3.2.2 CLASSROOMS

3.2.2.1 General

The Design Team must coordinate all classroom designs with the Office of Campus Planning and the Information Technology Unit including, but not limited to, the Division of Instructional Technology (Do IT).

3.2.2.2 Facility Planning and Design

3.2.2.2.1 Classroom Concepts

The following classroom concepts are included for discussion between the Design Team and George Mason University during the planning and design of non-lab teaching spaces. Various furniture configurations show a number of possibilities for classrooms of the same size to support a variety of instructional delivery types.

The diagrams included should be used as a reference when evaluating the space needs for new or renovated classrooms. It should be noted that the allocated square footage per student exceeds the guidelines for space planning in the CPSM. A greater square footage allocation for classrooms provides more flexibility in instructional delivery and the option for collaborative learning. Refer to the CPSM, Chapter 6.1 – General Design Standards for minimum state requirements.

For classroom prototype diagrams, refer to details 3.2-1, 3.2.3, 3.2.4, 3.2.5, 3.2.6 and 3.2-7. The table below includes planning standard suggestions for classroom learning environments.

Type	Seating/Surface	SF/student	Details/Notes
Lecture Hall	Fixed seating; sloped or tiered floor	18sf/stud	Details 3.2-5 and 3.2-7.
Tiered Classroom	Movable seats, fixed tables; two rows per riser	25sf/stud	Modesty panels on table at front of riser; back table has double width to allow student collaboration. Detail 3.2-6.
Case Study	Tiered room, seats in a "U"/"C" shape	35sf/stud	Room has to be laid out to determine actual square footage. Details 3.2-1 and 3.2-2.
Flexible Classroom	Movable tables, movable chairs; flat floor	40sf/stud	Details 3.2-1 and 3.2-2.
MILS (Mason Innovative Learning Space)	Movable chairs; flat floor		Problem based learning/SCALEUP/New Mason Idea. Detail 3.2-4.
High Volume/Density Classroom	Flat floor, tables/chairs or movable tablets	25sf/stud	Detail 3.2-3.
Break-out Rooms			

3.2.2.2.2 Classroom Proportions

- The acceptable classroom proportion is a rectangle between 1:1 and 4:3 (Width : Length) or between 1:1 and 3:4 (Width : Length).
- Ceiling height and ceiling projector mounting height shall be coordinated to provide the desired image size.
- Any space with a ratio greater than 3:4 or 4:3 is unacceptable as a classroom space.

3.2.2.3 Windows and Walls

- Natural light is highly desired in classrooms, however, the placement of windows should be carefully coordinated to avoid distracting from instruction. Classrooms shall have blackout shades supplied on all windows.

3.2.2.4 Doors

- It is unacceptable to place classroom doors on the instructional wall; the ideal place for doors is on the wall opposite the instruction wall.
- It is acceptable to place classroom doors on side walls; however, they should be on the side of the room opposite the lectern.

3.2.2.5 Accessibility

- Classrooms shall be universally accessible for students, staff, and faculty.
- For classrooms—regardless of size—it is preferred that accessible seating be dispersed rather than clustered in a single location. Provide an accessible space for students at the top and bottom of each classroom. Exceptions may be approved by Mason depending on unique circumstances.
- Lectern placement and furniture must be compliant with the current ADA guidelines. In addition, the following guidelines shall apply:
    - A 60” minimum from instructor side of lectern to wall or obstruction behind the lectern is required.
    - If 12” of unobstructed knee clearance is available, then the lectern may be 48” from any obstruction or wall behind the lectern.
    - Lectern must have 36” knee width unobstructed underneath the lectern.
    - Lectern must be between 27”-34” in height. Preference is for 34” height.
    - Where the reach depth exceeds 20 inches (510 mm), the Lectern high forward reach shall be 44 inches (1120 mm) maximum and the reach depth shall be 25 inches
    - An ADA compliant path of travel to the lectern must be provided.

3.2.2.6 Furniture and Equipment

3.2.2.6.1 Classroom Specialties

- Classroom specialties such as whiteboards, projection screens, and seating vary significantly depending upon the ultimate use of the space. The Design Team shall work closely with Mason to identify the needs of each room.
- Projection screens in classrooms shall be coordinated with Campus Planning and the Department of Instructional Technology.
- Provide wall protection in all classrooms to mitigate chair and table impacts.

3.2.2.6.2 Whiteboards

- Mason accepts three types of whiteboards: wall talkers; porcelain-on-steel surface; and white-board paint. The use of each shall be determined by Campus Planning and DoIT in coordination with the Design Team.
- The writing surface shall span the entire teaching wall with a 48” height whiteboard. Additional whiteboard space may be required for a given classroom.
- Other types of whiteboards shall be full wall surface.
- Whiteboard walls shall be free of all devices (thermostats, receptacles, switches, strobes, horns, etc.).

3.2.2.6.3 Classroom Display Size and Placement (Projected and Direct View)

- Avoid locating projection screens near doors due to conflict with exit lights.
- The display shall either be a front screen projection or a direct view monitor for classrooms with technology.
- Rear projection is not preferred, but may be considered in specific projects in coordination with Learning Space Design in Mason’s Division of Instructional Technology.
- The bottom of the displayed image shall be located at a min of 48” AFF and as appropriate for viewing.
- A minimum of a 3” separation shall be provided between the top of the display and the finished ceiling.
- The maximum display size for a classroom is a direct factor of the ceiling height of the classroom. This display size will dictate the nearest viewer (defined as the closest set of viewer eyes in front of the display) and the further viewer (defined as the furthest set of viewer eyes in front of the display).
- Front projection shall not be used in any space with a ceiling height lower than 102”.

Finished Ceiling Ht. (FCH)	FCH – 48" – 3" = **Maximum Display Ht.**	1.6 x Display Ht. = **Maximum Display Width** (16:10)	Width of Screen = **Nearest Viewer**	Screen Ht. x 7 = **Furthest Viewer**
90 in.	39 in.	62.4 in.	62.4 in.	273 in.
96 in.	45 in.	72 in.	72 in.	315 in.
102 in.	51 in.	81.6 in.	81.6 in.	357 in.
108 in.	57 in.	91.2 in.	91.2 in.	399 in.
114 in.	63 in.	100.8 in.	100.8 in.	441 in.
120 in.	69 in.	110.4 in.	110.4 in.	483 in.
126 in.	75 in.	120 in.	120 in.	525 in.
132 in.	81 in..	129.6 in.	129.6 in	567 in.

Table of Display Maximums and Viewer Locations based on Ceiling Height (this chart is not for use to determine floor to floor or desired ceiling heights for new classroom spaces, only to show relative proportionality in selecting projection size).

- All students must be within proper sight lines of the screen. Sight lines are defined as any viewing angle within 45 degrees off the axis of the edge of the display.
- For any classroom with more than 150 seats, multiple displays may be necessary as determined by the Mason for proper viewing. All students should be within the sight lines of both displays and within the nearest and furthest viewer range for both displays.
- When placing single displays it is expected that the display will be placed off center to allow maximum use of whiteboard space and displays simultaneously while preserving sight lines.
- Consider options other than traditional screens (e.g. whiteboards, etc) for projection display surfaces, as approved by the Mason.
- All classroom screens shall be motorized and provided with a low voltage wall switch to be located behind the instructor's lectern and low voltage connectivity to be controlled by a Crestron system via relays,
- Screens shall be ceiling recessed.
- Install screens so that the center of the screen does not fall on a ceiling grid line.
- Screens must be Matte White Material with a Gain of 1.0.
- Do not use tab tensioning for screens.
- Screen roller and other serviceable parts must be accessible from the classroom without making alterations to the ceiling grid (typical of Da-Lite Advantage Electrol).

3.2.2.6.4 Projector Infrastructure Placement

- Coordinate projector infrastructure with with Campus Planning and the Department of Instructional Technology, based on the project, screen size and screen placement.

3.2.2.6.5 Ceiling Type

- Construct ceilings to allow for easy installation and maintenance of audio visual equipment and screens.
- Classrooms, in most cases, shall have drop ceilings with acoustical tile.
  - Gypsum wallboard (sheetrock) is unacceptable for classroom ceilings.

3.2.2.7 Materials and Finishes

RESERVED

3.2.2.8 Building Systems

3.2.2.8.1 General

RESERVED

3.2.2.8.2 Plumbing

3.2.2.8.2.1 All Classrooms

- Refer to Section 3.3.3 – Plumbing Systems.

3.2.2.8.3 Heating, Ventilating and Air Conditioning

3.2.2.8.3.1 All Classrooms

- Refer to Section 3.3.1 – HVAC Systems.

3.2.2.8.4 Electrical

- Refer to Section 3.3.2 – Electrical Design Criteria for additional information.
- Single display classrooms (90% of classroom spaces) shall follow a defined lighting pattern. For classrooms larger than 150 seats or having multiple displays, the Design Team shall coordinate lighting design with Campus Planning and the Department of Instructional Technology.
- Single display classrooms shall utilize a four zone lighting scheme. All zones shall have dimmable capacity.
  - Zone 1 is defined as the lighting above the instructor and lectern. The lighting design shall provide for on/off control of all fixtures in this zone on a single circuit.
  - Zone 2 is defined as the lighting above the screen or display location. The lighting design shall provide for on/off control of all fixtures in this zone on a single circuit.
- In rooms with projection, when Zone 2 is in an off state and all other lighting is in an on state, a 15:1 projected image systems contrast ratio will be achievable at screen location as measured by ANSI/INFOCOMM 3M-2011. It should be assumed that the projector output is 3600 lumens for the lighting design purposes. To achieve this ambient light at screen location will be ~5 foot-candles (~50 lux) or lower, however, this should be verified by the lighting designer.

- Zone 3 & Zone 4 are defined as the fixtures above the students. These fixtures should be double ballast fixtures. Zone 3 shall provide on/off control of the first ballast for all fixtures within the area on a single circuit. Zone 4 shall provide on/off control of the second ballast for all fixtures within the area on a single circuit.
- Provide lighting control for all circuits both at the instructor wall adjacent or behind the lectern and on the entry wall behind the door.
- Presets for each zone shall be determined by Campus Planning, the Department of Instructional Technology, and the Provost Office representative.
- If there is an emergency or always-on fixture in the room, it shall be placed above the entry door furthest from the display.
- For an example of a single projection classroom lighting scheme, refer to detail 3.2-9.

3.2.2.8.5 Communications (IT/AV)

3.2.2.8.5.1 Lectern Location

- Requirements for the lectern include:
  - Single 20-amp individual branch circuit on same phase as projector/s
  - Duplex 5–20r receptacles

3.2.2.8.5.2 Projector Location

- Requirements for the projector include:
  - Single 20-amp individual branch circuit on same phase as lectern branch circuit
  - In rooms with 2-4 projectors, the individual branch circuit may be shared amongst projectors only.
  - Projector ceiling box enclosure shall be hard wired only.

3.2.2.8.5.3 Boxes and Conduit

- Requirements for ceiling box enclosures (typical of FSR CB-22p) include:
  - Plenum rated, 2’x2’ in size to fit into a ceiling tile grid
  - Two full rack units of space for low voltage equipment
  - External AC receptacle and a switch/circuit breaker on the ceiling surface
  - Five internal AC outlets ergonomically spaced to allow room for equipment power supply bricks inside the enclosure
  - A white rim access door that you insert a ceiling tile into
  - Projector Pole Mount (1½” NPT fitting to hold up to a 50 lbs)

- 1½" NPT fitting can be located in multiple positions to optimize projector placement
- Requirements for lectern floor box and AV conduit (example: FSR FL-500P-4) include:
  - Minimum 4" depth
  - Floor box cover shall allow for cables to pass through when closed
  - Floor box cover shall have the same finishing as flooring
  - If floor box is not in use, it should blend in with the rest of the floor
  - Single gang separation for duplex electrical outlet
  - Electrical shall have its own conduit
  - Single gang knockout for networking
  - Networking shall have its own conduit
  - At minimum a dual gang knockout for audiovisual cabling
  - With two 1¼" conduit enclosed from floor box to stubbed up above finished ceiling
  - Above the finished ceiling an audiovisual cable tray is to be installed from AV conduit stub out, from floor box, to projector ceiling box enclosure
  - For information regarding AV floor boxes and conduits, refer to details 3.2-8 and 3.2-10

3.2.2.8.6 Network & Telecom

- Provide 3 each: Network connections terminated to a standard wall plate type receptacle in each classroom floor box using dedicated networking conduit
- Provide 2 each: Network connections terminated into a surface mount jack housing placed in each classroom ceiling box (if there is a projector)
- Provide 2 each: Network connections terminated into a wall place behind each wall mounted large screen monitor in a manner coordinated with the AV installation (if there is a large screen monitor)
- Provide 1 each: Wall mounted digital telephone and required networking infrastructure including wall mount style telephone jack in each classroom located on the wall behind or adjacent to the lectern

3.2.2.9 Acoustics

References:

- Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools
- For classrooms <50 student seats, follow ANSI/ASA S12.60-2010/Part 1

3.2.2.9.1 Videoconferencing or Lecture Capture

Videoconferencing or Lecture Capture (any seat count) and classroom (> 49 seats) require special attention and the services of an acoustical engineer. Initial guidance (needs to be verified by an acoustical engineer) for the following issues:

- High-reflectance materials near the instructor area that project sound.
- Sound-absorbing materials on ceilings and on the upper levels of walls in the rear.
- The following acoustical targets shall apply to any videoconferencing or lecture capture room:
    - Target 0.75 reverberation time (acceptable range, 0.6 to 1.2)
    - 50 STC Walls, ceilings, floors, movable or folding partitions
    - 40 STC Doors and windows near high noise areas
    - 28 STC Doors and windows near low noise areas

3.2.2.10 Security

- Specifications are to be provided by Mason's Physical Security Office.
- All classroom primary doors must have an electronic card swipe reader and strike plate.
- If a classroom has two doors that do not share the same hallway, then the secondary door must have an electronic swipe card reader and strike plate. If the two doors share the same hallway, then the secondary door must have only an electronic strike plate.