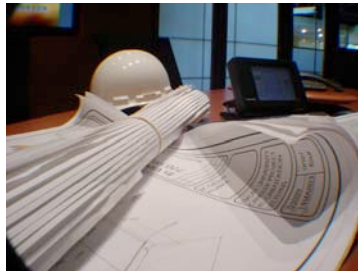


Emory College Classroom Design Guide



October, 2010

Acknowledgments

The College Classroom Working Group at Emory University, along with members of the campus community, dedicated many hours over to create and publish this design guide.

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I. Introduction

We present this design guide as the distillation of what Emory College has learned the past few years about the design, construction, renovation, and maintenance of instructional spaces. It compiles the knowledge and experience of those responsible for day to day campus operations as well as those who plan for the future. We consulted vendors and experts in the various components that make up teaching spaces. Research on the latest trends in teaching in higher education was reviewed as well as design guides from other colleges and universities. More important, it reflects our careful listening to the faculty and students who live and learn in the environments for which we are responsible. We expect this document to continue to be refined as we learn more, grow in experience, and receive more input from those who use the spaces.

The planning and writing of this design guide was carried out by representatives from the Emory College Facilities and IT Group and the UTS Classroom Technologies Group. At the time of this printing – the group is responsible for over 200 classrooms in 23 different buildings across campus. Collectively referred to as the Classroom Working Group we meet weekly to:

- Set priorities on classroom renovations and features required for new rooms
- Review classroom utilization and look for the right mix of room sizes and features
- Plan and budget for improvements
- Coordinate with Campus Services, vendors, contractors, the Registrar, Office of Disability Services, Meeting Services, University Conferences, and others
- Project manage classroom renovations and new classroom construction
- Design and conduct classroom user surveys
- Update and expand classroom information databases
- Develop classroom user policies
- Perform ongoing facility assessments
- Plan, develop, and conduct user training and user guides

A note on the Americans with Disabilities Act

Emory University adheres to the Americans with Disabilities Act (ADA) for its construction and renovation projects. The Classroom Group works closely with Emory's Facilities Management and the Office of Disability Services to recommend accessibility design and upgrades to all instruction spaces.

II. Infrastructure

1. Locations

Whenever possible, locate classrooms on an entrance level. If this is not possible, the width of stairs, depth of stair landings, and width of doors leading to stairwells must also be considered to give students enough room to transition from one space to another. Classroom locations must be accessible as per the Americans with Disabilities Act.

Classrooms should be separated from noise generating areas such as mechanical rooms, elevators, vending, and restrooms.

2. Hallways/Corridors

Hallways should be designed as an essential, thoughtful aspect of the building. Although the corridors are used to move students throughout the building and generally can be noisy, major consideration in planning and design of these spaces is integral to a successful project. Building codes are not the only criteria to consider. This section will discuss other components of the hallways which are equally as important as the classroom design.

Lower portions of the hallway walls should be finished with a durable surface. Floors should provide non-skid surface and should include some type of design, pattern into the hallway. Hallways should improve acoustics and create visual interest. If doors must open out into hallway a special design should be inset into the floor to inform users of potential door opening.



3. Rest Rooms/Drinking Fountains

Restrooms should be located near the classrooms for convenience. Under no circumstances should there be a common wall or ceiling between any classroom and restroom. Drinking fountains should be located on each floor and should comply with ADA guidelines


4. Signage – Wayfinding/Room signage

Building signage should be designed such that the user is directed to classrooms from the major entrances and circulation areas of the building, including elevator lobbies and stairwell landings. All signage should employ easily changeable paper inserts.

Classroom Number Signs: Room number signs should include a display bar to post announcements. They should not require tape or thumbtacks. Instruction on the mounting location and height of room signs should be taken from ADA guidelines.

Classroom Photo/Information Sheets: Room data sheets should be posted inside the classroom, preferably near the instructor station or near the room entrance. Sheets include a photo of the room set-up to help guide the Building Services staff in setting the room configuration correctly at the start of each day. Other information listed on the sign includes: type and quantity of furniture, room configuration, audio visual equipment, and phone numbers with contacts for reporting problems with the facility or requesting assistance with the audio visual equipment. Below is an example of this sign:

PAIS 290



- **Auditorium with 108 fixed seats and tablets**
- **Dual screens with interactive capability**

To report problems with this classroom call FMD Customer Service 7-7463

For assistance with the presentation equipment in this classroom call Classroom Technologies 7-6853

5. Computer Kiosks

Computer kiosks should be placed in any building where there are multiple classrooms. Kiosks allow students to quickly check email between classes without having to carry a laptop. The kiosks should allow for comfortable standing as well as an option for seated height for ADA. Power and data should be located directly under the counter with grommets drilled through counter top. There should be lighting above the counters. Pendant lighting or can lights

desirable. The wall behind the computers can be fitted with cork to allow use as bulletin board for postings. The design of the kiosks should take the entire surroundings into consideration. Sleek and creative, rather than large bulky design is desired.



6. Bulletin Boards

Display boards should be installed near a large grouping of classrooms. Each classroom does not require its own board. Thoughtful design should be developed for the boards and should incorporate the wood or paint color of the adjacent area.

- It is desirable to position these near computer email/kiosk stations.
- Large display boards are not desired in other areas because they attract notices of events and advertisements that detract from room and building appearance.

7. Vending

Even with the advent of cafes throughout campus, it is still necessary to install small vending spaces in each classroom building. The spaces should be accessible and visible. One beverage and one snack machine is usually appropriate for each vending area. **When possible, place vending machines on a “Vending Miser” occupancy sensor to decrease lighting costs during low occupancy times.**



Vending rooms should also provide a small microwave and sink. Select appropriate smaller scale furniture, which is easily cleaned for use for lunch seating. Space should not be designed for privacy. A casual and comfortable environment is desirable. A campus phone nearby may be appropriate, as well as a small bulletin board.

8. Informal Interaction Spaces

Hallways and corridors should be designed to provide thoughtful common spaces for social interaction. These spaces should be considered as networking and social areas, not just passageways. Small alcove spaces are well suited for conversations between two to four people. Larger spaces provide for interaction between groups of six or more. Along with comfortable seating it is important to provide the following attributes:

- White boarding areas
- Robust network for wireless service or data drop
- Power located for convenient access
- Proper lighting for reading and use of computers

- Privacy should be designed into some areas, while others should be designed for social interaction, offering a place for individuals to “be seen”.
- Provide soft seating, table (end or coffee tables), rugs, lamps and plants to make it a specific space, rather than an afterthought. Value the space.



9. Extended Learning Spaces

Extended Learning Spaces serve to expand the available square footage for active learning in both new building construction and renovations. Through creative use of hallways niches, lobby space and areas near building columns/support – space should be assigned for collaborative project-based work and group learning. Spaces like there are increasing in numbers across campus, and are in high demand by students. Successful prototypes include the collaborative work areas in Cox Computing Center, PAIS 2nd floor lobby, ECIT Teaching Theater, Neuroscience and Behavioral Biology reception space and the Atwood (Chemistry Bldg.) lobby.



Cox Computing Plasma Pole



Emory Center for Interactive Teaching (ECIT)



NBB Reception Space

Space Attributes:

- Inviting color and differences in floor coverings can be used to define the areas
- Moveable furniture typically includes 4 to 5 comfortable soft-seating chairs with tablet arm.
- A small table (on wheels) to hold a laptop with paperwork, or a wireless keyboard and mouse
- A wall or pole mounted plasma (or LCD display) offers real estate for display of project-based work or for group learning before and after class
- Interactive overlay on display allows for annotation and touch control

- Flexible chairs and tables are on wheels, so students and faculty can move the furniture to best facilitate their activity.
- Conduit for data, power
- Mounting of display can be blocking for wall mounted display (or) poles that run floor to ceiling. Examples of both are shown in the picture illustrations.
- Dedicated computer with SMART software to drive board compatibility

The visibility and high traffic in collaborative spaces make these spaces popular with building occupants, and an important element in new construction or renovation programming.

III. The Shell

Classrooms should be developed from the “inside out”. The conventional method of designing the room first then filling it- usually leads to an inefficient layout, poor sightlines and reduced seating capacity. The following items should be considered when creating a new classroom:

- Determine the number and size of screens required based on the seating capacity, type of room, display needs, and teaching style.
- Determine the general location, size and orientation of screens, whiteboards, and seating space.
- Ensure the instructor area meets the minimum dimensions required.
- Draw viewing angles from each screen and ensure that all student seating falls within the viewing area.
- Determine the width and depth base on the proposed seating space guidelines
- Determine the location and size of aisles
- THEN decide where the walls should be located.

1. Lighting/Electrical

Zoning and controls

Proper lighting is an important, albeit complicated, element of any teaching space. Lighting needs are dependent on factors such as room size and shape, whiteboard size, AV configuration, ceiling height, and windows.

The following are general guidelines for lighting specifications:

- Either hard switches or a Lutron dimming panel should be located near the entrance of the room and near the instructors podium. If the room is not equipped with Crestron lighting controls interface, another panel of switches or Lutron dimming panel should be located near the instructors lectern.
- Lutron dimming and control systems are preferred due to ease of interface with Crestron audio visual control systems.
- Hard switches for dimmable lights should have sliders to control dimming
- Dimmable fluorescent lights should be equipped with a quiet 1% dimming ballast

Lighting zones

As a rule, all classroom spaces will have lighting organized into a number of zones. These zones can be combined and switched to create a number of different lighting scenarios.

Please note that the requirements for lighting zones have changed since the last published copy of the *Guidelines*. In the past we have recommended special lights be used to minimize bleed into the projection area. Due to improvements in projector brightness, it has been determined by the Classroom Working Group that these are no longer necessary in most spaces. As a result, the zone definitions have changed.

In each of these zones, 2' X 4' or 2' X 2' parabolic fixtures with three fluorescent lamps are preferred. These should be equipped with 1% dimming ballasts and dimming controls. In spaces where cost concerns prohibit dimming, parabolic fixtures should be wired for inboard/outboard switching. Use of 2' x 4' fixtures should be oriented parallel to the teaching wall where the instructor typically stands.

There are four possible lighting zones in most classrooms:

Zone 1 – Main classroom lighting (student seating area)

Zone 2 – White board

Zone 3 – Projection area

Zone 4 – Instructor Workstation

- Zone 1 – Main Classroom Area: This zone services students and allows them to read and take notes in class.
- Zone 2 – White Board: The first row of lights over the main white board area of the room should be switched separately from the rest of the room. These lights should be far enough away from the surface to avoid having the light trapped above the board (this sometimes occurs in the case of sliding boards). It should be close enough to allow for proper illumination of the board. Proper illumination is defined as an average of 40 lumens across the surface of the board with no area dipping below 20 lumens.
- Zone 3 – Projection area: While light bleed isn't the problem it once was, it is still important that light not shine directly on a screen during projection. Because of this, we recommend that lights which shine directly on the screen be switched separately. They can be turned off during presentations, but turned on when maximum whiteboarding are needs to be illuminated
- Zone 4 – Instructor Workstation: The light direction above the instructor workstation should be switched separately whenever possible to allow the instructor to see their materials while conducting a class with the rest of the lights off for projection.

Emergency Lights

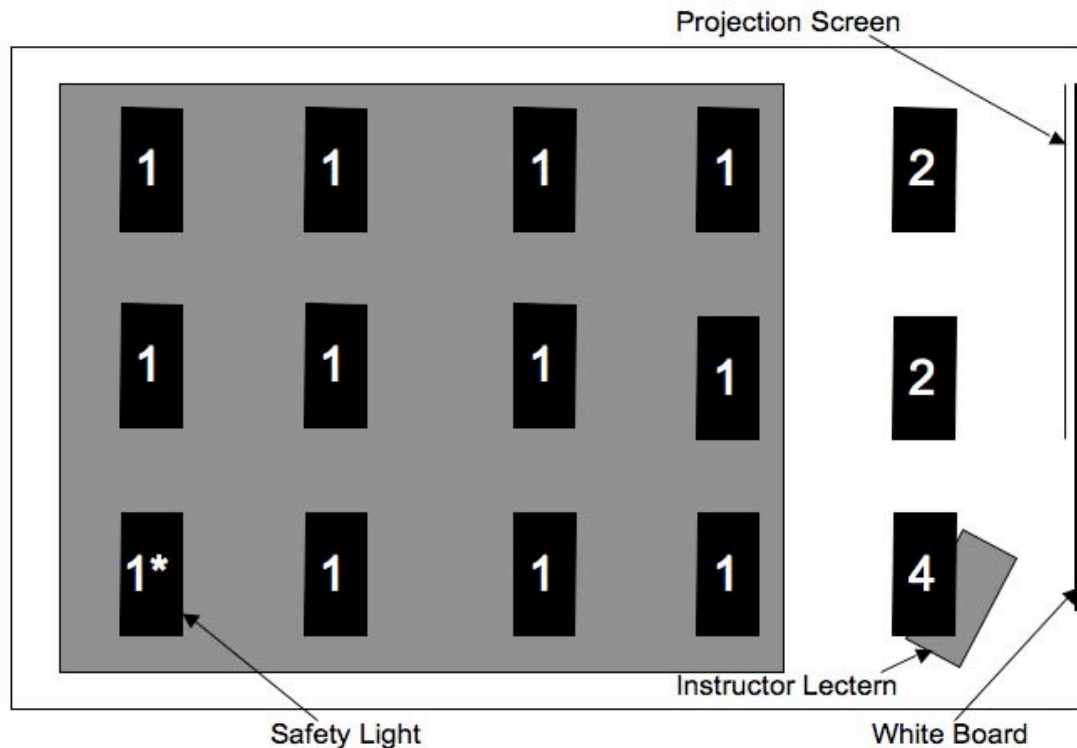
Due to fire and safety codes, many classrooms must have an emergency light that stays on at all times, even when the lights are shut off. Because this can cause interference with the clarity of the projected image on screen, every effort must be made to isolate light radiation to the back of the room away from the projection screen. In order to further reduce glare, plastic sleeves are manufactured that can be installed over the fluorescent bulbs to dim, but not extinguish, the output from emergency lights.



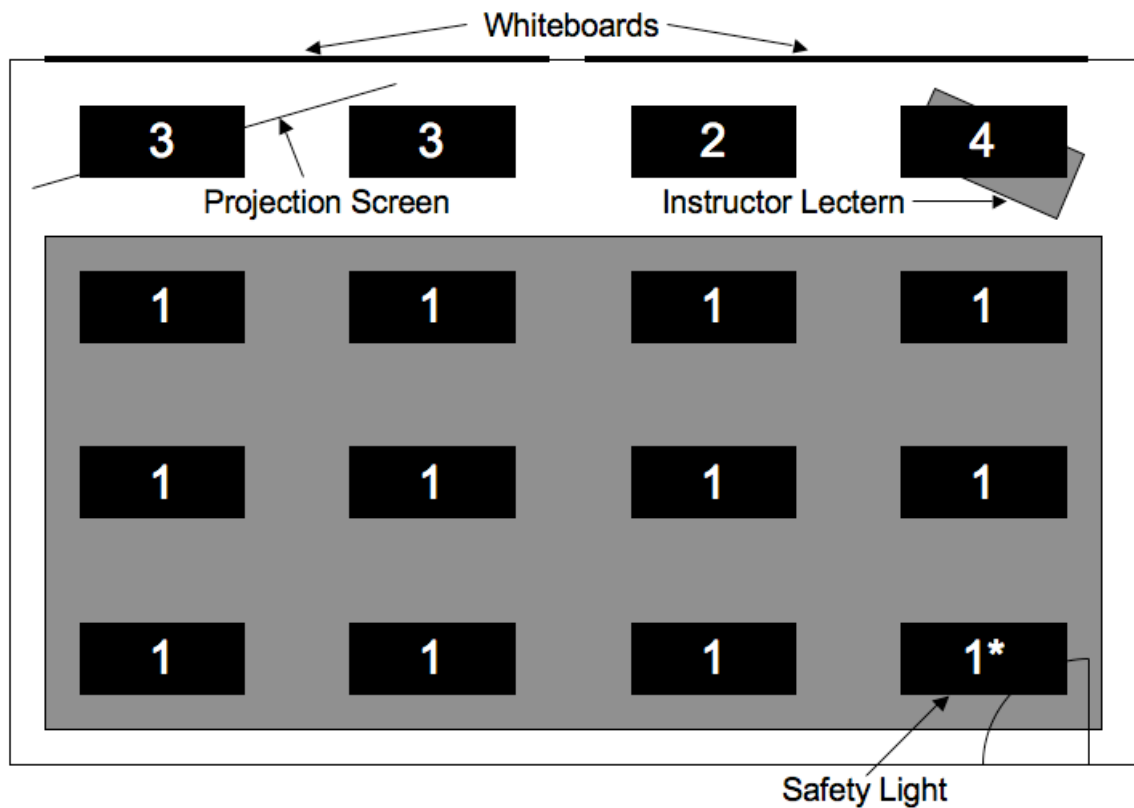
Motion Sensors

Motion sensors shut off the lights in a space after a specified period of inactivity. This helps assure that the lights are off when the space is not in use to reduce electrical consumption. When installing motion sensors in classrooms, be sure to set the timer to maximum to avoid accidental light shutdown during relatively low-motion activities like testing.

Sample 20 seat classroom lighting diagram (no Zone 3 lighting)



Sample 40-seat Classroom lighting diagram



2. HVAC

Indoor air conditions:

The HVAC system shall be designed to maintain a temperature range of 70 to 72 degrees Fahrenheit year-round.

The humidity shall range from 40% to 65% relative humidity throughout the year. Typically humidity is not actively controlled for our classrooms. The indoor humidity fluctuates with the outdoor humidity. We do not employ humidifiers or control logic to actively control humidity. The Designer should consult with the User Group to determine if there are specific project requirements that would require a tighter relative humidity range.

Outdoor air conditions:

The summer outdoor air conditions used to determine the cooling load should be 94 degrees F dry bulb/ 74 degrees F wet bulb (ASHRAE 93).

The winter outdoor air conditions used to determine the heating load shall be 17 degrees F dry bulb (ASHRAE 93).

Balancing dampers:

Provide balancing dampers in the supply ductwork to serve all diffusers. The dampers shall be located a minimum of 2.5 diameters upstream of the diffuser.

Diffuser location:

Pay specific attention to the location of the diffusers in the classroom layout. Do not locate diffusers near projection screen or whiteboard; this is to avoid conflicts with the mounting of the audio/visual equipment in the ceiling. Care should be taken to avoid drafts on projection screens. This can cause the screens to move in the breeze while in use.

Location of above-ceiling mechanical equipment:

Locate above-ceiling mechanical equipment needing routine service in a location outside the classroom. This allows service without disrupting the class. We do understand however that conditions frequently dictate that the equipment be located in the classroom because no other space is available. It is very important that the above-ceiling equipment have adequate access available to service the unit. Therefore do not sacrifice access space just to get the equipment out of the classroom.

Noise:

Disruptive noise is the single most prevalent complaint that we receive about the classroom. Careful attention must be paid to acoustics in the design of the classroom. Noise related to the HVAC system is transmitted to the classroom in three ways:

- Noise can be transmitted from areas adjacent to the classroom. This noise can travel through doors, lighting fixtures, return air paths, plenum spaces and return ductwork.
- Noise can be transmitted from the classroom diffusers. This noise can be air noise and radiated noise from the HVAC equipment.
- Noise can be transmitted from adjacent HVAC equipment. This is frequently caused by the location of mechanical rooms, location of fan-powered terminal units and location of ductwork mains.

The NC ratings for general classrooms shall be NC 30 or less. Large lecture halls shall have a rating of NC 25 or less. Individual equipment such as fans, ductwork and diffusers shall have rating not exceeding NC 25 throughout the load range.

Noise from adjacent areas should be mitigated as follows: doorways should have sealing hardware if appropriate to achieve noise levels, lighting openings shall take into account noise transmission, return air paths shall incorporate noise traps, wall shall extend to the structure and openings including piping, ductwork and electrical penetrations shall be sealed with electrometric caulking.

Noise from diffusers and ductwork should be mitigated by careful selection of diffusers to limit noise ratings. Ductwork should be designed to limit air velocities to limit noise ratings. Ductwork geometry should be designed to limit noise rating from adjacent connected equipment.

Noise from adjacent HVAC equipment should be mitigated by layout design and by attention to construction details. Mechanical rooms should not be located so as to share a wall or floor structure with a classroom. Main ductwork runs should be located so that duct chases are not located near a classroom and ductwork mains

avoid classrooms as much as possible. This should be coordinated between Mechanical Engineer and Architect during the initial floor plan layout. If HVAC equipment and ductwork unavoidably has to be located near classroom, the Designer shall provide specific construction details to limit noise transmission. These should include ductwork stiffening, special duct hangers, separation of wall structures from support materials, etc.



Zoning

When designing buildings, classrooms should be placed on the same air handler unit and separate from laboratory and other HVAC-intensive spaces. Large auditoriums should also have their own air handlers. Placing classrooms on the same air handler unit will allow the HVAC to these areas to be shut down at nights to save energy.

3. Networking and Cable Television

Each room will be equipped with three active network drops and an active cable TV connection, grouped together at the instructor AV lectern location. One inactive network drops and an inactive telephone line are required at the front of each classroom as well.

AV Lectern Active Data: The three active drops should be grouped together near the instructor lectern in a location easily reached by the podium whip, preferable in the same 4-gang box. The wall box should be located so that data cables run from the wall to the lectern do not create a tripping hazard for the instructor. One data drop will be for the on-board computer, one will be for laptop access, and one will be for Crestron Roomview Monitoring.

Room Front Inactive Data and Phone: The inactive data drop and the inactive telephone line should be installed as close to the front/center of the classroom as possible. They should be grouped in the same gang box if possible and located near a power outlet. These drops are installed in the event that it is necessary to activate for a special needs accommodation.

Wireless: Wireless coverage in College classroom buildings should be robust enough to allow users the option to use the Emory Unplugged wireless system

Emory Cable Television: Each room will also have an active Emory Cable Television connection located as close to the network drop box as possible and ideally no further than 10 inches away.

Network Communications has a Building Standards document available to anyone via their website. This document has in detail the required specifications for cable and fiber infrastructure to and within Emory buildings. Emory Cable TV system is an 862MHz fiber/coax hybrid system. All infrastructure specifications for buildings and building distribution should be obtained from the Network Communications Building Standards document, specifically section 27100 - Cable Plant, located on the NetComm website under the "Site Index" link, document name is Building Standards".

<http://www.fm.emory.edu/design.shtml>

4. Doors/Room Security

Door Hardware

All classroom doors should be outfitted as follows:

- Classroom function lockset with a mortise lock (either Best or Schlage)
- Levers as opposed to knobs
- We do not recommend door closures on classroom doors. This will allow the door to remain open on its own for easy access into and out of classroom
- Concave wall bumpers at lever height for wall protection
- Door silencers to muffle the noise of the door closing

Card access control systems may be installed on “special use” rooms or some computer labs. These doors will need the following:

- Storeroom function lockset
- Door closure
- Electric strike (to allow key over ride when needed)
- Door contacts
- Proximity card access system
- The card reader should be located on the wall adjacent to the door lever at ADA height.
- If an ADA accessible door is required, install the following:
 - Electric system
 - Door closure
 - Push buttons on inside and outside of classroom

Doors

Doors should be located at the back of the classroom so that students entering and exiting the space will not disrupt instruction. Exceptions to this rule would be large tiered classrooms and auditoriums that require multiple doors located at the front and rear of the space. The doors themselves should adhere to the following parameters:

- Minimum of three feet wide
- Door opening force, hardware, width, thresholds and maneuvering clearance should confirm to ADA standards.
- It is acceptable to locate a door closer to the instructor area if required to meet fire code door separation criteria.
- Should have a small glass window panel or glass sidelights to allow viewing into and out of the room. The base of the vision panel should be no higher than 42 inches above the floor, and the top of the vision panel should extend at least 62 inches above the floor.
- Sidelights that are full height or begin about three feet above floor level are preferred. When sidelights are installed, there are occasions where hallway lighting can bleed into the classroom, interfering with audio/visual presentation. Be certain to take measures to prevent this when designing hallway lighting.

- Existing classrooms with only one door near the front of the room shall be modified during renovation to move the door, move the instruction area or add a second door.



- When possible, doors should be recessed into the room so that the door does not swing into the hallway. If it is necessary for the door to open into the hallway, some kind of visual identification (such as the tile pattern in floor) can be used to indicate the amount of space the door will occupy when it swings open.

5. Windows

Windows should be installed in every classroom. It is recommended that they should be on the side or rear wall. In larger rooms as well as sloped or tiered rooms, it is desirable to install motorized shades and blinds. Be certain to design sufficient depth in the window and wall to allow for motorized installations.



Tinted, “Low-E” rated glass is preferred for all windows.

Window coverings can be manual if they are easily accessible and minimal in quantity. If windows are too high to reach and/or are too numerous, then the window treatments should be motorized and capable of being controlled by the AV touch panel. Motorized shades are recommended. Use of light diffusing shades on a roller is recommended. Window treatments should have a non-reflective matt finish.

6. Flooring

A multi-colored or patterned carpet should be used in classrooms- no solid color should be installed. Carpet tiles can be considered where appropriate. Four to six inch cove base should also be installed. If carpet cannot be installed under seats in fixed classrooms due to maintenance, then the concrete floors should be free of cracks and defects and should be sealed. Carpet should have a high recycled content and should be manufactured within a 500 mile radius of campus.



7. Walls, Ceilings and Chair Rails

Walls

- Walls should extend to structure above ceiling to provide sound isolation
- Folding or moveable walls should be avoided

- Walls in lecture halls should not be parallel and should have a rough or textured surface. The rear wall should have an acoustically absorbent finish.

Ceilings

- Ceilings in small classrooms (with less than 50 students) may be entirely acoustical ceiling.
- Minimum ceiling height for classrooms is 10 feet. In large, sloped or tiered classrooms, the ceiling height is directly related to the distance to the last row of seats.
- The surface of the ceiling must be designed to accommodate the required acoustical properties of the room. The ceiling should include significant amounts of hard surface material coupled with acoustical tile.
- The area of the ceiling that should be covered with acoustical tile is directly related to the ceiling height. Ceilings above 10 feet should have 50-60% acoustical ceiling tile.
- The ceiling should act as a sound mirror, reflecting sound downward to blend with direct sound.
- Ceilings in small lecture halls should be at least 15 feet high at the front of the room and 9 feet high at the rear. Larger lecture halls should be at least 20 feet in front and 10 feet at the rear. An angled ceiling at the front can deliver better sound to the rear.

Chair rails

- Rails should match the architectural design of the room.
- Chair Rail material should be wide enough to work with tables and chairs of varying height and mounted at a height that will prevent damage to wall surfaces: typically a minimum of 6 inches, with the bottom edge approximately 25 inches above the finished floor.
- In rooms with movable furniture, chair rails must be installed on the side and rear walls.
- Recommended product – InPro Corporation Grad .06 thick applied with #53 InPro Bond Adhesive.



8. Colors/ Finishes

Walls should be painted in a light color in an eggshell finish. A darker contrasting shade of color is acceptable on the front teaching wall. Spaces where distance learning takes place should be light blue or grey in color. No vinyl wall covering should be used. Paint colors should be compatible with successful color schemes used through the same building.



No-VOC paints should always be used in an effort to improve indoor air quality.

Colors for furnishings and audio-visual components shall be coordinated with finish colors used in the same building.

9. Reflectance Values

The Engineering Society of North America recommends the following reflectance values for finish materials. Be sure to coordinate floor and paint finishes to achieve reflectance values without increasing lighting.

- Ceilings - 80% or higher
- Walls between 50% and 70%
- Floors between 20% and 40%
- Desktops between 24% and 45%

10. Acoustics

The front wall may reflect sound to the rear of the room. If a reverberation problem occurs, apply a small amount of acoustical material to the walls in the rear of the room to deaden the problem. Walls in the classroom should have a minimum sound transmission class (STC) of 50. The rear wall of any large classroom (over 75) should have an acoustically absorbent finish. Side walls in large lecture halls should not be parallel and they should have a rough or textured surface. Noise levels should not exceed NC 25-30.

11. Closets

There is often a need for a small storage room for classroom supplies separate from audiovisual storage. Room should be 80 square feet to store board supplies, movable lecterns and additional chairs. This space requires lighting, a lockable door, conditioned air, power and a few shelving units for small supplies and no window. It should be equipped with a storeroom function lock. Closets should not be installed inside a classroom.

IV. Room Sizes by Type

All teaching spaces need to be large enough to comfortably accommodate the number of students planned, type of teaching, use of audiovisual equipment and furniture. The following are standards which should be used in the Programming phase of a project. The following space guidelines should be used to estimate the total usable floor space of classrooms.

Square Feet per Student*	Maximum Capacity	Room Type	Furnishings
29 to 35	20	Seminar	Movable Tables and Chairs
28 to 32	12-18	Conference	One Large Table and Chairs
24 to 28	45	Classroom	Tablet Arm Chairs
30 to 39	45	Classroom	Movable Tables and Chairs
24 to 27	45	Classroom	Fixed Table and Moveable Chairs
20 to 22	200	Auditorium	Auditorium Seats with Tablet Arm
28 to 30	200	Auditorium	Fixed Table with Movable Chairs

* Instructor space included in “Square Feet per Student”

- The shape of the room, size and types of furnishings proposed, and other special design features may increase or decrease the amount of space required per student.
- Room proportions have an impact on the seating capacity, sight lines and ability for student and instructor to interact with one another.
- Avoid spaces which are too wide. They make it difficult for instructor to make eye contact. Wide spaces also have poor sightlines -- especially in front rows. Wider spaces dedicate too much space to the instructor.
- Avoid spaces that are too deep. Deep spaces make it challenging for students in the last rows to communicate, hear and see the front of the room. Also, instructor space may be too narrow for screens and boards.
- Avoid creating seminar & conference rooms with long narrow tables that make it difficult for everyone to see each other. Long rooms typically make it difficult to see the projection screen and writing on boards. Rooms which are almost square or have a shape based on viewing angles are best.
- Non-traditional layouts and extra presentation screens will require more square footage per student.

V. Room Definitions

Different pedagogical techniques require different types of learning spaces. We have defined six basic classroom types that are prevalent on campus. The bulk of current spaces fit in the “classroom” or “seminar” categories. Although we have created these definitions to be as mutually exclusive as possible, there is some overlap. A seminar may, for example, be taught in a classroom space with the chairs moved into a circle. These definitions designate the most efficient use of a space, but do not necessarily tell us what a space is being used for at a given point in time.

1. Loose Seating:

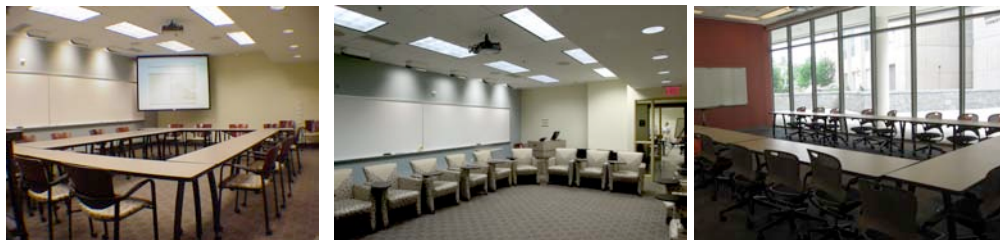
These are our most common learning spaces. Because they have movable furniture, these spaces are very flexible. Furniture can be configured for lecture, seminar, group work, or anything else the instructor might require. Spaces often require more daily maintenance attention, as instructors do not always return furniture to its original location at the end of class. These rooms can be generally described as having:



- 20 to 50 seats
- Flat floors (not tiered or sloped)
- Tablet arm chairs or movable tables and chairs in rows
- 9 feet from the front of the room to the first row of seats
- 10 square feet for an instructor station.

2. Seminar:

Seminar rooms generally accommodate smaller numbers of students seated in either a circular or rectangular format. Characteristics of these spaces include:



- 8 to 25 seats
- Face-to-face seating arrangement
- Instructor sometimes sits with students
- Movable tables and chairs on casters

3. Conference:

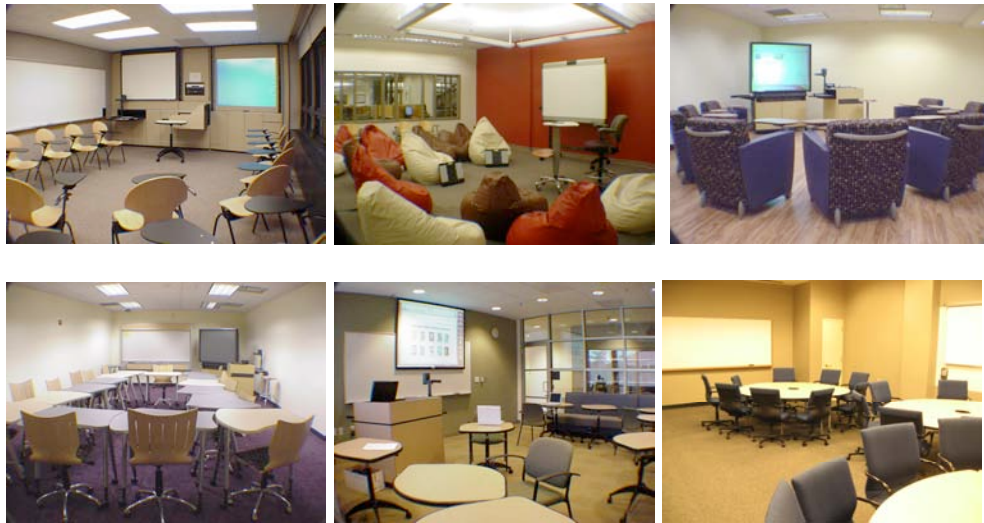
Conference rooms sometimes serve as seminar rooms, particularly at the level of academic departments. However, they are often more formal than seminar rooms, and have the following characteristics:



- 8 to 25 seats
- One large conference table or several tables configured together into one large seating area
- Chairs on casters
- Instructor sits at table with students
- Normally need to account for the peripherals in the room: bookcases, displays, credenza tables for food when designing space.
- Space used as teaching and meeting space

4. Collaborative:

Collaborative space designs are catching on. They are characterized by having:



- 8 to 25 seats
- Require more space per person
- May have a SMART board, which requires floor space
- Expanded instructor space to use interactive display
- Seating may be larger than standard specifications and should be easily reconfigured.
- Comfortable and movable chairs and tables

Collaborative learning spaces offer unique opportunities to experiment with seating and with new audio visual technologies. These classrooms often follow the design of incubator model spaces located in the UTS Centers and developed and maintained by the Academic Technologies Group in UTS. Contact the Classroom Technologies Team for more information on these spaces.

5. Fixed Seating:

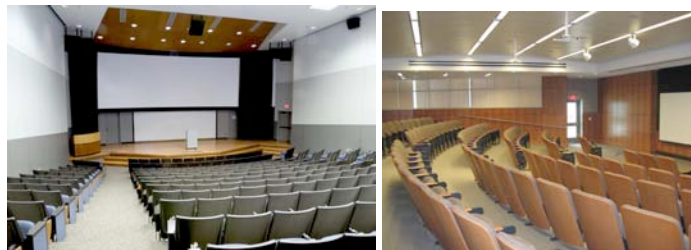
Fixed seating classrooms have a well-defined “front” or main lecture area in the center or front of the room. Students tend to be more distant from the instructor due to the increased room size. Rooms are usually tiered or sloped to insure proper sightlines for both students and instructors.



- 40 or more seats
- Normally a sloped or tiered space
- Fixed table and seats or fixed table and moveable chairs or fixed tablet chairs
- Row and aisle dimensions are extremely important

6. Auditorium:

The Auditorium is a space for large classes, meetings, presentations, and performances. Auditorium facilities may include assembly halls, exhibit halls, auditoriums, and theaters. As such, they tend to have wide spans and are multiple-story high in order to accommodate seating, sightline, and acoustical requirements. Raised stage floors and special lighting equipment are often required as well. Design features and characteristics that differentiate Auditorium space types from other gathering spaces include:



- 100 or more seats
- Sloped or tiered space
- Fixed seating usually with tablet arm or fixed seating with fixed tables
- Increased distance between faculty and students
- Special acoustic design including wall treatments or coverings

- Because of large size - automated room controls include lighting, shades, drapes and AV equipment
- Sound reinforcement for lecturers
- Seat dimensions and row/aisle dimensions are extremely important

VI. Furniture and Equipment

1. Student Chairs

Student seats should comfortably accommodate the tallest and smallest persons. They should provide good ergonomics and have backs that allow for articulating movement.

Recommended Seat Spacing

- 1) Moveable tables and chairs
 - Moveable seats placed a minimum of 28” on center
 - Tables should be 36 inches apart to allow access between rows
- 2) Continuous work surfaces with moveable chairs:
 - 36” apart for rows with up to 20 seats
 - 38” apart for rows with 21-24 seats
- 3) Large auditoriums with tablet arm seats
 - Seats spaced a minimum of 24” on center
 - Seat cushions should be a minimum of 19”
 - Minimum 21” clearance between tablet arm supports
 - Minimum 15” clearance between tablet arms in-use and seat backs (with seats fully reclined)
 - Keep all seating no less than 44” seat back to seat back to allow passage of students when writing tablet surfaces are being used.

Access Aisles

Provide a minimum 36” wide aisle leading to front of room. 46” to 50” is preferable.

Moveable Chairs

- Seat cushion should be a minimum of 17” wide and 18 ½ “ deep.
- They should have casters
- Depending on the application, they can either have arms or be armless
- They should be stackable to at least 5 high

Movable Tablet Arm Chairs

- Seat should be minimum of 18” wide.
- Tablet arm tablets should be at least 130 square inches.
- 20% of the seats should be left-handed.
- The back of the chair should have some flex
- Casters or sliders are acceptable.
- A tablet that can fold off to the side is desirable, but there are few products that can accomplish this while still being sturdy and durable. Take care in selecting a product if this feature is desired.



Auditorium seating

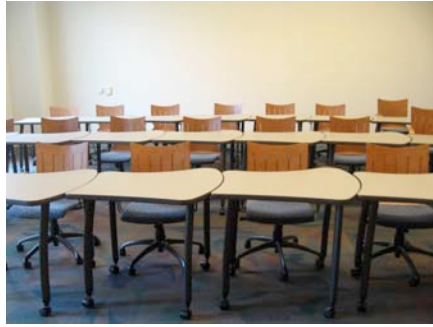
- Seats should be spaced a minimum of 24" on center
- Stagger seats to allow clear viewing
- Fixed seating should allow for comfortable seating for the person in the seat as well as the person behind the seat. Avoid rear panels and chair heights that don't allow for proper legroom and foot space.
- Flip-up seats allow for easier passage between rows. Self-lifting upholstered seats are desirable.
- Aisle panel to be determined by project
- Tablet arms should flip down.
- 20% should be left-handed.
- Tablet should be oversized with laminate top
- At this time data and power are only necessary for students who need a hearing accommodation.
- Provide 36 inch wide accessible workstations for students in wheelchairs as follows:
 - 4 workstations for rooms with 49 to 300 seats
 - 6 workstations for rooms with 301 to 500 seats

For each accessible workstation, provide the same number of moveable chairs as per the requirements for movable seating listed above.

2. **Student Tables**

Movable tables allow the class to rearrange seating into smaller groups if needed and should:

- Have casters with a locking mechanism and be small enough to move easily
- Have a depth of 18 to 20 inches and a width of 28 to 30 inches per person when two or more are at a table
- Provide unobstructed knee clearance under the table that is at least 22 inches wide and at least 27 inches high
- Tables should be 36 inches apart
- Individual desks can also be provided and could be 33 inches wide and 22-30 inches deep



3. Conference Table

Conference tables should allow eye contact between the students on both sides of the table. There should be an unobstructed view of the instructor, projection screen, and white board. Use of a boat shaped table or movable tables is desired. Special care is required to ensure proper legroom around and near table legs. Users should not have to straddle a table leg to sit at a table. Design seating space with adequate room for each student.

4. Instructor Furniture

- Typical instructor station requires 10 square feet.
- If an AV lectern is installed the instructor can use that for their teaching space. The lectern must be at least 48 inches from the front wall and 48 inches from the side wall for ADA accessibility. More information on this is in the AV section of this document.
- If no AV, provide a small sturdy table with modesty panel and a tabletop podium.
- Provide one free standing podium for every 5 rooms. Podiums should be lightweight, on casters and coordinated with the décor of the building.

5. Special Rooms

In classrooms or labs where chemicals or art supplies are used, provide movable chairs or stools that do not need foam pads and upholstery to provide comfort. Use chairs with adjustable height seats and backs and back tension that adjust automatically to weight.

6. ADA Tables

Each movable classroom -- whether it has tablet arms chairs or movable tables -- should be equipped with a table to allow for wheelchair access. In areas where there are a large number of classrooms, heavier tables are desirable to discourage people from removing them from the rooms. Lightweight tables are easier to maneuver in the classroom, but are prone to being removed without permission for reasons other than an accommodation.



6. Types of furniture to avoid

- Pedestal seats bolted to the floor.
- Moveable student desks with seats attached.
- Pivot arm seats that do not comfortably accommodate large or small students.
- Movable tablet arm chairs with tablets that are not durable.

7. Whiteboards/Chalkboards

Provide white boards in classrooms as follows:



- Fixed-height white boards should be mounted with the top of the chalk tray 36-inches above the floor
- Have a low-gloss white porcelain enamel steel surface that is easy to clean.
- Be illuminated by lights on a separate switch that do not spill over onto screens, other white boards, or the wall behind them.
- Have a continuous marker tray below the marker board surface and a wall-mounted holder nearby that is large enough for six markers and an eraser.
- In a large auditorium setting a wall mounted vertical traveling whiteboard may be recommended. This product provides several boarding surfaces to utilize simultaneously. The height of the marker tray should be 3' from finished floor. The height of the bottom of the board when it is pushed up to the highest position should be considered. The board should be reachable for the average 5'5 person to reach at 7' to be capable of pulling the board to the down/lowest position. A Claridge vertical sliding markerboard is recommended.
- Special attention should be made when reviewing construction documents to ensure the fire strobes do not interfere with the whiteboard locations. If the fire strobes are located in the center of the whiteboard wall, then the

whiteboard will have to be lowered two inches, which will be too low for instructors use.

8. Clocks, Trash and Recycling

Clocks should be provided in each classroom, should be large and easy to read. The clock should be seen easily by the instructor and students and placed on either a side wall or the back wall if necessary. Never locate the clock at the front of the classroom. If a battery clock is selected it must be “noise free”. Clocks should be decorative in nature and appropriate for each space. The installation of synchronized wireless clocks is under consideration at this time. This will allow all clocks to be automatically re-set when times change, will reduce staff hours changing batteries and will ensure all clocks will be showing the same time.



Trash and Recycling - All classrooms must be equipped with proper *trash/recycling* containers that are conducive to the décor of the area. Trash and paper recycling should be located near the exit door of each classroom. Additional trash, paper recycling and plastic/aluminum recycling should be provided in lobby, vending and student common areas. Special design consideration should be considered for location, design and use for each building. Off-the shelf style containers may not always be appropriate.

9. Artwork

Artwork is recommended for installation in classrooms for its aesthetic added value. Inexpensive choices are best, to reduce the liability of theft. Picturesque Emory photos, nature shots or themed pictures for specific departmental or building classrooms should be chosen.

VI. Audio-Visual Technologies

1. General Conditions

Audio-visual systems in College classrooms should be designed for the delivery of most commonly used media -- whiteboards, projection screens, digital displays, slides, DVDs, compact disks, document cameras, Emory Cable TV, and computer-generated media. Classrooms must also support legacy systems such as 16mm film, VHS and other portable equipment that can easily be set-up by audio-visual technicians for occasional use. The following sections provide applicable guidance for each of these media.

2. Classroom AV Levels

Type D – Enhanced Smart Classroom

Type C – Smart Classroom

Type B – Basic (projector in ceiling)

Type A – Low Tech

Type D: Enhanced Smart Classroom – (level 1 single or dual screen)

Dual display smart classrooms have all the attributes of the Emory standard smart classroom, with the addition of dual interactive pen-equipped computer monitors. The monitors create virtual whiteboards that allow users to write in digital ink over applications, write electronic notes, and capture whatever is displayed on the computer screen as a graphic file for distribution to class participants. This virtual whiteboard gives the presenter unlimited chalkboard space without the need to erase to make room for additional notes. The Emory College standard requires at least two 17” pen-equipped high-resolution Sympodium monitors by SMART Technologies. The monitors sit atop the instructor lectern and are secured by Kensington-style locks. The required SMART Notebook software is required on the dedicated computer and is managed along with the other standard software by Classroom Technologies. Extra SMART pens should be purchased for replacement.

The Emory standard for the dual display Smartroom includes: two projection screens with ability to display two unique or identical sources, an on-board computer with wired network connection, user laptop connections including VGA display, audio, power, and network connections, document camera, region free DVD/VHS player, cable tuner with Emory Cable TV distribution of channel line-up and special broadcasts, auxiliary barrel connections for hooking up ipods, digital cameras or other audio or video display devices.

NOTE: In classrooms using high definition capable data projectors – Blu-ray Disc players are recommended along with traditional DVD/VHS combo deck. Blu-ray would also be used for special departments (such as film studies or visual arts) requiring a higher definition viewing experience.

Type C: Smart Classroom (level 1 single or dual screen)

The Emory standard for a level one smart classroom includes: single projection screen for data projection display, an on-board computer with wired network connection, user laptop connections including VGA, audio, power, and network

connections, document camera, region free DVD/VHS player, cable tuner for Emory Cable TV distribution, auxiliary barrel connections for hooking up Ipods, digital cameras or other audio or video display devices. Especially in rooms where budget allows, and white boarding is important – a Smart Symposium interactive computer monitor is added. The monitor creates a virtual whiteboard that allows users to write in digital ink over applications, write electronic notes, and capture whatever is displayed on the computer screen as a graphic file for distribution to class participants. This virtual whiteboard gives the presenter unlimited chalkboard space without the need to erase to make room for additional notes. The single monitor sits atop the instructor lectern and is secured by Kensington-style lock. The required SMART Notebook software is required on the dedicated computer and is managed along with the other standard software by Classroom Technologies.

Note on Blu-ray Disc: In classrooms using high definition capable data projectors – Blu-ray Disc players can be utilized. Blu-ray would also be used for special departments (such as film studies or visual arts) requiring a higher definition viewing experience.

Type B: Basic Technology Classroom

Often a data projector, screen, wall plate solution is appropriate for teaching. In this instance, a basic projection classroom is provided. The basic projection classroom includes: single projection screen display, wall plate with VGA and audio connections for user laptop, network connection and power nearby wall plate for laptop. Features include wall plate connections for hooking up a DVD/VHS player, ipods, digital cameras or other audio or video display devices. Ceiling mounted audio speakers are recommended when audio quality is important.

Type A: Low-Tech Classroom

This classroom has no dedicated audio/visual technology. A projection screen or flat white wall for projection by portable devices is required. For renovation and new construction, coordination with room owners should take place to locate infrastructure for future addition of audio/visual equipment. Power and network drop in the ceiling for a data projector, or support blocking and conduit for a wall mounted LCD would be appropriate steps. College classroom team will supply requirements.

3. Instructor Lectern

Technology-rich classrooms should include an instructor AV Lectern designed to accommodate audio-visual systems, presentation computer and other commonly used audio-visual components and control devices. The lectern should be designed for instructors who are standing or seated.

Most “off-the-shelf” lectern furniture does not meet our goals. The College has worked closely with AV vendors and custom millwork companies to develop custom designs that do meet these goals and seek to standardize workstation and user interface design for each classroom. This standardization simplifies ease of

use and minimizes instructor training. Refinements to the College's custom-designed instructor workstations are made periodically. **Architects and Consultants should obtain electronic copies of drawings for the appropriate current design(s) from the College Office.**

Floor plans and cross sections that show the lectern must be included in design submissions. Floor plans and sections must show the location of the following:

- Instructor AV Lectern drawn to scale
- Other portable media projectors and carts (if proposed)
- Locations of wall or floor junction boxes for power/data/audiovisual system wiring to serve the lectern

A typical instructor AV lectern is illustrated below in two styles:



- Lecterns shall be oriented to allow instructors to maintain eye contact with students while using keyboards and allow students to see projected media.
- In rooms with one screen, an instructor workstation on the left side of the instructor area, marker boards in the center, and a screen in the right corner usually works well.
- In large rooms with multiple screens, a lectern located on the left side of the instructor area, near the marker board, usually works well, but a more central location may be preferable in some rooms. Tables used for instructor notes or references may also be needed.
- Lectern audio-visual components shall not block views of screens and marker boards:
 - a) 34 inches above floor—maximum height of work surfaces
 - b) 41 inches above floor—maximum height of monitors/task lights/other components
- Lectern shall accommodate instructors who stand, sit, or use a wheelchair
- Lectern accessibility
 - a) Provide accessible route to workstations
 - b) PC keyboard/mouse/controls within easy reach of instructors

- c) Control panel for A/V system in easy reach of instructors
- d) Height of instructor's seat easily adjusted - 19 to 27 inches above floor
- Lectern Security
 - a) Security of lectern components will be enhanced by using exterior door locks – either electronic or keyed. The College will designate a lock style in order to standardize for locking/unlocking.
 - b) Lockable user doors to secure AV equipment
 - c) Door access in lectern back for technician access to computer and audio-visual components for maintenance – lectern key lock (or electronic locking code) to be different from user key lock.
 - d) Security cables to tether computer, computer monitor, and document camera equipment to a solid support structure within the lectern.
 - e) Electronic security system to prevent theft of lectern components can be considered, although these systems are currently recommended for ceiling mounted projectors only. **Check with Classroom Working Group on level of security desired.**
- Instructor AV lectern shall provide space for the following:
 - a) Instructor's references and handouts
 - b) AV Touch Panel controls
 - c) Computer monitor
 - d) Cable chase (including power/data/VGA/ and stereo mini connection for laptops, computer device extensions such as USB, and auxiliary RGB cables) See photo below:



- e) Small task light with shade, focused on usable lectern work surface, is an optional addition that may be considered
- f) Audio-visual components installed in standard racks with user and non-user equipment grouped separately
- g) Pocket doors for computer and user AV equipment access
- Floor Boxes for Special Installations:

As a rule, the classroom instructor lectern cabling should run to an adjacent wall. When cabling from the lectern to the wall creates a tripping hazard or disrupts the visual aesthetic of a space, a floor box may be used. Floor Boxes must be large enough to accommodate power, network and AV cabling to the instructor lectern and still maintain adequate clearance when the lectern is positioned over top of

the box. Cables must not rub against the bottom of the lectern or crimp. When a floor box is called for in Type D & C Smart Classroom designs, a 10" X 8" a Wiremold Walker infloor system floor box (or similar to Model AF3) is recommended. The field wired box is 5" deep and serves the AV lectern with power, network and audio visual cables. Specifications on the box should be obtained from the audio visual vendor, Avyve.

4. Interface (Crestron)

Control systems for electronic components will have the capability of controlling all of the components identified above as well as projection screens, room lights, and shades operated by electric motors. Contact the College Classroom Group for detailed specifications. Currently all control systems must --

- Be Crestron manufactured controls
- Be programmable and capable of being re-programmed
- Interface properly with controls for AV equipment, screens, lights, and shades and other selected programmable devices
- Be eControl capable and ready
- Have a touch panel on the instructor workstation with easy-to-read, simple menu choices which mirror the Emory College chosen standard design. Design samples will be supplied by the College Classroom Group. (see sample design below)



6" Touch Panel Interface

- All source codes, compiled codes, and access passwords shall be provided to the University at acceptance and become University property.
- AV vendor will provide updates to existing code during the life of the AV vendor equipment service warranty
- In conjunction with the Crestron control system, in College smart classrooms, use of Roomview and eControl is recommended. Roomview is a client-based application running on Windows XP, which allows for the monitoring and management of all the Roomview enabled Crestron systems on the network. The current recommended Crestron Roomview software version as of this 4/09 writing is version 6.1. A dedicated network connection with static IP address is required for each device (projector or LCD display) that is monitored. The features of the Roomview systems are:

Monitoring - the current state of the room (Online, Log, System on, Display on, Lamp life, Schedule, Pic Mute, Audio Mute, Active Source, Projector Communication / Error, User Doors, Services Doors)

- Scheduling – the Unlocking of the user doors, the Locking of the User doors, the Locking of the services Doors, the System shutdown, the Projector Shutdown.
- Other features - Remote updating of the code via our vendor, remote diagnostics of the system, log files that allow us to track down problems, and usage information.
- Cost Savings – With the use of the scheduling feature we can reduce power consumption of the AV system by shutting down systems that may otherwise be left powered on for an extend period of time. Also by powering down our systems and projectors we are able to extend the lamps, reducing the wasteful use of a system left on.

5. Crestron Roomview and E-Control

In conjunction with the Crestron control system, in College smart classrooms, use of Roomview and eControl AV equipment monitoring is recommended.

Roomview is a client-based application running on Windows, which allows for the monitoring, management and remote user support of all the Roomview enabled Crestron systems on the network. The current recommended Crestron Roomview software version as of this writing is version 6.1. A dedicated network connection with static IP address is required for each device (projector or LCD display) that is monitored. The features of the Roomview systems are:

- Monitoring - the current state of the room (Online, Log, System on, Display on, Lamp life, Schedule, Pic Mute, Audio Mute, Active Source, Projector Communication / Error, User Doors, Services Doors)
- Scheduling – the Unlocking of the user doors, the Locking of the User doors, the Locking of the services Doors, the System shutdown, the Projector Shutdwon.
- eControl - is a Web based interface used in conjunction with Roomview to facilitate remote access to a live image of the Crestron touch panel in the lectern. With the remote access, support staff is able to offer remote assistance, reducing the time to get to the room.
- Other features - Remote updating of the code via our vendor, remote diagnostics of AV systems, log files that provide support staff information to track down problems, and usage information.
- **Cost Savings – With the use of the scheduling feature, support staff can reduce power consumption of AV systems by shutting down electronics that may otherwise be left powered on for an extend period of time. Also by powering down systems and projectors, extend lamp life and wear-and-tear on equipment – resulting in cost savings over the life of the technology.**



6. Computer

Consumer grade classroom computers are being requested by instructors and are now routinely installed in a smart classroom. The computers are usually running a Windows operating system with a standard Office package. The management of large numbers of classroom computers has become a challenge.

The convergence of digitized media and print material along with presentation software and connections to the Internet make computers an essential educational

technology. Succeeding generations of instructors and students now come to the classroom with computer literacy skills and expectations that some sort of computer will be available. Size and type of computer is an important element in the design of an instructor lectern. **NOTE: Check with Classroom Working Group for current computer specifications.**

Standards

- At least one computer installed in the classroom
- Ethernet connections for at least one classroom computer, one laptop, and possibly another connection for a student laptop in the front of the class
- Minitower footprint so that additional cards and drives may be added
- 15” Ultrasharp LCD display with VGA out
- One DVD-ROM drive
- USB 2.0, 6 port standard
- One active USB 2.0 powered extension
- Possible firewire card for MACs
- One micro or standard sized keyboard
- One optical scroll wheel mouse
- Computer (and other sources) distributed to room speakers
- Current version of Windows operating system
- Current version MS Office
- Current Emory Online (EOL) software
- Insight client software

7. Document Camera

In the past overhead projectors have been used in classroom spaces to project an image rendered onto a transparency. Technological improvements provide a newer device that captures visual images by using a video camera mounted vertically on a base. The video image is converted to an electronic signal that can be transmitted, using a video or data cable, to a data projector, a video monitor, a computer, or a communications network to be received at a remote location.

The cameras provide all of the image projection of traditional overhead projectors plus the ability to project images that are three-dimensional, in color or black and white, in the original visual format e.g., books, magazines, clothing samples, etc. Some document cameras have the ability to save images that can be replayed. The image projected is usually much brighter and clearer and larger than can be obtained from overhead projectors.

Standards

- Whenever possible a document camera will be installed instead of an overhead projector
- A camera fixed to a base that allows it to fold away in the lectern for security
- Progressive scan camera
- Digital SXGA, XGA or SVGA signal on RGBHV and DVI outputs
- Video out
- Able to upgrade firmware
- 75Hz and 60Hz output modes

- RS232 and USB inputs for control and connection to other devices
- Automatic and manual zoom
- Brightness controls
- White working surface that dampens reflection and allows for transparency use

8. DVD/VCR Player

Each smart classroom needs to have source playback machines for videocassette recording tapes, DVDs, and CDs. In some cases an instructor may want to use a laserdisc player for older format titles.

While more image and sound files are digitized and possibly available using a classroom computer and Internet connection there is still a need to play back older analog and digital formats.

Standards

- When possible, a combination DVD/VCR player is preferred
- Region Free DVD is required
- NTSC signal VCR is required (unless a multi-standard world deck is specified – usually for the teaching of languages)
- IR ports for control through the Crestron or other controllers
- Consumer grade playback machines are acceptable
- Playback decks should be able to fit in standard AV racks
- Outputs should be BNC or RCA or both
- Highly desired to have front inputs for RCA video, left and right channels

9. Cable TV Tuners

Use of tuners applies only to Level 1 and 2 classrooms in which we require a dedicated cable tuner. VCR's in these classrooms must not be used as a tuner. The type of tuner used should –

- Be programmable and able to skip over numbers where stations are unavailable (rather than roaming thru static as you scroll up and down the range). **Contact College Classroom Group for latest model specifications.**
- Provide access to Emory Cable TV system

10. Other Equipment

A. Projectors

To keep pace with current technology, the Classroom Technologies/IT team should work directly with audio-visual consultants/vendors to specify projectors that meet current criteria established by Emory College. Cost should not be the only consideration when selecting projection options. Consider projector performance, features, warranty and lens options relative to room size. Consult the Classroom Technologies/IT team, who will fully test a range of projectors suggested by the consultant/vendor. Performance goals include:

- Low noise output
- Compatibility with classroom computers, laptops other audio-visual components

- Uniformly bright, clear images with good resolution and excellent color rendition
- Accessibility of lamp change housing –
NOTE: Projector mounts should not cover the lamp change housing area so that lamp changes can be made without removing the projector from the ceiling mount. (See illustration for example of desirable configuration)



- Reliability including proven track record for good customer service and a competitive warranty
- Availability and cost of lamps and replacement parts
- Low-profile size to avoid blocking views of screens and whiteboards
- Availability of specialized projectors and/or lenses for unique classroom spaces

B. Screens

Projection screens should be designated for front projection in all learning rooms except large rooms used for distance learning. Screens shall be located and sized so students in all seats can easily see the entire projected image without discomfort or image

Screen Size:

- Minimum Height: 20% of distance to seat farthest away from screen
- Minimum Width: Determined by aspect ratio of projected images, as follows:

Current Technology: 4:3 Aspect Ratio (Screen width to screen height)

Example: 36 feet to screen, image 7.2 feet high, 9.6 feet wide

Specify screen with nominal dimensions 7.5 ft high, 10 ft wide

HDTV Technology: 16:9 Aspect Ratio (Screen width to screen height)

Example: 36 feet to screen, image 7.2 feet high, 12.8 feet wide

Specify screen with nominal dimensions 7.5 ft high, 13 feet wide

This example illustrates that HDTV “wide screen” images may reduce the number of screens that can comfortably fit in the instructor area and still allow enough space for whiteboards.

Slide Projection: Classroom projection screens must accommodate the occasional viewing of 35mm slides. A slide projector on a cart or a slide projector mounted on a shelf opposite the screen is utilized. Wireless remotes control the projector.

Screen Location and Orientation:

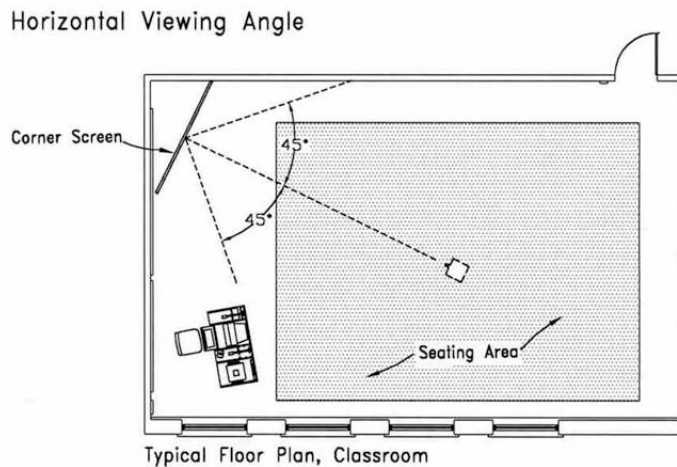
Screens should be oriented towards the “center of gravity” of the seating area so students in all seats can easily see projected images and the whiteboards.

- In classrooms with only one screen, locate screen on right side of instructor area
- Minimum distance between screen and closest seat:
 - a) Same as screen width: Rooms with 10-48 seats
 - b) 1.5 times screen width: Larger rooms

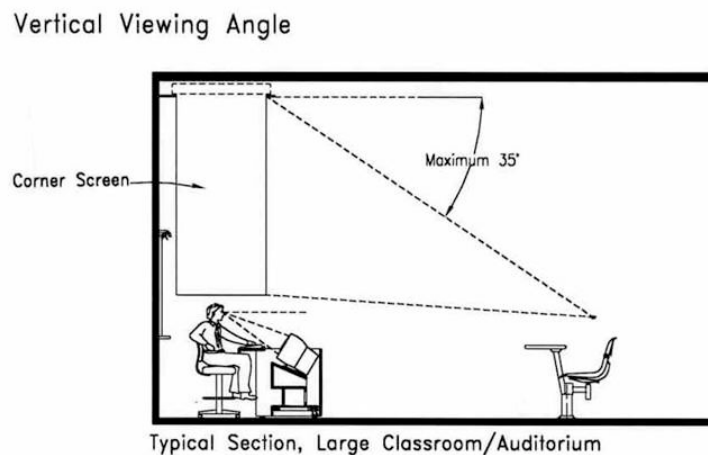
Viewing Angles:

Provide an unobstructed view of the entire image on all screens from all seats within the viewing angles (cones of vision) described below:

- Maximum 45-degree horizontal angle from the perpendicular to the center of screens



- Maximum 35-degree vertical angle from the perpendicular to the top of each screen



Screen Type:

- Matt white with gain of about 1.0 (30 Lamberts per square foot of screen area)
- Black border
- Electrically operated whenever possible
- Tab tensioned screens are not desirable and must be approved for special use by the College Classroom Technologies AV Staff.
- Mounted above the suspended ceiling with opening in ceiling
- Stop point five feet above the floor
- Manual screens will be considered only in rooms designed primarily for interactive discussion and the project budget precludes the use of ceiling-mounted data projectors and other audiovisual components that are installed permanently.
- Manual screens should be wall-mounted above the suspended ceiling whenever possible. Screens mounted below the ceiling with exposed brackets are not desirable.

Rationale for using electric screens: Screens operated by electric motors represent less than 10% of the cost of an electronic audio-visual system. Installing them after rooms are built can be very costly if ductwork or lights must be moved and new wiring circuits added. Most manual screens are not very flat, distort projected images, are hard to raise and lower, and can be easily damaged. Students in rear rows cannot see the bottom half of projected images if manual screens are mounted just above the whiteboard.

Manual screens should therefore be considered only as a last resort in rooms where projected images are only needed infrequently.

Dual Screens:

Certain teaching styles lend themselves to the use of two projected images at once. For example, an instructor may wish to show a streaming video presentation on one screen and create a spreadsheet cataloguing various aspects of the performance on another. At this time, Emory has only a few examples on campus, but the technology is becoming more in demand.

Currently, the standard dual screen set up is to have one main screen located in the center of the room or slightly offset and a secondary screen angled off to the side. This best allows for single-projection instruction while providing the option of going to dual screen. We have been using dual Symposium technology in these scenarios as well. This allows the instructor to annotate on each screen and capture these notes.



Installation Note: Because many screen materials contain high VOC contents, we recommend having the manufacturer “air-out” the screens in a warehouse prior installation. This will greatly cut down on the initial VOC odor of the screens in the occupied space.

C. Audio Systems

Accurate sound reproduction for sound and moving image playback is important for the teaching spaces where playback is routinely done. For spaces without permanent installations a portable sound system may suffice.

While some data/video projectors have built-in speakers the sound reproduction has proven inadequate in permanent installs. Besides general classrooms consideration should be given to the specific amplification needs for the teaching of film studies and music with input from the respective faculties. In larger classrooms there may be a need for voice amplification using a fixed lectern microphone and/or a wireless lavalier microphone

Standards

- Playback sound amplification should be present when a data/video projector is designed into the room
- There should be at least one each midrange left and right speakers
- Speakers should be mounted in front of the room where instruction usually takes place
- Speakers should be mounted in or up near the ceiling
- Film Studies and Music teaching faculty should be consulted about their specific needs

D. Storage/mobile AV units

Classrooms may need additional AV equipment added ad hoc (e.g., 16mm film projector where there is not a permanent installation.)

Additional AV equipment may be placed upon a wheeled, sturdy cart designed specifically for AV use. This allows for equipment to be stored in locations around the campus for proximity and prompt delivery.

Standards

- Carts should be designed for AV use specifically
- Usually, two heights are preferred: 30 inches and 42 inches with a two or three shelf design
- High impact plastic is preferable to metal
- Good quality wheels with brakes will allow better and safer transport over uneven surfaces and will avoid disruption of classroom instruction by squeaking wheels
- A two or three-outlet power strip with a 15 foot power cord is preferred

E. Slide Projectors

The 35mm slide projector is primarily used in the teaching of art history, although many instructors in other disciplines still use 35mm slides for their presentations. The technology is mature and reliable. With other formats available now the 35mm slide projector is no longer being produced by Kodak but is still available from Eiki, Elmo, and Navitar.

The 35mm color slide is superior for detail and color reproduction of art objects and is used in the teaching of art history. Even with the increasing use of digitized projected images such as Insight the clarity and brightness of the 35mm slide image is

still desired. The projector may be permanently mounted in the room, or it may be placed upon an AV cart.

Standards

- The standard to be emulated is the Kodak Ectagraphic 3
- It should have the ability to be controlled remotely using a wireless handheld device
- The lens should be 4-6 zoom or long throw for larger rooms
- Autofocus with manual override
- In rooms that will have a permanent installation a shelf may be installed in the back of the room, high enough to project without keystoneing or being blocked by audience members. There should be a power plug nearby.
- Art history classrooms usually require at least one 35mm projector, and in some cases two 35mm projectors for side by side image comparison.
- The AV cart should be wheeled, color black, plastic, with power cord (see carts standards)
- Height of cart depends on placement of the projection screen. Typically around 30" and 42" carts are used.

F. Overhead Projectors

The instructional process usually employs the projection of text and static images. The traditional method has been to use overhead projectors on carts for the showing of text and images rendered onto transparencies. The overhead projector sits on a wheeled AV cart.

In classrooms that do not have data/image projectors with document cameras the usual method of image projection is using an overhead projector with transparencies. The cart allows the overhead projector to be moved out of the way or better positioned for projection as necessary. Rooms with data/image projectors and document cameras do not have overhead projectors as standard equipment.

Standards

- The 3M Overhead Projector Model 1780 type is preferred with its sharper image and two lamps for switching in case of lamp failure.
- The AV cart should be wheeled, color black, plastic, with power cord.
- Height of cart depends on placement of the projection screen. Typically 30" and 42" carts are used.

G. AV Closets

Work with the College Classroom Working Group to list the minimum standards that AV technicians need to carry out the provision of mobile and backup audio visual equipment. Projection and playback equipment must be easily transported throughout the classroom building in a timely, efficient, and safe manner.

Each building should have at least one main AV storage closet to house a number of AV rolling carts, spare data projectors, 35mm slide projectors, 16mm motion picture projectors, sound amplifiers, microphones, VCR and DVD players, projector lamps, cables, and other sundry equipment and supplies. The close proximity of the spare

and backup equipment is vital to the quality of service so that the demands of a teaching space can be met with timeliness and a minimum of disruption of the teaching activity.

Standards

- At least one 120V outlet on each wall.
- Overhead light with light switch
- 120-150 square feet with sufficient width for carts and equipment
- Accessible by elevator and outside ramp in a public hallway. Note: The main AV closet cannot be located inside a classroom.
- Low door threshold for rolling carts
- Blind door, no sidelights or transom, 34” to 36” wide, adjustable closer for self propping
- Handicapped standards for wheelchair access
- Heated and cooled
- Utility type floor

VII. Other Items

1. Working with Campus AV Vendors

Emory Procurement maintains an ongoing contract for audio visual design and integration services with an Emory preferred approved AV integration vendor. The current contract is with Avyve of Norcross, GA. The College recommends working with this vendor whenever possible to help maintain consistency in design and equipment type, for special Emory pricing of components, extended equipment warranties, and for the long-term maintenance and repair services provided through Avyve. Working with AV consultants other than Avyve is done in other areas across campus, but is not the College model.

2. Emerging Technologies

Academic Technology Services provides incubator classrooms where testing and proofing of new technologies may take place. IT professionals in both Emory’s Center for Interactive Teaching and Cox Computing Center work closely with Classroom Technology Services to research, test and introduce new technologies in these controlled environments – where users have on-site support and classroom technologies can flex to accommodate new products. Once technologies are piloted and assessed, they are rolled-out to the College operational classroom pool if appropriate.

3. Computer Classrooms

Computing classrooms run the spectrum from fixed furniture with computer workstations to flexible mobile furniture and wireless laptops. The recommended model of design should begin with a Type D or C Smart Classroom. Additional power and wired data connections are required along with added security for equipment and classroom entrance.

Since computer classrooms in the College are department specific, they are

designed to fit the curriculum and learning preferences of the specific discipline of study. Proximity to staff that is responsible for technical support is recommended for classrooms using the wireless laptop design model. Laptops require charging between classes and are secured in a cart when not in use. Below are existing facilities to illustrate the variety of configurations.

Examples:

1) Flexible Seating w/ Wireless Laptops

Cox Hall Classroom A & B – (Academic Technology Services)

Collaborative Classrooms A & B in the Cox Computing Center are designed to foster innovative interaction among faculty and students. The spaces accommodate 15 people. Faculty teaching in these spaces can work with students in a flexible environment that includes wireless laptops, mobile seating, SMART interactive touch screens, and Crestron controlled multimedia instructor stations.



2) Flexible Seating with Fixed Computers - Emory Center for Interactive Teaching - ECIT 214

Incubator Classroom 214 in Emory's Center for Interactive Teaching is designed to foster innovative interaction among faculty and students. The rooms accommodate 18 people. Faculty teaching in these spaces can work with students in a flexible environment that includes 16 workstations (bootable to Windows or Macintosh). The iMac computers are fixed around the perimeter of the room with flexible seating and moveable keyboard tables. Modular furniture can be rearranged to create a seminar style environment. Dual SMART interactive touch screens and Crestron multimedia AV control are offer display and easy switching between content that is presented.



VIII. Future Additions to the Guidelines

- Special Needs Accommodations (Hearing impaired, sight impaired)
- Process

Thank you for taking the time to review this document. Emory College is committed to updating this document as new lessons are learned and as our classroom spaces evolve. Please help us to continue improving our classroom design process. Suggestions can be made by sending an e-mail to classrooms@listerv.emory.edu or by calling 404/712-9523.