, dimmed system to allow for darkened projection screen but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights.

Telecommunications Requirements:
- Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
- Wireless Ethernet access for students.
Other Requirements:  
- Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility.
- Room darkening shades at any exterior windows.

Audio-Visual Requirements:

Writing Surfaces:  
- Grey or off-white dry marker surface at front and side walls, full width of walls.

Video Systems:  
- Single electrically operated ceiling mounted front projection screen at front wall in front of writing boards. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10. Sized to support viewing by the entire class.
- Video/data projector, fixed in position below ceiling or at rear wall. WUXGA (1920x1200) resolution, high brightness projectors.
- Multiple flat panel monitors at side and rear walls, image height equal to maximum viewing distance divided by 6. Sized to support viewing by small breakout groups.
- Connections (one each of VGA, DVI, and audio) at instructor’s station to support portable notebook computer. May display on projection screen or any or all flat panel monitors.
- Blu-ray disc player and high resolution document camera at instructor’s station. Additional connections (composite video, Y/Pb/Pr component video, and audio) to support a portable media player. May display on projection screen or any or all flat panel monitors. Further additional connection to support audio-only MP3 player.
- Connections (one each of VGA, DVI, and audio) at wall at each flat panel monitor to support portable notebook computer. May display on associated monitor only.
- Digital video signal switching and distribution, HDCP compliant.
- Closed caption decoding for video playback sources, may be defeated if not required.

Audio Systems:  
- Gooseneck microphone at instructor’s station and two lavalier wireless microphones. Four wired microphones with floor and desk stands, may be connected to instructor’s station for panel discussions. Automatic microphone mixing equipment for unattended instructional use.
- Ceiling loudspeakers for speech reinforcement of instructor.
- Two-channel (stereo or dual mono) program audio playback employing loudspeakers at front wall, reproduces audio associated with projected image. Loudspeakers at each flat panel monitor, reproduces audio associated with displayed image.
- Permanently installed wireless assistive listening system for hearing-impaired listeners.

**Content Distribution Systems:**
- Lecture capture system to University standards, limited system, captures presentation content plus instructor’s speech.

**Control Systems:**
- All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.
- Pushbutton control panel at instructor’s station. Panel for control of audio-visual equipment only.
- Support for personal response system by portable devices used with portable notebook computer; no installed personal response system.
- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.
Tiered floor large auditorium with student seating at fixed tables, and fixed instructor’s station. Seating capacity 150 seats or greater.

Distinguishing characteristics:
- Three projection systems (dual left/right and single centered)
- Strip tables, two rows per riser, permit student collaboration
- Optional video conferencing

Support Spaces:
- Equipment Closet at front wall behind instructor, to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Fixed Furnishings:
- Continuous student tables with microphones and power. Students may turn around to work collaboratively with students in row behind.
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Lighting Requirements:
- Preset lighting control system, dimmed system to allow for darkened projection screens but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights. Additional low voltage control from A/V system.

Telecommunications Requirements:
- Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
- Wireless Ethernet access for students.

Other Requirements:
- Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility and permit open microphones.
- Electrically operated blackout shades and room darkening shades at any exterior windows, with low voltage control from A/V system.

Audio-Visual Requirements:

Writing Surfaces:
- Small grey or off-white dry marker surface at one side of front wall.

Video Systems:
- Front projection screen(s) at front wall, one or more screens as required to permit dual side-by-side images or single centered image. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10.
- Three video/data projectors, fixed in position below ceiling or at rear wall. WUXGA (1920x1200) resolution, high brightness projectors.
- Connections (two each of VGA, DVI, and audio) at instructor’s station to support one or two portable notebook computers.
- Blu-ray disc player and high resolution document camera at instructor’s station. Additional connections (composite video, Y/Pb/Pr component video, and audio) to support a portable media player. Further additional connection to support audio-only MP3 player.
- High definition video camera on pan/tilt mount at rear wall, allows image magnification of instructor, also supports lecture capture.
- Desktop camera for use with small objects, portable, may be connected as required.
- Touch screen control panel may serve as confidence monitor, allowing instructor to see projected images without having to turn around and look at the projection screen.
- Video switching to permit any image source to be displayed upon any or all projectors. Digital switching and distribution, HDCP compliant.
- Closed caption decoding for video playback sources, may be defeated if not required.

Audio Systems:
- Gooseneck microphone at instructor’s station and two lavalier wireless microphones. Four wired microphones with floor and desk stands, may be connected to instructor’s station for panel discussions. Automatic microphone mixing equipment for unattended instructional use.
- Ceiling loudspeakers for speech reinforcement of instructor and other students. Zoned so that microphones in one region of the room are reproduced through loudspeakers in other regions.

- Two-channel (stereo or dual mono) program audio playback employing loudspeakers at front wall.

- Permanently installed wireless assistive listening system for hearing-impaired listeners.

**Content Distribution Systems:**
- Lecture capture system to University standards, captures presentation content (single channel) plus instructor’s speech and image.

**Control Systems:**
- All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.

- Touch screen control panel at instructor’s station. Panel for control of all audio-visual equipment as well as lighting and window shades.

- Installed personal response system.

- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.

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**Optional Distance Education Systems:**
- One or more high definition video cameras on pan/tilt mounts at front wall, capture images of students. Lecture capture camera captures images of instructor. Automated preset camera positioning for routine operation, positioning also by instructor.

- Microphones fixed at student tables, one microphone for each pair of adjacent students. Microphones may be voice activated or push-to-talk, as selected by the instructor. Microphones also provide amplification between students at opposite sides of the room.

- High definition video codec for compressed digital transmission to far end locations. Dual channel codec, supports separate camera and content channels. Far end image displayed on side projection screen.

- Large flat panel video display built into face of front row student table, for display of far end students or instructor to local instructor.

- Support staff establishes communications links to far end sites, but otherwise all operation is by the instructor. Nothing requires the assistance of a technician.
- High level lighting, 75 foot-candles horizontal and vertical, for use during distance education activities. To illuminate participants but not projection screens. Distance education fixtures separately controlled, and may be dimmed or extinguished when not required.
University of Massachusetts Amherst
Audio-Visual Program Guideline - Team-Based Learning Classroom
Version 1.0

TEAM BASED LEARNING

Flat floor classroom, with round tables of nine seats each, permits students to work in groups of nine or three.

Distinguishing characteristics:
- Students work in groups of three or nine
- Furnishings and systems to allow student-student sharing of content

Support Spaces:
- Equipment Closet to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Fixed Furnishings:
- Student tables, with equipment required for student presentation, communication, and control. Sufficient space around and between tables so that instructor may circulate freely and provide assistance to any student.
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Telecommunications Requirements:
- Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
- Wired Ethernet connections at student tables, for computers and utility use. Access to University networks and to the public internet, internet access may be defeated when required.
Other Requirements: - Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility.
- Room darkening shades at any exterior windows.

Audio-Visual Requirements:

Writing Surfaces: - Grey or off-white dry marker surface convenient to each table, one per table. This is the primary tool for sharing between groups of students.

Video Systems: - Ceiling mounted video camera at each marker board, fixed view. High definition 1080p resolution. The camera captures an image of the board, which then may be presented on projection screens or flat panel displays throughout the classroom.
- Three personal computers at each table, one for each group of three students. When not in use, monitors may be lowered allowing group work among all nine students at a table. Any computer may be presented on projection screen or flat panel displays throughout the classroom. This is a secondary tool for sharing between groups of students.
- Large screen video/computer display (projection screen or flat panel) convenient to each table, one per table. Image height equal to maximum viewing distance divided by 6; image aspect ratio 16:9 or 16:10 Displays alternate in two groups, permitting two different images to show on adjacent displays.
- Instructor’s station, with personal computer, document camera, and Blu-ray disc player, which may be presented on projection screens or flat panel displays throughout the classroom. Dual monitors for instructor’s computer; second monitor may also display any computer at student tables.
- Connections (VGA, DVI, and audio) at instructor’s station to support portable notebook computer.
- Digital video switching and distribution, HDCP compliant.

Audio Systems: - Wireless microphone for instructor, clip-on or headset.
- Wired microphones throughout the space for coverage of students at the tables and when presenting at marker boards.
- Ceiling or under-table loudspeakers for program sound reproduction and speech reinforcement. Loudspeakers zoned to permit amplification of student speech from one end of the room to the other.
- Permanently installed wireless assistive listening system for hearing-impaired listeners.

Control Systems: - All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.
- Touch screen control panel at instructor’s station. Full operating controls for all A/V equipment.

- Pushbutton control panel at every work area (marker board and student computer), permitting student work at that board or computer to be shared throughout the room.

- Instructor call pushbuttons at each table, one for each group of three students.

- Support for personal response system by portable devices used with portable notebook computer; no installed personal response system.
Stepped floor lecture room with student seating at fixed tables, and fixed instructor’s station. Seating capacity between 80 & 150 seats.

Distinguishing characteristics:
- Three projection systems (dual left/right and single centered)
- Alternately, two projection systems (center and side)
- Optional video conferencing

Support Spaces:
- Equipment Closet at front wall behind instructor, to house switchers, amplifiers, and other electronic equipment not requiring access by instructor.
- Media playback equipment installed within instructor’s station.

Fixed Furnishings:
- Continuous student tables with power. Students may turn around to work collaboratively with students in row behind.
- Instructor’s station for standing or seated use, ADA accessible, with equipment required for instructor presentation, communication, and control.

Lighting Requirements:
- Preset lighting control system, dimmed system to allow for darkened projection screens but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights. Additional low voltage control from A/V system.

Telecommunications Requirements:
- Wired Ethernet connections at instructor’s station, for computers, network media devices, audio-visual control, and utility use. Access to University networks and to the public internet.
- Wired Ethernet connections at Equipment Closet, for network media devices and audio-visual control. Access to University networks.
- Wireless Ethernet access for students.

Other Requirements:
- Room acoustics (background noise, reverberation time) as required to provide suitable speech intelligibility.
- Electrically operated blackout shades and room darkening shades at any exterior windows, with low voltage control from A/V system.

Audio-Visual
Requirements:

Writing Surfaces:
- Grey or off-white dry marker surface at front wall, full width of front wall. Column-mounted boards if needed to achieve satisfactory board space.

Video Systems:
- Three electrically operated ceiling mounted front projection screens at front wall in front of writing boards, two side-by-side screens for dual images plus third screen for single centered image. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10.

  - Alternately Two electrically operated ceiling mounted front projection screens at front of room in front of writing boards. One screen on room centerline, the second screen at side opposite instructor's station.

  - Two or three video/data projectors, fixed in position below ceiling or at rear wall. WUXGA (1920x1200) resolution, high brightness projectors.

  - Connections (two each of VGA, DVI, and audio) at instructor’s station to support one or two portable notebook computers.

  - Blu-ray disc player and high resolution document camera at instructor’s station. Additional connections (composite video, Y/Pb/Pr component video, and audio) to support a portable media player. Further additional connection to support audio-only MP3 player.

  - High definition video camera on pan/tilt mount at rear wall, allows image magnification of instructor, also supports lecture capture.

  - Touch screen control panel may serve as confidence monitor, allowing instructor to see projected images without having to turn around and look at the projection screen.

  - Video switching to permit any image source to be displayed upon any or all projectors. Digital switching and distribution, HDCP compliant.

  - Closed caption decoding for video playback sources, may be defeated if not required.

Audio Systems:
- Gooseneck microphone at instructor’s station and two lavalier wireless microphones. Automatic microphone mixing equipment for unattended instructional use.
- Ceiling loudspeakers for speech reinforcement of instructor.
- Two-channel (stereo or dual mono) program audio playback employing loudspeakers at front wall.
- Permanently installed wireless assistive listening system for hearing-impaired listeners.

Content Distribution Systems:
- Lecture capture system to University standards, captures presentation content (single channel) plus instructor’s speech and image.

Control Systems:
- All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.
- Touch screen control panel at instructor’s station. Panel for control of all audio-visual equipment as well as lighting and window shades.
- Installed personal response system.
- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.

Optional Distance Education Systems:
- One or more high definition video cameras on pan/tilt mounts at front wall, capture images of students. Lecture capture camera captures images of instructor. Automated preset camera positioning for routine operation, positioning also by instructor.
- Microphones fixed at student tables, one microphone for each pair of adjacent students. Microphones may be voice activated or push-to-talk, as selected by the instructor. Microphones also provide amplification between students at opposite sides of the room.
- High definition video codec for compressed digital transmission to far end locations. Dual channel codec, supports separate camera and content channels. Far end image displayed on side projection screen.
- Large flat panel video display built into face of front row student table, for display of far end students or instructor to local instructor.
- Support staff establishes communications links to far end sites, but otherwise all operation is by the instructor. Nothing requires the assistance of a technician.
- High level lighting, 75 foot-candles horizontal and vertical, for use during distance education activities. To illuminate participants but not projection screens. Distance education
fixtures separately controlled, and may be dimmed or extinguished when not required.
Flat floor flexible classroom with student seating at loose tablet arm chairs. Seating capacity up to 80 seats.

Also covers seminar and discussions spaces; smaller spaces may warrant the user of a flat panel monitor in place of a projection system.

Distinguishing characteristics:
- Single projector or flat panel for small to moderately-sized groups

Support Spaces: - Equipment cabinet at wall or in ceiling to house electronic equipment not requiring access by instructor.

Movable Furnishings: - Tablet arm chairs for students.
- Loose instructor’s table.

Lighting Requirements: - Multi-level lighting to allow for darkened projection screen but sufficient illumination for note-taking and discussion.
- Wall mounted operating controls for lights.

Telecommunications Requirements: - Wired Ethernet connections at wall or in floor, for computers. Access to University networks and to the public internet.
- Wired Ethernet connections at equipment cabinet for audio-visual control. Access to University networks.
- Wireless Ethernet access for students.

Other Requirements: - Room darkening shades at any exterior windows.

Audio-Visual
Requirements: Writing Surfaces:  - Grey or off-white dry marker surface at front and side walls, full width of walls.

Video Systems:  - Single electrically operated ceiling mounted front projection screen at front wall in front of writing boards. Screen height equal to maximum viewing distance divided by 6; image aspect ratio 16:10.

- Video/data projector, fixed in position below ceiling or at rear wall. WUXGA (1920x1200) resolution, high brightness projectors.

- Alternately Flat panel monitor at wall for display of video and computer images. Monitor height equal to maximum viewing distance divided by 6.

- Connections (one each of VGA, DVI, computer audio, composite video, Y/Pb/Pr component video, and playback audio) at wall or in floor beneath table to support portable notebook computer and media playback equipment.

- Digital video signal switching and distribution, HDCP compliant.

- Closed caption decoding for video playback sources, may be defeated if not required.

Audio Systems:  - Ceiling loudspeakers for monaural program audio playback.

- Alternately Two channel (stereo) program audio playback employing loudspeakers at flat panel monitor.

Content Distribution Systems:  - Lecture capture system to University standards, limited system, captures presentation content plus instructor’s speech.

Control Systems:  - All routine activities in the space are performed by the instructor. Nothing requires the assistance of a technician.

- Pushbutton control panel at wall. Panel for control of audio-visual equipment only.

- Support for personal response system by portable devices used with portable notebook computer; no installed personal response system.

- Projector supervision through web browser, permitting control and monitoring from remotely located help desk. Capabilities to include tracking of projector lamp life, scheduled end-of-day system shutdown, and email notification of projector faults.