

Classroom Technology Standards Office of Information Technology Technology Support Services, ClassTech



Please direct all inquiries to classtech@ncsu.edu.

TABLE OF CONTENTS

DOCUMENT PURPOSE	1
Process	2-3
Learning Space AV/IT Functionality: Expectations	4-5
Infrastructure Basics	6-13
AV/IT Design Criteria	
Technology Package Deliverables	15
Classroom/Lecture Capture	16-17
Type-S Room Technology Package	18-20
Type-M Room Technology Package	21-24
Type-A Room Technology Package	25-28
Appendix A: Referenced Documents & Websites Listing	29-30
Appendix B: Technology Definitions & Descriptions	31-32

DOCUMENT PURPOSE

The following pages outline the technology standard(s), both infrastructure and technology based, that is available in all OIT/ClassTech supported spaces. They are provided to assist users in identifying functionality needed for a given space, regardless of support structure (centralized or departmental). Additional information is located in the Appendices, and serves as guidelines for meeting this design/technology standard. This information goes hand-in-hand with the Classroom Construction Standards that are a part of the University's Construction Guidelines.

This document should be the reference manual for any project pertaining to classroom technology in '110' spaces at North Carolina State University. Contractors and/or consultants will adhere to the standards laid out in this document, in order to fall in line with the technology standards set forth.

There are sections related to Process, Design Criteria, Expected Functionality, Lecture Capture, amongst others.

Classroom technology does not drive pedagogy. The goal is to provide an environment that facilitates a high level learning experience for both faculty and students, that is unobtrusive to the user who opts not to employ technology on a daily basis. Users should expect a baseline technology package wherever they lecture, and regardless of the college or department they are affiliated with.

Technology standards are evaluated on a continual basis, while taking emerging technologies and faculty pedagogy into account, student interactions/expectations, as well as industry standards & enforcement (impact of HDCP, etc.). There are several key components to this process. One of these components is the importance of providing a consistent user experience in 110 classrooms, which can only be achieved with a sound technology evaluation process. As part of this, the NC State Multimedia Convenience Contract (document **63-TTA10081**, **Appendix A**, **Row 2**) was devised, and is updated on regular intervals. This contract lays out a framework to assist the campus at large with purchases and vendor decisions. Another key component is receiving feedback from campus stakeholders. To that end, the Classroom Technology Working Group was formed. This group is comprised of a/v support specialists, and upper management. Their unique insight is important as their use cases are driven by faculty and student needs, which are unique to each college represented.

1

Process

FACILITIES DIVISION INTERACTION

The Facilities Division is responsible for managing Capital Projects (new building and large scale renovation), with a smaller division within Facilities responsible for classroom renovations – Design and Construction Services (referred to as DCS). Registrations and Records, being the 'owner' of all 110 spaces on campus, will determine the schedule for which rooms are to be renovated in any given fiscal cycle, and communicate those needs to DCS. DCS will manage the project from that point forward as the subject matter experts on buildings/classroom renovations, and will be responsible for managing all project timelines and entities ClassTech and DCS work closely to ensure that AV/IT infrastructure and design guidelines are being followed as part of the larger project scope.

This partnership with Facilities allows for the introduction of AV/IT requirements at the design/programming phases of projects. The outcome is a more cost effective approach to classroom design and renovations, which is a substantial boost to integration timelines, and budgetary savings (fewer 'change orders' to meet the expected outcome).

The process for planning, designing, and constructing buildings at NC State is well established within the Facilities Division. Extensive documentation outlining this process is available from the Office of the University Architect (https://facilities.ofa.ncsu.edu/oua/).

The chief driving factor behind setting technology standards is the Classroom Designation model set forth by the UNC-GA (General Administration). ClassTech chiefly designs and supports what is designated as 110 classrooms, thus the campus technology standard is geared toward these spaces (and their needs from a lecture standpoint).

Important Note:

At this time, Facilities is responsible, with input from OIT, for purchasing both lecterns and projector screens. They work closely with OIT/ClassTech in determining the design needs for lecterns, as well as proper projector screen size and placement.

CLASSROOM DESIGNATION: 110

By definition, "110" classrooms all have similar characteristics. UNC-GA's (General Administration) definition of a "110" classroom describes it as a basic lecture-style classroom having no equipment, furnishings, or configuration that are particular to teaching any one discipline. This allows many of the design characteristics for "110" classrooms to be predetermined. However, it is still important to guide the users through the process so that they understand why things are done in a particular way as well as insure any special requirements can be addressed.

Designs for non "110" spaces will need to be considered on a case by case basis depending on the needs of the user group, as these spaces are as varied as "110" classrooms are standard.

Facilities provides guidelines that must be followed at the onset of any project where 110 designated spaces are involved. These guidelines can be found at the following URLs:

Construction Guidelines	https://go.ncsu.edu/con_guidelines
Planning & Design: Classrooms	https://go.ncsu.edu/con_classrooms

The core guideline relating to 110 spaces is referenced on row 2 of the above table (Planning & Design: Classrooms). This document closely ties room design parameters to the technology deliverables that are required of that design.

Learning Space AV/IT Functionality

Faculty, including other stakeholders and user groups, will have some level of expectations in relation to technology functionality in 110 designated classrooms. These core expectations are referenced below, and are open to discussion, enhancement, and/or removal of specific items not deemed within the scope of current lecturing pedagogy, or technology standards/trends.

Computing	 Standard campus environment Ability to access digital media storage (CDs, DVDs, USB, etc.) Internet access (web, email, etc.) Streaming media capability Access to network file space Convenience of in-room computing Ability to display digital slideshows Microsoft Office Suite (Word, Excel, PowerPoint, etc.) Access to common set of specialized software Ability to display remote computing devices
Annotation & Writing	 Digital Visualizer, aka: Document Camera Ability to display and manipulate books, transparencies or other hard copy material in color and high resolution Whiteboard, or Chalkboard Ability for impromptu writing while simultaneously projecting material
User-Provided Technology	 Ability to utilize external computing devices (power, wireless connectivity, audio, video connectivity) Ability to connect external AV devices
Commercial Media	Ability to play DVD media

Technology Usability & Support	 Speech amplification (when necessary) Reliability of secure technology in a controlled environment Capability to comply with Section 508 accommodation regulations Remote management of classroom equipment Standard user interface Fixed installation Rapid access to technical support
Nonstandard Functionality	 Mobile installation Ability to audio conference with remote sites Ability to integrate students from remote locations into the classroom Ability to video conference with remote sites Ability to display and capture student work from in class exercises Ability to install software for in class use

Infrastructure Basics

There are numerous construction guidelines put in place, and enforced, by the Facilities Division. For more detail on these guidelines, please refer to the links at the bottom of page 3.

Important Points:

- Classroom design should accommodate current pedagogies, and technologies, while at the same time providing the opportunity for new techniques to be incorporated in the future. To help accomplish this goal, all new or renovated classroom facilities at NC State will receive an infrastructure package based on the description provided herein, and the 'A/V Conduit Riser Diagram' shown below. This infrastructure must be laid out specifically for each space that requires or may require a/v technology.
- The technology included in each classroom will be determined by NC State, with some level of input from the 'local' College represented.
- Technology information, and specifications, can be obtained at
 - https://oit.ncsu.edu/classtech/technology-standards
 - OIT web pages are under renovation, and the addresses may change.

Below, are the infrastructure requirements that ensure a successful technology deployment can take place. These requirements are in direct support of the technology [hardware] standard that is set/maintained by OIT. The following is a baseline, with actual data determined as part of the site visit phase during construction or renovation.

All referenced diagrams can be found in the 'Planning & Design: Classrooms' document: https://go.ncsu.edu/con_classrooms.

CLASSROOM LAYOUT DIAGRAM

This diagram illustrates typical spacing, view angles and design issues to be considered. This serves only as a reference point, with minimum requirements referenced.



- This drawing intended to illustrate various classroom requirements, spacing, aisle sizes, etc.
 Drawing is for reference only!
 Different seating styles shall not be mixed in classrooms.
- Aisle for fixed tables may be located at the side or center of the classroom.
- Collaborative/Computer teaching methods may require group/flexible seating arrangements. Additional space may be required to accommodate capacity and required aisle spacing, etc.
- View angles for all dry erase/black boards, and projection screens, should be considered when selecting seat layout and selection.



- Tablet Arm Chairs
- Fixed tabled and movable chairs

CLASSROOM SECTION

This diagram illustrates typical layout and design issues to be considered.



The important component to consider is viewing angles, throw distance from projector to screen, and that the lecturer/user should not block the projected image from the viewer (screen height from floor).

LECTERN DIAGRAM

This diagram illustrates typical layout and design issues to be considered.



A/V RISER DIAGRAMS

These diagrams illustrate typical A/V conduit layout, and design issues to be considered.



TYPICAL A/V CONDUIT RISER SMARTBOARD & LCD PANEL (TV)



SCREEN SIZE MATRIX

This table is not exhaustive, nor can be applied to all technology design packages, and/or current deployments of technology. Specific needs related to pedagogy, or 'course type', may drive these distance values to meet those needs.

There are standards in place for viewing distance, related to `Least Favored Viewer'. These are defined as 4x, 6x, and 8x - all relating to a multiplier to screen (image height) height.

4X: Inspection Viewing

Detailed viewing of video, where clarity is the necessity. Furthest viewer can be no further than 4X the Screen Height.

6X: Presentation Viewing

Typical distance to furthest viewing for presentations. PowerPoint, Websites, etc., all follow this paradigm for lecture halls.

8X: Video Viewing

This distance standard is reserved for viewing of video. Media encompasses movies, YouTube style content, etc.

The following chart outlines viewing characteristics for Presentation Viewing.

Presentation Characteristics 6X Viewing Model

Least Favored Viewer	Minimum Image Height	16:10 Image Width	Screen Diagonal	Minimum Ceiling Height at Screen	Minimum Distance to Front Row Seat
12′	2′	3′ 2″	3′ 9″	6′	4'
18′	3′	4' 10"	5′ 8″	7′	6′
24′	4′	6′ 5″	7′ 7″	8′	8′
30′	5′	8′	9′ 5″	9	10′
36′	6′	9′ 7″	11′ 4″	10′	12′
42′	7′	11′ 2″	13′ 2″	11′	14′
48′	8′	12' 10"	15′ 1″	12′	16′
54′	9′	14′ 5″	17′	13′	18′
60′	10'	16′	18' 10"	14′	20′
66′	11'	17′ 7″	20' 9"	15′	22′
72`	12′	19' 2″	22′ 8″	16′	24′
78′	13′	20' 10"	24' 6″	17′	26′
84′	14′	22′ 5″	26′ 5″	18′	28′
90′	15′	24′	28′ 4″	19′	30′
96′	16′	25′ 7″	30′ 2″	20′	32′
102′	17′	27′ 2″	32′ 1″	21′	34′
108′	18′	28' 10"	34′	22′	36′
114′	19′	30′ 5″	35′ 10″	23′	38′

AV/IT Design Criteria

At a minimum, classroom a/v should meet a prescribed level of functionality to be adequate to the lecturing experience. Although there are specialty spaces that require equipment to suit those needs, in general terms most needs are met under the following conditions:

Db Level Range: Program Audio at Furthest Listener	70-85 dB SPL
Db Level Range: Speech Reinforcement at Furthest Listener	55-70 dB SPL
Task Lighting Level Without A/V	540 lux
Task Lighting Level With A/V	325 lux
Image Brightness on Screen	1500 lux
Contrast Ratio on Screen	10:1
Minimum Font Size (Presentation)	24 point
Max Vertical View Angle for Closest Viewer (top of screen)	< 30 degrees
Max Off-Axis View Angle for Closest Viewer (center of screen)	< 45 degrees

Technology Package Deliverables

The following packages are designed to meet the criteria set forth in the above section of this document. There are times where budgetary constraints may prevent a perfect mix of architecture (room design) and technology.

TYPE-S: SMALL CLASSROOM DESIGNATION, < 50 SEATS

- 5,000+ Lumen Projector
 - 16x10 Aspect Ratio @ 60Hz
- 16x10 Projection Screen
- Digital Visualizer
- Program Audio Speakers
- Auxiliary/Laptop Connections
 - Analog (VGA) & Digital (HDMI, Mini DisplayPort) Connections
 - 3.5mm Audio, Power

TYPE-M: MEDIUM CLASSROOM DESIGNATION, ≥ 50 < 100

- 5,000+ Lumen Projector(s) (Single or Dual Projector, Based on Layout)

 16x10 Aspect Ratio @ 60Hz
- 16x10 Projection Screen
- Digital Visualizer
- Program Audio Speakers
- Speech Reinforcement via Lapel Microphone/Bodypack
- Auxiliary/Laptop Connections
 - Analog (VGA) & Digital (HDMI, Mini DisplayPort) Connections
 - 3.5mm Audio, Power
- Assistive Listening System (ADA Compliance)

TYPE-A: AUDITORIUM CLASSROOM DESIGNATION, ≥ 100

- 5,000+ Lumen Projector(s) (Single or Dual Projector, Based on Layout)
 - Additional screens, typically LCD, can be deployed as needed
 - \circ 16x10 Aspect Ratio @ 60Hz
- 16x10 Projection Screen
- Digital Visualizer
- Program Audio Speakers
- Speech Reinforcement via Lapel Microphone/Bodypack
- Auxiliary/Laptop Connections
 - Analog (VGA) & Digital (HDMI, Mini DisplayPort) Connections
 - \circ 3.5mm Audio, Power
- Assistive Listening System (ADA Compliance)

Classroom/Lecture Capture

The Office of Information Technology has standardized on Sonic Foundry's Mediasite classroom capture product line. In partnership with DELTA (Distance Education and Learning Technology Applications, NCSU), ClassTech has deployed a large number of capture units across campus. DELTA also maintains their own technology rich environments that are utilized for online learning, as well as maintaining the server backend necessary for these systems to function. This partnership with DELTA provides access to subject matter experts, as well as leveraging their maintained backend systems (server and storage) – a significant cost savings.

As well as hardware based recorders (Mediasite Rack Mount), there is a campus standard for Desktop Recording. This standard is also made available by DELTA, and is the My Mediasite software platform from Sonic Foundry. This software package is not currently installed in classrooms, as it's intent is to be used in small studios, or the user's office.

Note: Colleges/Departments can deploy other capture solutions as fits best with their objectives. However, those solutions falling outside the campus standard will not have enterprise level support available to their user base(s).

CURRENT HARDWARE & SOFTWARE STANDARDS

Hardware Campus Standard (2015): Sonic Foundry, Mediasite RL700 Desktop [Software] Campus Standard (2015): Sonic Foundry, My Mediasite

PROCESS REGARDING CAPTURE AND DATA RETENTION

The current process requires that faculty interested in classroom capture must "Opt-In" for the service via the following url:

https://go.ncsu.edu/classroom_capture_portal

Once that step is completed, a "Classroom Capture" button will be present on the touch panel in the classroom. Touching this button will kick off the recording process, which includes verifying that the course data is correct. After the class has ended, the recording is pushed to the server, and is typically available for viewing within 15 minutes.

RECORDING/DATA RETENTION

A retention SOP was adopted in the Spring of 2015 that calls for recordings to be deleted after three years if they have had less than 5 views in the previous 18 months. Content will not be deleted until 12 months after that initial notification. Currently, annual clean-up of file space is handled by administrators for the various Mediasite instances (tied to Colleges within the University).

When requested by faculty, Publish-to-Go and Vodcast files can be made available from DELTA. These requests must be submitted to DELTA directly via mediasite-help@ncsu.edu.

Note:

Although Mediasite is the current campus standard for Classroom Capture, it is not deployed to every OIT/ClassTech supported space. For this reason, it is not added to the Equipment List for each room type (Type-S, Type-M, and Type-A) in the proceeding sections. The a/v signal and rack elevations files do show the required connections [and rack layouts] for these "standard" room types.

TYPE-S ROOM EXPANDED EQUIPMENT LISTS, SIGNAL FLOWS, & RACK ELEVATIONS

DESIGNATION: SMALL CLASSROOM (TYPE-S)

Below represents the current technology deployment to meet the digital standard for small classrooms under the OIT/ClassTech support model.

Seat Count: < 50

Equipment lists, signal flows, and rack elevations can be downloaded at the following URLs:

Equipment List

https://go.ncsu.edu/type-s_equipment

Signal Flow

- https://go.ncsu.edu/type-s_signal_flow
- https://go.ncsu.edu/type-s_signal_flow_capture (Mediasite)

Rack Elevation

- https://go.ncsu.edu/type-s_rack
- https://go.ncsu.edu/type-s_rack_capture

The following pages outline the current equipment required to meet the technology standard for this room type.

For more information, please visit https://go.ncsu.edu/classtech!

Equipment List

Switching				
Line Item	Manufacturer	Part Number	Description	Count
1	Crestron	DMPS3-300-C	DigitalMedia Presentation Switcher	1
		DM-RMC-SCALER-	DigitalMedia 8G+™ Receiver &	
2	Crestron	С	Room Controller w/Scaler	2

Audio				
Line Item	Manufacturer	Part Number	Description	Count
1	Extron	60-1308-03	SM 26 8 ohm – White, Pair	1

Video				
Line Item	Manufacturer	Part Number	Description	Count
1	NEC	NP-PA571W-13ZL	5700 Lumen Widescreen Projector	1

Control				
Line Item	Manufacturer	Part Number	Description	Count
1	Crestron	TSW-1052-B-S	10.1" Touch Screen, Black Smooth	1
		TSW-1050-TTK-B-	Tabletop Kit for TSW-1050 & TSW-	
2	Crestron	S	1052, Black Smooth	1

Hardwar	Hardware				
Line Item	Manufacturer	Part Number	Description	Count	
1	Extron	60-1405-02	Cable Cubby 700 - Black-with US AC Power Module	1	
2	Extron	26-614-02	High Performance HDMI Male to DVI-D Male Cables 6'	1	
3	Extron	26-614-03	High Performance HDMI Male to DVI-D Male Cables 12'	1	
4	Extron	26-679-06	Mini DisplayPort to HDMI adapter cable	1	
5	Extron	70-678-08	Cable Retraction System for Cable Cubby Access Enclosures - Filler Module - Retractor	1	
6	Extron	70-1066-11	VGA M-M and 3.5 mm Stereo M-M	1	
7	Extron	70-1066-04	HDMI Male to Male	1	
8	Extron	26-663-12	Ultra Flexible High Speed HDMI Cables - 12'	1	
9	Extron	26-663-06	Ultra Flexible High Speed HDMI Cables - 6'	3	
10	Extron	60-718-11	MLP 101 AAP Black	1	
11	Extron	60-632-02	AAP 301 1U Rack Mount	1	
12	Extron	70-615-22	Extron DVI-I Female to DVI-I AAP	1	

13	Extron	70-090-11	Extron Blank Plate - Single (Black)	1
14	Extron	70-090-12	Extron Blank Plate - Double	2
15	Extron	70-718-01	Single AAP Blank Black	1
			8-Port Gigabit GREENnet PoE+	
			Switch (4 x Gigabit PoE/PoE+	
16	Trendnet	TPE-TG44g	Ports and 4 x Gigabit Ports)	1
		221P-3.5TRSM-M-	3.5mm Stereo Audio cable for	
17	Liberty	10	permanent installations	4
18	Middle Atlantic	BL1	Single Space Blank	5
19	Middle Atlantic	D2	2RU Drawer	1
20	Middle Atlantic	PD915-R	Power Strip Switched	1
21	Middle Atlantic	PD815R-PL	8 Outlet 15A Rackmount Power	2
22	Middle Atlantic	LBP-1A	Lace Bar, L-Shaped	1
23	Middle Atlantic	HP	Black Matte Rack Screws	2
24	Middle Atlantic	RSH4A	Custom Plate for Dell 9020	1
25	Middle Atlantic	RC-2	Rack Clamping Shelf - 2RU	3
26	Middle Atlantic	Slim 5-14	Equipment Racks	2
			60"x96" Tensioned Advantage	
27	Da-Lite	34538LS	Electrol	1
28	Chief	CMS006009	6-9" Adjustable Extension Column	1
29	Chief	CMS445	Projector Mount Ceiling Tile Kit	1
30	Chief	RPMA285	Custom Projector Projector Mount	1
31	Wolfvision	VZ-8Light4	Visualizer	1
32	Dell Inc.	Optiplex 9020 SFF	PC w/ 22" Widescreen Monitor	1
33	Spectrum	95512	Monitor Mount	1

Bulk Cables and Connectors					
Line Item	Manufacturer	Part Number	Description	Count	
		24-4P-P-L5SH-	Plenum CAT5E Shielded Twisted		
1	Liberty	WHT	Pair Cable	250	
			Plenum 22 Gauge 2 Conductor		
2	Liberty	22-2C-PSH-BLK	Stranded Sheilded Cable	250	
			Commercial Grade General		
			Purpose 16 AWG 2 Conductor		
3	Liberty	16-2C-P-WHT	Plenum Cable	250	
4	Liberty	PCB010BL	10' CAT 6 Patch Cable - Blue	10	
			RJ45 Shielded Modular CAT5		
5	Liberty	100020	Connector -50	1	
			Neutrick Professional Audio XLR 3-		
6	Liberty	NC3FXX	Pin female Connector	2	
			D-SUB 9-Pin Male Solder		
7	BTX	CD-9709M	Connector	4	
			D-SUB 9-Pin Female Solder		
8	BTX	CD-9709S	Connector	2	
9	BTX	CD-DPH9R	DB9 Platic Hood w/ Thumbsrews	6	

DESIGNATION: MEDIUM CLASSROOM (TYPE-M)

Below represents the current technology deployment to meet the digital standard for medium classrooms under the OIT/ClassTech support model.

Seat Count: $\geq 50 < 100$

Equipment lists, signal flows, and rack elevations can be downloaded at the following URLs:

Equipment List

- https://go.ncsu.edu/type-m_equipment_single_proj
- https://go.ncsu.edu/type-m_equipment_dual_proj

Signal Flow

- Below represents the most common deployment for this room type
 Dual Projection Setup, with Speech Reinforcement
- https://go.ncsu.edu/type-m_signal_flow_70volt
- https://go.ncsu.edu/type-m_signal_flow_capture (Mediasite)

Rack Elevation

- Below represents the most common deployment for this room type
 Dual Projection Setup, with Speech Reinforcement
- https://go.ncsu.edu/type-m_rack
- https://go.ncsu.edu/type-m_rack_capture (Mediasite)

The following pages outline the current equipment required to meet the technology standard for this room type, **under a dual projector setup**.

For more information, please visit https://go.ncsu.edu/classtech!

Equipment List

Switching				
Line Item	Manufacturer	Part Number	Description	Count
			DigitalMedia Presentation	
1	Crestron	DMPS3-300-C	Switcher	1
			DigitalMedia 8G+™ Receiver &	
2	Crestron	DM-RMC-SCALER-C	Room Controller w/Scaler	3

Audio				
Line Item	Manufacturer	Part Number	Description	Count
1	Extron	60-1308-03	SM 26 8 ohm - White, Pair	1
			SI 26T 70v - White Pair - Speeh	
2	Extron	42-070-03	Reinforcement	3
3	QSC	CX602V	2-CH 70V Power Amplifier	1
			Wireless Microphone System	
4	Shure	BLX14/CVL	(Body Pack, Mic, Transmitter)	1

Video				
Line Item	Manufacturer	Part Number	Description	Count
			5700 Lumen Widescreen	
1	NEC	NP-PA571W-13ZL	Projector	2

Control				
Line Item	Manufacturer	Part Number	Description	Count
			10.1" Touch Screen, Black	
1	Crestron	TSW-1052-B-S	Smooth	1
			Tabletop Kit for TSW-1050 &	
2	Crestron	TSW-1050-TTK-B-S	TSW-1052, Black Smooth	1

Hardware				
Line Item	Manufacturer	Part Number	Description	Count
1	Extrop	60 1405 02	Cable Cubby 700 - Black-with	1
L	EXTLOU	60-1405-02	High Performance HDMI Male to	L
2	Extron	26-614-02	DVI-D Male Cables 6'	1
3	Extron	26-614-03	High Performance HDMI Male to DVI-D Male Cables 12'	1
4	Extron	26-679-06	Mini DisplayPort to HDMI adapter cable	1
5	Extron	70-678-08	Cable Retraction System for Cable Cubby Access Enclosures - Filler Module - Retractor	1
6	Extron	70-1066-11	VGA M-M and 3.5 mm Stereo M-M	1

7	Extron	70-1066-04	HDMI Male to Male	1
			Ultra Flexible High Speed HDMI	
8	Extron	26-663-12	Cables - 12'	1
9	Extron	26-663-06	Cables - 6'	3
10	Extron	60-718-11	MLP 101 AAP Black	1
11	Extron	60-632-02	AAP 301 1U Rack Mount	1
12	Extron	70-615-22	Extron DVI-I Female to DVI-I AAP	1
13	Extron	70-090-11	Extron Blank Plate - Single (Black)	1
14	Extron	70-090-12	Extron Blank Plate - Double	2
15	Extron	70-718-01	Single AAP Blank Black	1
16	Trendnet	TPE-TG44g	8-Port Gigabit GREENnet PoE+ Switch (4 x Gigabit PoE/PoE+ Ports and 4 x Gigabit Ports)	1
17	Liberty	221P-3.5TRSM-M-10	3.5mm Stereo Audio cable for permanent installations	4
18	Middle Atlantic	BL1	Single Space Blank	5
19	Middle Atlantic	D2	2RU Drawer	1
20	Middle Atlantic	PD915-R	Power Strip Switched	1
21	Middle Atlantic	PD815R-PL	8 Outlet 15A Rackmount Power	2
22	Middle Atlantic	LBP-1A	Lace Bar, L-Shaped	1
23	Middle Atlantic	НР	Black Matte Rack Screws	2
24	Middle Atlantic	RSH4A	Custom Plate for Dell 9020	1
25	Middle Atlantic	RC-2	Rack Clamping Shelf - 2RU	3
26	Middle Atlantic	Slim 5-14	Equipment Racks	2
27	Da-Lite	34538LS	60"x96" Tensioned Advantage Electrol	2
28	Chief	CMS006009	6-9" Adjustable Extension Column	2
29	Chief	CMS445	Projector Mount Ceiling Tile Kit	2
30	Chief	RPMA285	Custom Projector Projector Mount	2
31	Wolfvision	VZ-8Light4	Visualizer	1
32	Dell Inc.	Optiplex 9020 SFF	PC w/ 22" Widescreen Monitor	1
33	Spectrum	95512	Monitor Mount	1

Bulk Cables and Connectors					
Line Item	Manufacturer	Part Number	Description	Count	
			Plenum CAT5E Shielded Twisted		
1	Liberty	24-4P-P-L5SH-WHT	Pair Cable	500	
2	Lib autor		Plenum 22 Gauge 2 Conductor	250	
2	Liberty	22-2C-PSH-BLK	Stranded Shelided Cable	250	
			Commercial Grade General		
_			Purpose 16 AWG 2 Conductor		
3	Liberty	16-2C-P-WHT	Plenum Cable	500	
4	Liberty	PCB010BL	10' CAT 6 Patch Cable - Blue	10	
			RJ45 Shielded Modular CAT5		
5	Liberty	100020	Connector -50	1	
			Neutrick Professional Audio XLR		
6	Liberty	NC3FXX	3-Pin female Connector	2	
			D-SUB 9-Pin Male Solder		
7	BTX	CD-9709M	Connector	4	
			D-SUB 9-Pin Female Solder		
8	BTX	CD-9709S	Connector	2	
			DB9 Platic Hood w/		
9	BTX	CD-DPH9R	Thumbsrews	6	

24

DESIGNATION: AUDITORIUM CLASSROOM (TYPE-A)

NOTE:

Type-A classrooms are similar in scope and technology to Type-M, with the differentiator being seat count. In rare setups, there could be a need for a 3^{rd} projector in these spaces (currently only 1 space meets this criteria). For this reason, the referenced documents match those of the Type-M standard.

Below represents the current technology deployment to meet the digital standard for medium classrooms under the OIT/ClassTech support model.

Seat Count: \geq 100

Equipment lists, signal flows, and rack elevations can be downloaded at the following URLs:

Equipment List

- https://go.ncsu.edu/type-m_equipment_single_proj
- https://go.ncsu.edu/type-m_equipment_dual_proj

Signal Flow

- Below represents the most common deployment for this room type
 Dual Projection Setup, with Speech Reinforcement
- https://go.ncsu.edu/type-m_signal_flow_70volt
- https://go.ncsu.edu/type-m_signal_flow_capture (Mediasite)

Rack Elevation

- Below represents the most common deployment for this room type
 Dual Projection Setup, with Speech Reinforcement
- https://go.ncsu.edu/type-m_rack
- https://go.ncsu.edu/type-m_rack_capture (Mediasite)

The following pages outline the current equipment required to meet the technology standard for this room type, **under a dual projector setup**.

For more information, please visit https://go.ncsu.edu/classtech!

Equipment List

Switching					
Line Item	Manufacturer	Part Number	Description	Count	
			DigitalMedia Presentation		
1	Crestron	DMPS3-300-C	Switcher	1	
			DigitalMedia 8G+™ Receiver &		
2	Crestron	DM-RMC-SCALER-C	Room Controller w/Scaler	3	

Audio				
Line Item	Manufacturer	Part Number	Description	Count
1	Extron	60-1308-03	SM 26 8 ohm - White, Pair	1
			SI 26T 70v - White Pair - Speeh	
2	Extron	42-070-03	Reinforcement	3
3	QSC	CX602V	2-CH 70V Power Amplifier	1
			Wireless Microphone System	
4	Shure	BLX14/CVL	(Body Pack, Mic, Transmitter)	1

Video				
Line Item	Manufacturer	Part Number	Description	Count
			5700 Lumen Widescreen	
1	NEC	NP-PA571W-13ZL	Projector	2

Control	Control				
Line Item	Manufacturer	Part Number	Description	Count	
			10.1" Touch Screen, Black		
1	Crestron	TSW-1052-B-S	Smooth	1	
			Tabletop Kit for TSW-1050 &		
2	Crestron	TSW-1050-TTK-B-S	TSW-1052, Black Smooth	1	

Hardware				
Line Item	Manufacturer	Part Number	Description	Count
1	Extron	60-1405-02	Cable Cubby 700 - Black-with US AC Power Module	1
2	Extron	26-614-02	High Performance HDMI Male to DVI-D Male Cables 6'	1
3	Extron	26-614-03	High Performance HDMI Male to DVI-D Male Cables 12'	1
4	Extron	26-679-06	Mini DisplayPort to HDMI adapter cable	1
5	Extron	70-678-08	Cable Retraction System for Cable Cubby Access Enclosures - Filler Module - Retractor	1
6	Extron	70-1066-11	VGA M-M and 3.5 mm Stereo M-M	1

7	Extron	70-1066-04	HDMI Male to Male	1
0			Ultra Flexible High Speed HDMI	
8	Extron	26-663-12	Cables - 12'	1
9	Extron	26-663-06	Cables - 6'	3
10	Extron	60-718-11	MLP 101 AAP Black	1
11	Extron	60-632-02	AAP 301 1U Rack Mount	1
12	Extron	70-615-22	Extron DVI-I Female to DVI-I AAP	1
13	Extron	70-090-11	Extron Blank Plate - Single (Black)	1
14	Extron	70-090-12	Extron Blank Plate - Double	2
15	Extron	70-718-01	Single AAP Blank Black	1
16	Trendnet	TPE-TG44g	8-Port Gigabit GREENnet PoE+ Switch (4 x Gigabit PoE/PoE+ Ports and 4 x Gigabit Ports)	1
17	Liberty	221P-3.5TRSM-M-10	3.5mm Stereo Audio cable for permanent installations	4
18	Middle Atlantic	BL1	Single Space Blank	5
19	Middle Atlantic	D2	2RU Drawer	1
20	Middle Atlantic	PD915-R	Power Strip Switched	1
21	Middle Atlantic	PD815R-PL	8 Outlet 15A Rackmount Power	2
22	Middle Atlantic	LBP-1A	Lace Bar, L-Shaped	1
23	Middle Atlantic	HP	Black Matte Rack Screws	2
24	Middle Atlantic	RSH4A	Custom Plate for Dell 9020	1
25	Middle Atlantic	RC-2	Rack Clamping Shelf - 2RU	3
26	Middle Atlantic	Slim 5-14	Equipment Racks	2
27	Da-Lite	34538LS	60"x96" Tensioned Advantage Electrol	2
28	Chief	CMS006009	6-9" Adjustable Extension Column	2
29	Chief	CMS445	Projector Mount Ceiling Tile Kit	2
30	Chief	RPMA285	Custom Projector Projector Mount	2
31	Wolfvision	VZ-8Light4	Visualizer	1
32	Dell Inc.	Optiplex 9020 SFF	PC w/ 22" Widescreen Monitor	1
33	Spectrum	95512	Monitor Mount	1

Bulk Cables and Connectors				
Line Item	Manufacturer	Part Number	Description	Count
			Plenum CAT5E Shielded Twisted	
1	Liberty	24-4P-P-L5SH-WHT	Pair Cable	500
2	Liberty	22-2C-PSH-BLK	Plenum 22 Gauge 2 Conductor Stranded Sheilded Cable	250
3	Liberty	16-2C-P-WHT	Commercial Grade General Purpose 16 AWG 2 Conductor Plenum Cable	500
4	Liberty	PCB010BL	10' CAT 6 Patch Cable - Blue	10
5	Liberty	100020	RJ45 Shielded Modular CAT5 Connector -50	1
6	Liberty	NC3FXX	Neutrick Professional Audio XLR 3-Pin female Connector	2
7	BTX	CD-9709M	D-SUB 9-Pin Male Solder Connector	4
8	втх	CD-9709S	D-SUB 9-Pin Female Solder Connector	2
9	втх	CD-DPH9R	DB9 Platic Hood w/ Thumbsrews	6

APPENDIX A: CONSOLIDATED DOCUMENTS & WEBSITES LISTING

The following tables outline the referenced documentation, and websites, that form the core of this technology standards document.

Should you need to make an inquiry into these listings, or are requesting changes or additions, please contact ClassTech directly (classtech@ncsu.edu).

REFERENCED DOCUMENTS & WEBSITES

REGISTRATION & RECORDS: `110' CLASSROOM LISTING	https://go.ncsu.edu/2015_110-classroom-listing
A/V MULTIMEDIA CONVENIENCE CONTRACT	https://go.ncsu.edu/2015_multimedia_contract
CLASSROOM CAPTURE: MEDIASITE OPT-IN PORTAL	https://go.ncsu.edu/classroom_capture_portal
NC STATE FACILITIES DIVISION: CONSTRUCTION GUIDELINES	https://go.ncsu.edu/con_guidelines
NC STATE FACILITIES DIVISION: PLANNING AND DESIGN – CLASSROOMS	https://go.ncsu.edu/con_classrooms

CLASSROOM TYPES: EQUIPMENT LISTS

TYPE-S DESINGNATION (SMALL)	https://go.ncsu.edu/type-s_equipment
TYPE-M DESIGNATION	https://go.ncsu.edu/type-m_equipment_single_proj
(MEDIUM)	https://go.ncsu.edu/type-m_equipment_dual_proj
TYPE-A DESIGNATION	https://go.ncsu.edu/type-m_equipment_single_proj
(AUDITORIUM)	https://go.ncsu.edu/type-m_equipment_dual_proj

CLASSROOM TYPES: SIGNAL FLOWS

TYPE-S DESINGNATION (SMALL)	https://go.ncsu.edu/type-s_signal_flow https://go.ncsu.edu/type-s_signal_flow_capture (Mediasite)
TYPE-M DESIGNATION (MEDIUM)	https://go.ncsu.edu/type-m_signal_flow_70volt https://go.ncsu.edu/type-m_signal_flow_capture (Mediasite)
TYPE-A DESIGNATION (AUDITORIUM)	https://go.ncsu.edu/type-m_signal_flow_70volt https://go.ncsu.edu/type-m_signal_flow_capture (Mediasite)

CLASSROOM TYPES: RACK ELEVATIONS

TYPE-S DESINGNATION	https://go.ncsu.edu/type-s_rack
(SMALL)	https://go.ncsu.edu/type-s_rack_capture
TYPE-M DESIGNATION	https://go.ncsu.edu/type-m_rack
(MEDIUM)	https://go.ncsu.edu/type-m_rack_capture (Mediasite)
TYPE-A DESIGNATION	https://go.ncsu.edu/type-m_rack
(AUDITORIUM)	https://go.ncsu.edu/type-m_rack_capture (Mediasite)

Appendix B: Technology Product Definitions & Descriptions

Item	Description
Computer	Small form factor computer, installed in lectern.
Auxiliary/Laptop Connection	Laptop connections, made available via the lectern cable cubby. Including VGA, HDMI, Mini DisplayPort, 3.5mm Audio, and Power.
Programmable Control System	An a/v processor, and additional components, that comprise the core system backend. Programming, and touch panel interfaces, provide the user an ability to 'control' the space. Switching between video and audio sources is done via this system.
Touch Panel	Provides ability to control the a/v processor, video and audio inputs, as well as projector screens, and microphone audio.
Wireless Keyboard and Mouse	Provides instructor the flexibility to operate the computer away from the lectern location. Increases support costs.
Interactive Graphics Tablet	Provides the instructor the ability to annotate a computer source and save those annotations in various formats. Can be used as a "digital whiteboard". Increases learning curve for instructors.
Integrated Lighting Control	Individual lighting zone control from the touch panel for added environmental flexibility. Allows for preset scenes to be activated upon selection of sources. Lights can also be controlled remotely for energy savings.
Integrated Screen Control	Localized integrated control of projection screen(s). Provides remote control of screens.
Integrated Shade Control	Localized integrated control of motorized shades. Provides remote control of shades.
LCD Projector	Minimum 5,000 lumen LCD projector with RS 232 capabilities
Large Flat Screen	Minimum 46" diagonal LCD flat panel for small seminar or conference rooms only. Must provide RS 232 capabilities, or network control.
DVD player	Playback is handled via the lectern computer in OIT supported spaces.

Item	Description
Table Top Digital Visualizer	Able to display paper, transparencies, or three- dimensional objects in color in at least XGA resolution.
Ceiling Mounted Digital Visualizer	Able to display paper, transparencies, or three- dimensional objects in color and at least XGA resolution. Must be RS 232 controllable. (Requires Programmable Control System)
LCD monitor for PC	22" LCD display for computer preview
Stereo Speaker System	2 wall mounted speakers with amplifier for basic classroom audio. Volume must be controlled through the control system.
Ceiling Speaker System	Required in larger spaces where speech reinforcement is required. Can be used in place of or in addition to stereo speaker system. Requires separate amplifier from stereo speaker system. Volume must be controlled through the control system.
Surround Sound Speaker System	Multiple wall mounted speakers and a separate processor/amplifier are required. Must be separate from speech reinforcement system. Volume must be controlled through the control system.
Wireless Microphone	Wireless Lavaliere Microphone for the instructor
Wireless Assisted Listening System	Required if voice amplification system is installed
Articulating Arm	Table top mounted arm for LCD monitor or the large touch panel for improved flexibility of use.
Security Hardware	Includes NCSU standard security screws, cables, and locks for cables and doors.
Telephone	Basic NCSU standard telephone for immediate Help Desk support
Classroom Response System	Collects and assimilates input data from audience hand held input devices
Classroom Capture System	Records and saves lectures into digital formats for distribution to students
Lectern	Work surface for instructor as well as location for most AV equipment