

4.1.2 PROJECTOR

Current preferred spec:

Sharp PG-D40W3D Digital Multimedia Projector 4000 Lumens

Throw and mounting position can be found at:

<http://www.projectorcentral.com/projection-calculator-pro.cfm>

4.2 AUDIO

Wall or ceiling mounted speakers in all rooms 35 capacity or more (see A/V specs above).

Speakers at the front of the room must be located minimum 6' from the front wall to prevent audio feedback loop when the instructor is using a microphone (i.e. mount speakers forward of where the microphoned presenter is located)

4.3 CHALKBOARDS AND WHITEBOARDS

Chalkboards (black) are the standard specification for classrooms because (1) preferred by many (but not all!) faculty (2) Supply of chalk is easier to maintain than markers. Typically Math instructors will require blackboards and Management groups will expect whiteboards.

Chalkboards are typically 4' high in 8' wide sections; seamless when joined.

Preferred minimum length chalkboard:

16' width Small classroom

24'+ width Large classroom

Generally speaking, more is better (for the instructors)

Minimum 6' width of blackboard to show with screen down

Prefer 8'+ showing with screen down

To prevent chalk dust from interfering with electronic components in the room, the room ventilation is to be designed to draw air directly away from the chalkboards without passing over any other part of the room.

In the case of tiered classrooms, chalkboards are to be multi-tiered (triple-hung). Stacked chalkboards are to be in no more than 10' sections, to prevent mechanical difficulties in raising/lower long sections.

All chalkboards are to have a chalk tray all along the lower edge.

Mount blackboards 36" from the finished floor.

4.4 TEACHING STATION / TEACHING STATION JR.



<http://www.utoronto.ca/teachingstation/>

Specs and information for these 2 standard A/V control stations are available on the website. They are standard products built for UofT based on specifications from the Office of Space Management at the St. George campus and the central A/V divisions of the Scarborough and Mississauga campus'.

http://www.utoronto.ca/teachingstation/tech_support.html

The Teaching Station (classrooms capacity 100+) is essentially a fixed podium 2'6W x 2'6D x 43"H located 5'+ feet from the front wall, usually to one side of the projection screen. The Station itself does not obstruct the screen or blackboard; the instructor standing behind the TS will do so. The TS uses a conduit connection through the floor and so is fixed equipment.

The Teaching Station Jr. (capacity 35-100) is fixed control stand 2'W x 2'6D x 37"H. Cables come from a wall connection to the TSJr, which is either located against the wall or 2' out from the wall and turned towards the instructor.

5 LIGHTING

5.1 LIGHTING GRIDS

LEVEL:	50 FC at desk height (<u>All desks</u>) - REQUIRED
ZONES:	<ul style="list-style-type: none"> (1) Blackboard zone - wall washers directed at the boards - ON/OFF (2) Student zone - Fluorescent tubes - 2 or 3 levels For larger halls these is the option of: <ul style="list-style-type: none"> (3) Instructor zone - Dimmable or multi-levels in teaching area (4) Perimeter zone - lighting around the room perimeter is ONLY recommended for rooms with presentation on multiple walls, as in Skills or management group-style rooms.

Aisle lighting and perimeter pot lights are not required, and any excessive complication of the lighting system is strongly discouraged. Workshop or Skills rooms may have multiple room fronts and postings around the room, so may use a full perimeter zone instead of a front blackboard zone.

To achieve multiple light levels in a zone, it is preferred to have multi-lamp fixtures with lamps on different switches. All rows of lamps should be parallel to the front, as shown:



A three lamp fixture can be arranged in rows as:

AAB AAB AAB AAB AAB - 2 switches, for 0%, 33%, 66%, 100% control

A two lamp fixture can be arranged in rows as:

AB AB AB AB AB AB - 2 switches, for 0%, 50%, 100% control

If the fixtures cannot have multiple-lamp control, use a checkerboard pattern:

A B A B A B A B A

B A B A B A B A B

A B A B A B A B A - 2 switches, for 0%, 0%, 100% control.

5.2 LIGHTING CONTROLS

Electronic controls from AV control podium are optional, per AV group.

In addition to any AV control podium controls:

(1) Full manual control switches on wall by AV control area (switches 4' from floor). Screen control switch in same vicinity.

(2) Either duplicate full control or simple master on/off at main room entrance. Optional at other room entrances, per client request.

Simplest controls are better. Label if more than 2 switches. Electronic switch systems should have clear-to-read integrated labels or wall mounted diagram of switches.

Typical switch configuration (small/medium room):

- (1) Blackboard zone, on/off
- (2) Student zone a (33% level across student zone)
- (3) Student zone b (66% level across student zone)
- (4) Power screen control

If the switches are on the side wall, have the Blackboard switch located on the end closest to the blackboard.

5.3 ELECTRONIC LIGHTING

Electronic lighting systems can now have individual IP addresses allocated to each fixture, for full remote digital control. In such configurations ensure (through testing) that the switches themselves are as simple to understand as conventional light switches. Classrooms can have automatic on/off features to save power; private spaces (offices) should not have auto-on.



6 SEATING

6.1 CAPACITY

Seating capacity is to be listed on room data sheets.

Typical minimum classroom space allocation:

Seminar or Horseshoe (Case)	2.4 m ² /station	0.4 stations/m ²
Workshop (group tables)	2.4 m ² /station	0.4 stations/m ²
Lecture Style, fixed or loose	1.7 m ² /station	0.59 stations/m ²
Tablet Arms	1.5 m ² /station	0.67 stations/m ²

These numbers affected by room shape and seating type. Can be used for gross-up (reflect net area inside the room)

6.2.1 ROW DEPTH

Clear row space between furniture:

Loose desks	30" minimum gap between rows
Fixed continuous	30" minimum gap between rows (loose seating)
	30" minimum gap between rows (radius-arm seating)
Fixed Tablet Arm	15.75" absolute minimum (per Ontario building code)
	18" recommended minimum gap (tablet/seat retracted)

Ontario Building Code requires 400mm / 15.75" clear between rows of fixed seating for fire egress (OBC 3.3.2.3 (2)), with the seat and tablet/table in 'closed' or folded position. Loose seating is not subject to this requirement.

6.2.2 TIER DEPTH

Ideally tier depth is designed to allow changes in seating type. Functionally a 36" tier depth is the minimum (Tablet arm seats), 48" tiers will allow any of the current types of lecture hall seating. Design for 4' tiers, if possible.

Otherwise, typical tier depths:

Fixed Theatre tablet arm seats	1100mm (43" full tier depth)
Fixed tables with loose seats	46" (16" table depth+30" clear)
Horseshoe/Case	47" (as above with more clear distance due to curve)
Radius-Arm fixed seating	47" - allows clearance for exiting behind seated persons



6.3 TABLET ARM SEATING

Seat Width	minimum 22" Include as many 24"+ wide seats as possible
Tablet size	min. 160 square inches (approx 10" deep by 16" wide) (tending to rectangular). Small pie-shaped tablets are not acceptable.
Left-Hand tablets	Last seat on right (when facing back of room) on all rows to be left-handed (no-predetermined fixed number required)

6.4 CONTINUOUS WRITING DESKS

Continuous writing surfaces are to be cantilevered from support along the front edge rather than supported on intermittent gables (posts not to determine placement of loose seating).

Depth	minimum 15" / 400mm deep
Width	minimum 26", prefer 30" per station 36" wide for accessible stations
Length	Maximum 16 students in a row before aisle (aisle both sides) Maximum 8 students in a row before aisle (aisle one sides)
Modesty panel	required for first 2 rows, optional on later rows
Finish	Light colored laminate (to keep room looking bright) Uneven grain (to hide marking) Typical OSM spec is 'Kensington Maple'
Power	Optional, recommended (usually dependant on budget) Modules located under desk edge, facing student (not on surface)
Data	Wired data connection not required due to UofT wireless

6.5 LOOSE CLASSROOM TABLES

Exam	Typical 20"x30"+
Individual	Typical 24" x 36"
Student station	Depth 18" minimum Width 24" minimum/student (not to exceed 6 students in a row) 30" Recommended

Typical classroom tables are 60" wide for each pair of students (either 24 or 30" deep);



48" (x24") for areas where capacity is a premium.

Group tables Round - 5' diameter for 6 persons
 30"x60" - can be used for 4 persons (facing)
 36"x72" - 5 person (on on end)

6.6 POWER

Power outlets:

- 1 (duplex) by entrance for caretaking staff
- 1 in middle of presentation wall
- 2 (Quadplex) at AV control area
- 1 in ceiling at left side of screen housing (for power screen)
- 1 in ceiling at projector location
- General - around room perimeter at 10' intervals

At student stations:

Standard does not require power at all student stations, (due to associated cost) however it is preferred if possible.

Power at fixed tables/tablet arms:

1 outlet per station or 2 between 2 stations

Power at fixed tables:

Power plug-in unit attached to **UNDERSIDE** of table at front edge (leaves top smooth and clear). Prefer avoid top-mounted outlets as the lids break over time and the top surface is made uneven.

Alternate options for fixed seating:

If power cannot be done at all stations, option to provide power at front row only, or power at aisle seats.

Power at loose tables:

Loose tables are by nature reconfigurable so best option is power points inset in floor with covers flush to floor. Even if tables are planned for stationary location, this is a good option for flat-floor rooms as use may change over time. If the tables have built-in power point then still use a flush floor ballast/power point with a loose plug-in extension from the table mount to the floor.

6.7 DATA / INTERNET

At the St. George campus room internet is via wireless

<http://wireless.utoronto.ca/>

This infrastructure is separate from the rest of room AV. Generally one wireless point (wireless router mounted in ceiling cavity) is installed for each 2 or 3 classrooms. These modems require



1 network cable/port per. Power not required. Check with network services for requirements.

Hard-wired internet for the instructor is included as part of the Teaching Station and Teaching Station Jr. control podiums.

7 OTHER

Other reference documents:

- 4.4
Electronic Classrooms at the University of Toronto
Final Report by the Academic Computing Advisory Committee's
Subcommittee on Classroom Technology Standards
30 April 2007
- Design Criteria for Classrooms 2009