UNIVERSITY AT ALBANY CLASSROOM DESIGN GUIDELINES

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CONTENTS

The Classroom Design Guidelines are a tool with which future classroom planning and design at the University at Albany shall be approached. These guidelines set standards that will ensure quality, durability, consistency, sustainability, and appropriateness of materials, lighting fixtures, and interior furnishings across all University classrooms. The ultimate goal of these guidelines is to allow projects not only to succeed individually, but also to align with UAlbany's overall master plan and support the University's mission and core values.

01 INTRODUCTION AND STRATEGY

INTRODUCTION

Classrooms are the primary venue for instructional delivery for the University of Albany, and used regularly by nearly every student and faculty member. As such, they are essential to the University's ability to achieve its mission of engaged teaching and learning.

Well-designed classrooms enhance learning by facilitating interaction among students, between students and instructors, and between students and course materials by creating a physically comfortable environment as a "place" where learning may occur that supports interaction in a multitude of ways.

Classrooms represent only about seven percent of UAlbany's total facilities inventory, however they are the core of the University's teaching mission, housing approximately 80 percent of all scheduled instructional activity. Classrooms by nature are more resource efficient than class labs, both in terms of space requirements and design and maintenance costs being less specialized in terms of fixtures and equipment requirements. An ideal classroom inventory provides a high value at a modest cost.

This report presents the Classroom Design Guidelines for the University at Albany.

The first section, 01 Introduction and Strategy, sets the stage. It places classrooms in their broader context of learning spaces, which also include class labs and informal learning spaces. The section continues to define the factors that led to the development of this report and the applications of this report, which focuses on classrooms.

The second section, 02 Classroom Planning Guidelines, presents the University's guidelines for classroom space planning. The section defines types of classrooms and standards for classroom attributes such as building location, room layouts, and proportions.

The their section, 03 Classroom Design Guidelines, presents the University's design guidelines for classrooms.

LEARNING SPACE STRATEGY

In contrast to the more rapid evolution in styles of teaching and learning, the physical spaces where these activities occur experience change at a much slower rate due the alignment of cultural shifts with facility adjustments. This discrepancy requires a strategic and systematic approach to planning and design of learning spaces including classrooms. All new learning spaces designed at the University at Albany will contribute to a transition in pedagogy focused around student-engagement.

The University at Albany has established the following objectives for all learning spaces.

1 PROMOTE ENGAGEMENT

Promote student engagement with faculty, with other students, and with the course material.

2 PROVIDE VARIETY

Provide variety across the classroom inventory in size, technology level, and furnishing configuration to support UAlbany's diverse departments.

3 PLAN FOR A CHANGING FUTURE

Allow pedagogy to evolve within classrooms by making the physical environment flexible and adaptable to innovations in technology and new ways of teaching and learning.

4 INTEGRATE TECHNOLOGY EFFECTIVELY

Support technology-enhanced learning by making technology available and easy to use, but not intrusive.

5 MEET SUSTAINABILITY STANDARDS

Achieve the sustainability standards of the University, the SUNY System, and the State of New York by providing healthy and comfortable indoor environments, meeting energy efficiency goals, and using environmentally-preferable materials. Utilize space well to minimize the amount of new space that needs to be constructed.

ECOLOGY OF LEARNING SPACES

Teaching and learning is evolving at a rapid rate. Institutions are expanding expectations for what and how students learn in response to the increasing complexity, diversity in learning styles, an advanced understanding of low learning occurs, as well as rapid technology shifts. Methods of teaching and learning are evolving and broadening.

Contemporary teaching and learning approaches place more rigorous demands on both formal and informal learning spaces - or the "spaces between" formal spaces. Spaces must be flexible to multiple modes of learning on-demand. A single course may employ multiple types of spaces over the length of a term. Spaces must integrate a wide range of technology, while remaining nimble to technological advances.

In this context, UAlbany is developing an ecology of learning spaces that includes classrooms and class labs, as well as informal spaces. The learning space types described below and on the opposite page represent the university's ecology of learning spaces. Each type is illustrated with a photo, description, and a list of features.

Learning Space Attributes

UAlbany's ecology of learning spaces needs to engage a diverse student body in the classroom and class lab and beyond. To do this, different types of spaces are provided for different activities and learning styles.

Each learning space type must support a different mix of attributes. Some spaces must be designed to accommodate multiple attributes, such as classrooms that support students working alone and together at different times.

Who is participating?	*Alone*	*Together*
What is the energy level?	*Quiet*	*Buzz*
What is the duration?	*Touch Down*	*Settle In*
Was it planned?	*Scheduled*	*Spontaneous*

	SPACE	FEATURES
CLASSROOMS 	**Classroom** Classrooms are formal learning environments that need to be adapted for presentation, group work, discussions, and individual work. *Attributes: Alone + Together; Quiet + Buzz; Settle In; Scheduled*	Access to power and data, movable work surfaces and seating, writable and presentation walls
	**Lecture Hall** Lecture Halls are formal learning environments that typically provide a single point of focus. Flexible lecture halls also enable group work and individual work. *Attributes: Alone + Together; Quiet + Buzz; Settle In; Scheduled*	Access to power and data, stationary work surfaces and seating, writable and presentation wall
CLASS LABS 	**Lab** Class Laboratories are formal learning environments for active exploration and hands-on idea generation. They provide access to specialty equipment and tools that vary depending by discipline. *Attributes: Alone + Together; Quiet + Buzz; Settle In; Scheduled*	Access to specialized equipment and materials for procedure-based work, access to power and data, writeable and presentation wall

INFORMAL LEARNING SPACES

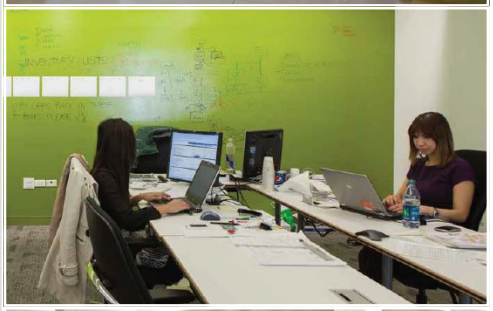
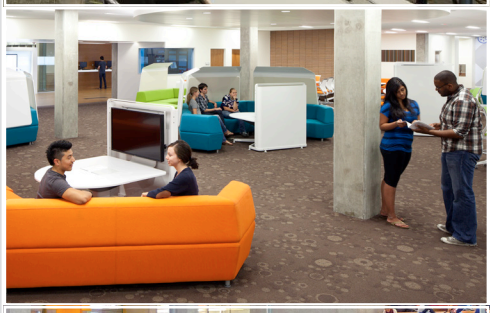
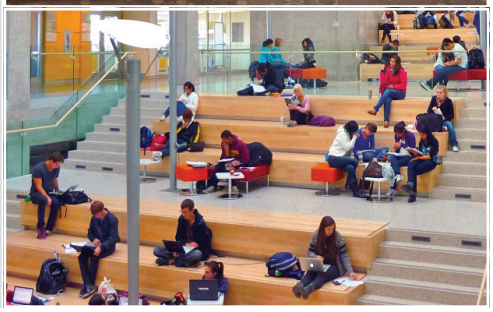
SPACE	FEATURES
 **Nook** A Nook is a partially or completely enclosed space for solitary work. It is typically removed from areas of greater activity to provide a quiet environment. *Attributes: Alone; Quiet; Settle In; Spontaneous*	Access to power and data, visual and aural privacy, large work surface, ergonomic seating
 **Springboard** Springboards are informal spaces located adjacent to formal learning spaces. They are areas to prepare, warm up, cool down before or after activities in formal learning spaces. *Attributes: Alone + Together; Buzz; Touch Down; Spontaneous*	Access to power and data, efficient work surface
 **Suite** A network of spaces belonging to a specific team or group make up a Suite. Suite are usually comprised of a variety of spaces for both group and individual work. *Attributes: Together; Quiet + Buzz; Settle In; Scheduled*	Access to power and data, writable and tackable walls, variety of work surfaces, variety of seating
 **Dock** A Dock is a space for short-term group work. It is provided for quick, planned or unplanned moments of collaboration. *Attributes: Together; Quiet + Buzz; Settle In; Scheduled + Spontaneous*	Access to power and data, writable walls, efficient work surface, seating
 **Commons** A Living Room is a space where people can work alone or together while immersed in a larger space with a buzz of energy. *Attributes: Alone + Together; Buzz; Touch Down + Settle In; Spontaneous*	Access to power and data, writable walls, efficient work surface, flexible seating to accommodate multiple group sizes

FIGURE 01.1 UAlbany's ecology of learning spaces includes classrooms, class labs, and a range of informal spaces.

THE CLASSROOM DESIGN GUIDELINES

DEVELOPMENT OF THE CLASSROOM GUIDELINES

The Classroom Design Guidelines are a tool to guide the future development of classrooms at UAlbany. These guidelines set standards that will ensure quality, durability, consistency, sustainability, and appropriateness of materials, lighting fixtures, and interior furnishings across all University classrooms. The ultimate goal of these guidelines is to allow projects to succeed individually while also aligning with the University's Facilities Master Plan (FMP) and Strategic Plan.

The Classroom Design Guidelines have been developed following the adoption of the University's FMP, completed in 2012. The campus-wide FMP process indicated the need for a tool to guide future classroom planning and design to address three issues:

1. Underutilization. The FMP revealed an underutilization of the existing classroom inventory, when considered comprehensively. Deeper analysis indicates that this occurs for different reasons on each UAlbany campus. Rooms on the Uptown Campus are significantly over-scheduled in terms of room hours, but filled to only 62 percent occupancy on average. Rooms on the Downtown and East Campuses are under-scheduled in terms of hours and under-filled. The University needs to utilize its classrooms more evenly across the full time zones.

2. Limited facilities resources. While classrooms are underutilized, the University at Albany expects the need for expansion of its facilities inventory over the next few decades to accommodate an expanding population while also taking entire buildings off-line for critical maintenance renovation. During this period, all University facilities will need to be used effectively to ensure the institution's many needs can be met. In the context of limited facilities resources, effective utilization classroom as shared University resources becomes even more critical.

3. Opportunity for renewal. Over the course of the next 40 years, nearly 2.4 million gross square feet (GSF) on the Uptown and Downtown Campuses – more than 70 percent of the total space – will undergo full renovation, including nearly all buildings on the Academic Podium of the Uptown Campus. This magnitude presents the opportunity to renew nearly every classroom over that time.

APPLICATION OF THE CLASSROOM GUIDELINES

Currently, two categories of classrooms exist at UAlbany: general purpose classrooms in large quantity and departmental classrooms in limited quantity (defined to the right). The planning and design guidelines outlined in this report should be applied to both categories to ensure UAlbany provides the highest level of instructional spaces for its students. Furthermore, designing departmental classrooms according to the guidelines may contribute to enhanced utilization, should they become available for broader University use.

The Classroom Design Guidelines do not represent or supersede any applicable federal, state, or local building codes or other legislation. All current applicable codes and University at Albany design standards should be consulted and considered in conjunction with these guidelines. Any conflicts that arise should be resolved during the design process with the appropriate University stakeholders.

Additionally, the guidelines cannot address all parameters for every possible classroom scenario or pedagogical shift that may arise, rather they are intended to provide a foundation for design. It is essential that the design of future classrooms include concerted collaboration between the design team and the University to achieve the best and most appropriate application of the guidelines.

Categories of Classrooms

GENERAL PURPOSE CLASSROOMS

General purpose classrooms are designed to support the entire University community by meeting the teaching and learning needs of a broad range of academic programs. As such, they typically experience a higher rate of utilization. They are centrally-scheduled through the Registrar's office.

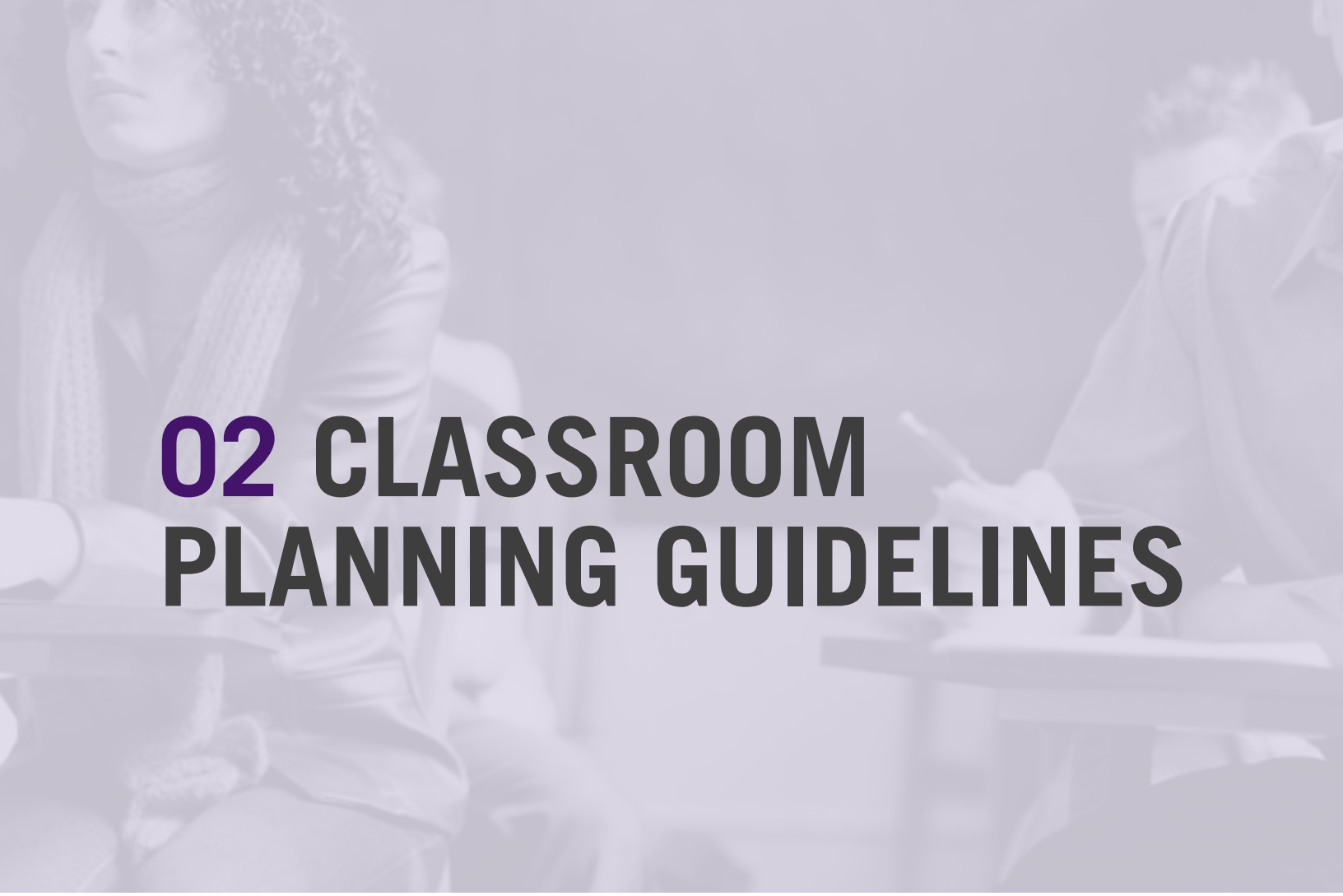
General purpose classrooms are identified by SUNY as space types 1001 for classrooms and 1100 for lecture halls, and the chart of accounts (department) "Instruction General." They are supported and maintained by the Office of Facilities Management and Information Technology Services, with advisory support from the Classroom Committee.

DEPARTMENTAL CLASSROOMS

Departmental classrooms are identified by SUNY as space type 1001 and the chart of accounts (department) to which they are assigned. They are supported and maintained by that department.

Departmental classrooms are assigned to an individual department or program with the intention of meeting its specific needs. The nature of the need may be related to functionality, but is often related to scheduling demands (classrooms are inherently less specialized in functionality than their class lab counterpart).

In the future, classrooms and other instructional spaces will not be assigned to departments, but will be owned by the campus and scheduled centrally through the Registrar's office. This will improve overall classroom utilization.



02 CLASSROOM PLANNING GUIDELINES

TYPES OF CLASSROOMS

Classrooms at UAlbany are organized into four major types: seminar rooms, basic classrooms, collaborative classrooms, and lecture halls. They are distinguished by learning objectives and physical and technological environment characteristics. The basic characteristics of each are outlined in Figure 01.1.

ROLE OF STANDARDIZATION

SIZE
Within each major type, it is recommended that classrooms be standardized to the maximum extent possible. This standardization will help the University renew its inventory effectively, efficiently and in a manner that is consistent with its needs.

TECHNOLOGY
It is recommended that each classroom be designed to achieve at least a minimum level of technology, defined as "baseline technology," as defined in the Technology Components section of this report. It will consist of infrastructure built into the structure of the classroom as well as installed technology components. The provision of baseline technology will enable current technology-enhanced delivery methods and allow classrooms to be upgraded for advances in the future. The Technology Guidelines per room type can be found within section 03 Design Guidelines.

TRANSITIONING THE CLASSROOM INVENTORY

The types and characteristics of classrooms outlined in Figure 01.1, and in subsequent sections of the Classroom Design Guidelines report represent UAlbany's standards for all future classroom renovation. A significant portion of the current inventory of classrooms do not meet these standards. It is the University's intention to work toward improvement or replacement of all classrooms. This will take time and significant capital investment, as well as a clear identification of priorities and phasing.

SEMINAR CLASSROOM (1001)

Objective: Learning is accomplished through small-group discussion of course material. Small-section format provides more time for each student.

Station Count	Floor Type	Number of "Display Walls"	ASF per Station Allowance	Furniture Style & Configuration
< 24	Flat	2	25 - 30	Moveable tables and chairs in a ring-formation*

BASIC CLASSROOM (1001)

Objective: Learning typically is accomplished through instructor lecture accompanied by discussion.

Station Count	Floor Type	Number of "Display Walls"	ASF per Station Allowance	Furniture Style & Configuration
25 - 100	Flat	1 primary, 1 secondary	22 - 27	Moveable tables and chairs in straight or U-shaped rows*

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COLLABORATIVE CLASSROOM (1001)

Objective: Learning is accomplished through student use of course concepts to solve problems, often while engaging with their peers in teams for group work.

Station Count	Floor Type	Number of "Display Walls"	ASF per Station Allowance	Furniture Style & Configuration
25 - 100+	Flat	Multiple (one per group)	28 - 38	Moveable tables and chairs in groups (6-9 stations per group)

LECTURE HALL (1100)

Objective: Learning is accomplished through large-group instructor lecture, which may be accompanied by individualized student engagement through forms of note taking or "clicker" feedback.

Station Count	Floor Type	Number of "Display Walls"	ASF per Station Allowance	Furniture Style & Configuration
100+	Tiered	1 primary	28 - 38	Fixed seating in rows

FIGURE 01.2 The four types of classrooms at UAlbany are seminar rooms, basic classrooms, collaborative classrooms, and lecture halls. They are distinguished by learning objectives and aspects of physical and technological environment.

* Seminar and Basic Classrooms may have node chairs if light renovation has been completed. If this is the case, the ASF per station allowance would be adjusted to 19-22.

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SAMPLE IMAGERY OF CLASSROOM LAYOUTS

SEMINAR CLASSROOM (1001)

BASIC CLASSROOM (1001)

COLLABORATIVE CLASSROOM (1001)

LECTURE HALL (1100)

CLASSROOM STATION COUNT

The effective alignment between size of classroom and station count is critical to learning and a judicious use of resources. Overcrowded classrooms in particular do not support the University's pedagogical goal of student engagement.

The station count for a classroom is a function of the instructional delivery style to be used, the furniture size and configuration needed to support that instructional style, and the overall size of the room. To provide a level of consistency across UAlbany's classroom inventory, assignable square footage (ASF) per station targets have been established by classroom type and total ASF ranges by total stations.

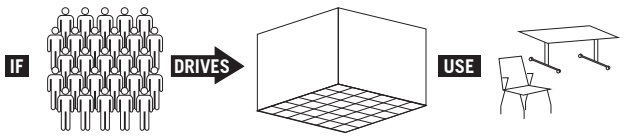
SEMINAR, BASIC, AND COLLABORATIVE CLASSROOMS

The station count for seminar rooms, basic classrooms, and collaborative classrooms should be determined using the ASF per station metric summarized in the figure on the opposite page.

Depending on the particulars of the renovation plans and needs, the station count for a room of this style may either drive the room area or be determined based on established room area constraints. In either case, the planning calculation should be provided by a specific test fit.

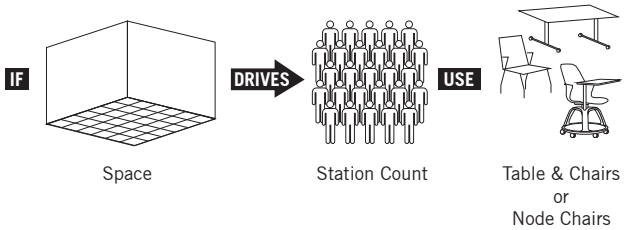
STATION COUNT AS DRIVER

Station count drives room area when classrooms are being designed to accommodate a specific number of students. The need for classrooms of a given station count is determined during the planning phase of a project by coordinating with the planned course curriculum. In these cases, the required number of stations and the appropriate ASF per station will determine the classroom square footage. The ASF per station accounts for one chair and one table space for each student. Using the station count as the classroom size driver is most realistic when a building is being designed or comprehensively renovated and walls can be located to define the ideal area.



CLASSROOM AREA AS DRIVER

Alternatively, existing room size drives station count when walls are fixed in place. In these instances, the total square footage of the space and appropriate ASF per station value should drive the station count. This typically occurs when rooms in existing buildings are repurposed and lightly renovated to accommodate classrooms. In such low-investment situations, classrooms may be furnished with either moveable tables and chairs or node chairs with an attached work surface. While tables and chairs are preferred from a pedagogical perspective, node chairs provide a more efficient ASF per station where room size cannot be controlled and a certain station count to be achieved.



CLASSROOM TEST FITS

The final station count for classrooms should be determined by conducting test fits to incorporate the full range of architectural requirements, particularly required circulation and clearances.

Assignable Square Feet

Assignable square feet, or ASF, is a measurement of the spaces that can be assigned to occupants for specific use. ASF does not include unassignable spaces such as mechanical spaces; circulation (lobby, hallways, stairways, elevators), and vertical shafts; the thickness of walls or building structure. ASF indicates a building's capacity for occupants or "program."

SEMINAR CLASSROOM (1001)

12 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	25 to 30
	ASF Range	300-360
24 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	25 to 30
	ASF Range	600-720

BASIC CLASSROOM (1001)

36 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	24 to 27
	ASF Range	864-972
	Node Chairs:	
	ASF/Station Range	21 to 22
	ASF Range	756-792
48 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	23 to 26
	ASF Range	1,104-1,248
	Node Chairs:	
	ASF/Station Range	21 to 22
	ASF Range	1,008-1,056
60 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	22 to 25
	ASF Range	1,320-1,500
	Node Chairs:	
	ASF/Station Range	21 to 22
	ASF Range	1,260-1,320
75 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	22 to 24
	ASF Range	1,650-1,800
	Node Chairs:	
	ASF/Station Range	20 to 21
	ASF Range	1,500-1,575
100 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	22 to 24
	ASF Range	2,200-2,400
	Node Chairs:	
	ASF/Station Range	20 to 21
	ASF Range	2,000-2,100

COLLABORATIVE CLASSROOM (1001)

24 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	32 to 38
	ASF Range	768-912
36 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	30 to 36
	ASF Range	1,080-1,296
48 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	28 to 34
	ASF Range	1,344-1,632
60 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	28 to 32
	ASF Range	1,680-1,920
75 Station (Podium Capable)	Tables & Chairs:	
	ASF/Station Range	28 to 32
	ASF Range	2,100-2,400
100+ Station (Podium Capable A-B projection challenged)	ASF/Station Range	28 to 32
	ASF Range	2,800-3,200+
	Podium Capable	Yes

FIGURE 01.3 To provide consistency across UAlbany's classroom inventory, ASF per station targets have been established according to the classroom type, total station count, and furniture style. Basic classrooms for 36 to 100 stations may be converted to 24 through 75 station collaborative classrooms.

LECTURE HALLS

Due to their typically larger room size and common need for sloped or tiered floors, lecture halls are significantly more cost-intensive to construct than other types of classrooms and less flexible. Lecture halls receive comparatively low utilization compared with classrooms, as a limited number of courses are offered with large section sizes. Furthermore, concerns exist about the effectiveness of this format in facilitating positive student outcomes.

In spite of the associated challenges, the need for large-section sizes is expected to continue at UAlbany as a result of the business model of instructional delivery. In the future, the use of alternate pedagogy such as online learning or large-section collaborative learning may play a more significant role in large-section teaching delivery. However, at this time the following is recommended to accommodate for large-sections:

1. Maintain existing large-section spaces, including the lecture halls on the Uptown Campus. Renovate auditorium spaces on the Downtown Campus to be instruction-capable.

2. Do not construct additional large-section lecture halls.

The station count for lecture halls should be determined using the ASF per station metric in the chart below. Further study is required to determine station counts in multi-purpose spaces, such as the auditoriums, to ensure seating meets the needs of all functions. Similar to classrooms, the final station count for lecture halls should also be determined by conducting test fits to incorporate the full range of architectural requirements.

ADDITIONAL CLASSROOM STATION COUNT

LECTURE HALL (1100)		
125 Station	ASF/Station Range ASF Range	18 to 20 2,250-2,500
200 Station	ASF/Station Range ASF Range	18 to 20 3,600-4,000
350 Station	ASF/Station Range ASF Range	18 to 20 6,300-7,000

FIGURE 01.4 ASF per station targets for lecture halls.

CONSIDERATIONS

PROVISION OF TEMPORARY STATIONS

Typically course enrollment shows an artificial peak at the beginning of the term as students sit in on the classes to determine if they will enroll. In some cases students also attend classes for which they are not enrolled in the first week, with the hopes of gaining a seat.

The facilities implication of this artificial peak can be deceiving, showing an artificial demand. This often results in a course being scheduled for a room that is larger than needed in the end.

To accommodate for this temporary peak, a limited number of temporary stations should be provided, when possible, in each classroom at the beginning of course terms. The temporary stations should be provided as stack-able chairs at the rear of the room.

INSTRUCTOR STATION

The University's current approach to the instructor station is to provide a clearly defined and physically prominent lectern at the front of a classroom equipped with technology components. The station is largely fixed due to power/network cables that connect to the wall or floor. If it is moveable, it is only for a short distance back and forth.

The University's emerging instructor station model integrates the instructor into the classroom to promote a learning-centric vs. teaching-centric mode of instructional delivery. This is achieved by replacing the instructor lectern with a media cabinet and instructor table incorporated into the student seating area.

The technology and controls that were once located at the lectern are provided in the media cabinet and may be controlled using wireless technology from anywhere in the room, or stored when technology is not required. This method enables an instructor to provide "shared control" with students or groups, by "passing around" the controls.

CLASSROOM LAYOUTS

Classrooms should be designed to allow for flexibility and enable multiple room layouts in order to meet the needs of different pedagogy. The following section presents the room layouts that classroom type should accommodate, the strategy for changing classroom layouts, and key dimensions to classrooms. As possible, the physical environment of classrooms should incorporate indicators to guide the location of furnishings in each layout.

SEMINAR ROOMS

Seminar rooms should accommodate a ring-formation and a forum formation, with tables in a single U-shape. Both layouts promote discussion by promoting equal hierarchy and allowing everyone in the room to see each other.

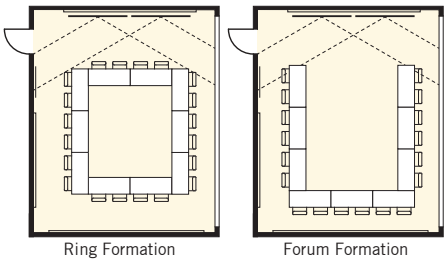


FIGURE 01.5 Classroom layouts for seminar rooms.

BASIC CLASSROOMS

Basic classrooms should accommodate a lecture formation, with tables in straight rows, and a forum formation, with tables in U-shaped rows. These layouts direct attention toward a single wall, the classroom front. Movable chairs allow students to shift their position to cluster with the students around them.

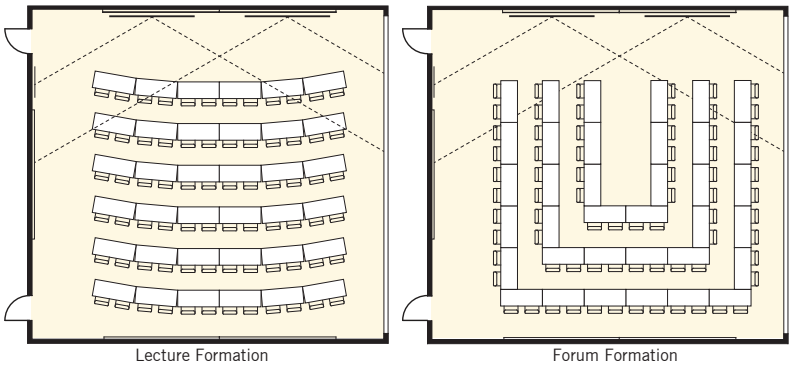


FIGURE 01.6 Classroom layouts for basic classrooms.

COLLABORATIVE CLASSROOMS

Collaborative classrooms should accommodate different ways of grouping students for collaborative pedagogy. Groups may form at the center of the room with a shared point of attention toward the classroom front form around the perimeter of the room, each with its own dedicated display. The provision of dedicated displays in collaborative classrooms requires additional technology infrastructure and components.

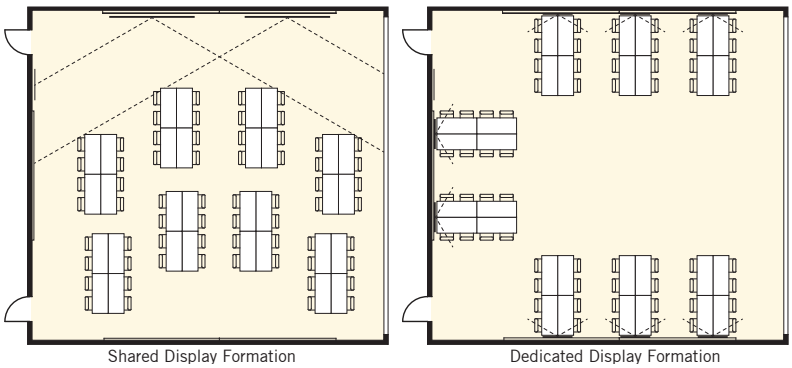


FIGURE 01.7 Classroom layouts for collaborative classrooms.

CHANGING CLASSROOM LAYOUTS

ON-DEMAND CHANGES

There are certain layout changes that can be made on-demand by the users of the space. For example, students and teachers can move tables and chairs in a basic classroom from lecture to forum format within a class period. The need for such adjustments are met by providing furnishings with casters to allow for easy and quick movement by the users.

The Registrar's Office determines the "primary" classroom layout for each classroom, and attempts to assign courses to rooms with in accordance with their preferred layouts. The University's policy is that furnishings must be returned to their "primary" layout prior to the end of the course period for the next user.

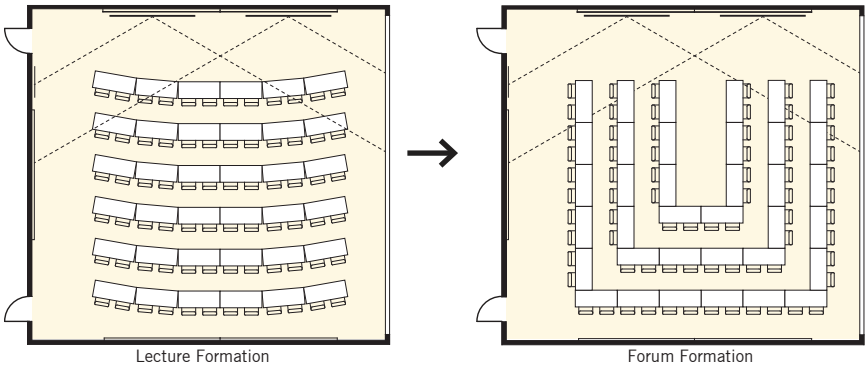


FIGURE 01.9 Classroom furniture may be reconfigured to change from a lecture formation to a forum formation on-demand, by the users. No technology changes are needed to make the change.

SEMESTER-BY-SEMESTER CHANGES

Other layout changes are more labor intensive and should occur on a semester-by-semester basis. These include any changes in the number of furniture components (tables or chairs) or a change in technology components. This type of layout change may also affect the classroom type and functionality, and needs to be coordinated with the Registrar to ensure proper scheduling.

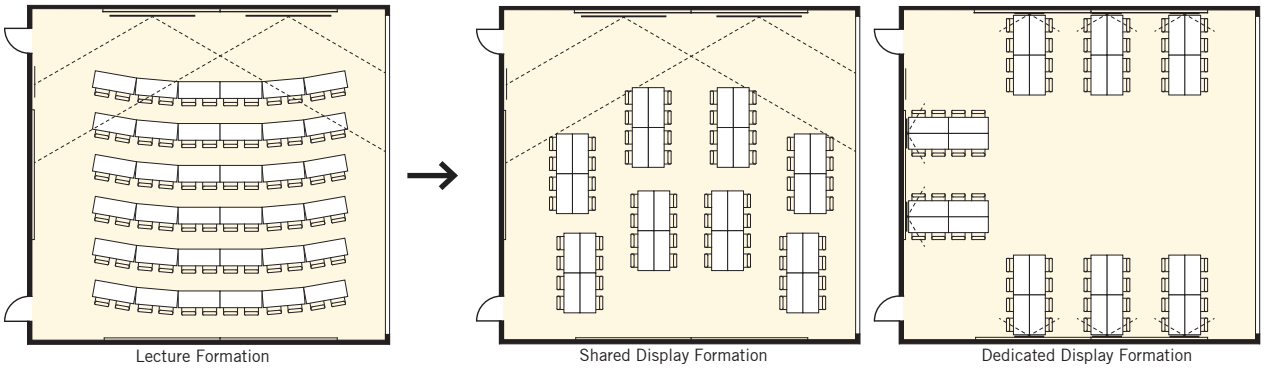
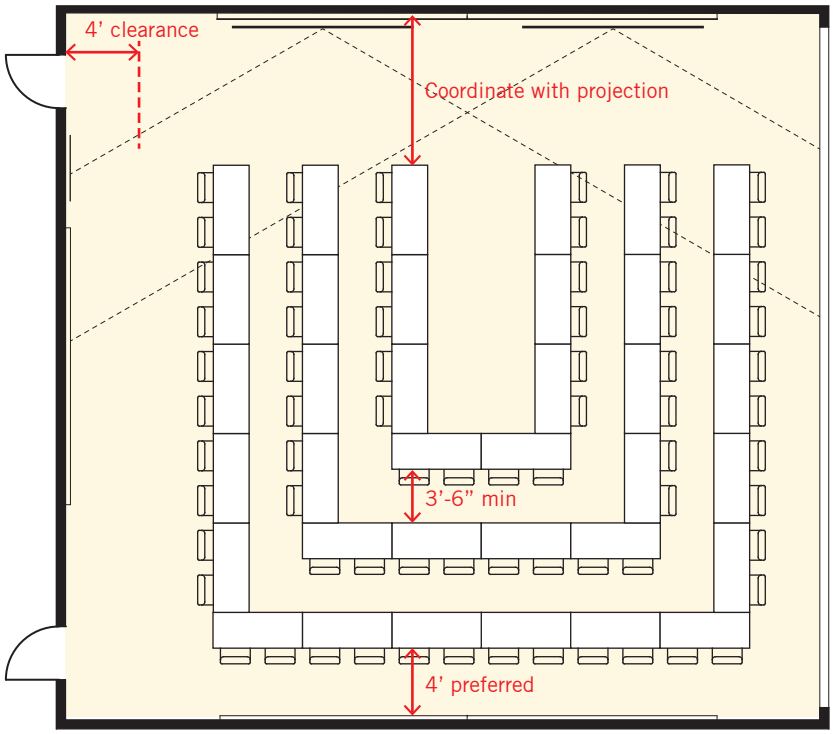


FIGURE 01.10 Changes from a lecture format to a collaborative format should occur on a semester-by-semester basis because they require changes in the amount of furniture in a room and in some cases changes in technology.

KEY DIMENSIONS

Classrooms at UAlbany should be designed to maintain a certain spacing between the rows of tables or desks, and between the desks and walls to allow for comfortable circulation and maneuverability. The diagram below summarizes best-practice dimensions.

The dimensions presented are guidelines and do not represent or supersede any applicable federal, state, or local building codes or other legislation.



CLASSROOM PLACEMENT

Classrooms are shared University resources. As such, they should be located no more than one level above or below the main "street" level of a building (or Podium level for buildings on the Uptown Campus Podium). This strategy reduces the load on elevators and stairs and minimizes disruption for other functions in the building, which may be more private in nature.

Classrooms with a larger station count, defined here as more than 48 stations, are recommended to be located on the main "street" level of buildings to allow for more direct access and egress by students (for buildings on the Academic Podium, the main level is typically the Podium Level; it may also include the basement level for buildings on the south side where the basement level is exposed).

All classrooms should be directly accessible from main entrances to limit student travel through the building.

OTHER CONSIDERATIONS

ACCESS TO DAYLIGHT

To the extent possible, classrooms should be located along an exterior wall to provide access to daylight, found to support positive student learning outcomes (see p.34 for more detail). Direct sunlight penetration should be avoided as it may result in glare and increased solar heat gain.

ACOUSTICS AND INDOOR AIR QUALITY

All classrooms should be located away from noise-generating areas such as mechanical rooms, elevators, rest rooms, and outdoor mechanical equipment, or provided with appropriate acoustical separation.

For improved indoor air quality, locating classrooms near outdoor sources of contaminants such as vehicle loading areas, parking entrances, and building exhaust areas should be avoided. High indoor air quality contributes to improved student performance.

RELATIONSHIP TO THE BUILDING CORRIDOR

Building corridors should be considered an extension of the learning environment and offer students places to gather informally before and after class. Informal engagement adjacent to the formal learning spaces environment may improve social engagement that is academically-related and increase interaction with faculty outside the classroom.

Recessing classroom doors from the corridors will provide of separation between the activity of the corridor and the classroom space and improve corridor safety as doors are opened and occupants come and go. It will also reduce the impact of the door on the corridor width so the door does not reduce the width of the path of travel for egress (required by code).

ACTIVE DESIGN

Promote active design by using strategies such as locating classrooms near stairs to encourage their use over elevators for able users. Active design promotes physical activity, while also reducing energy use.

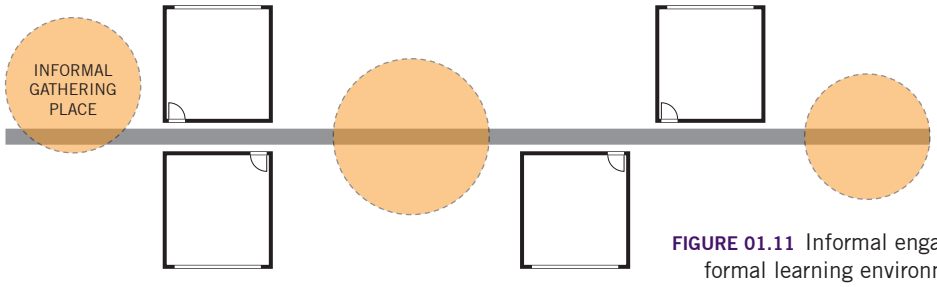


FIGURE 01.11 Informal engagement in proximity to the formal learning environment may improve social engagement that is academically-related.

CLASSROOM DIMENSIONS

CLASSROOM PROPORTIONS

A well-proportioned classroom supports student engagement by promoting effective viewing angles between students and the instructor, students and the teaching wall, and among students.

Classrooms should range in width-to-depth ratio from 1:1 (square) to 3:2. Rooms within the range provide optimal viewing angles for A-B projection and allow for the greatest amount of flexibility in seating arrangements, increasing the versatility of the space. In special situations driven by existing conditions, classrooms may have a larger width-to-depth ratio. In such cases, A-B projection will be challenged as seats at the sides of the room will have poor viewing angles to the projected image on the far side of the room.

All classrooms should be free of interior columns, which obstruct viewing angles and reduce the overall flexibility of the space.

CLASSROOM FRONT

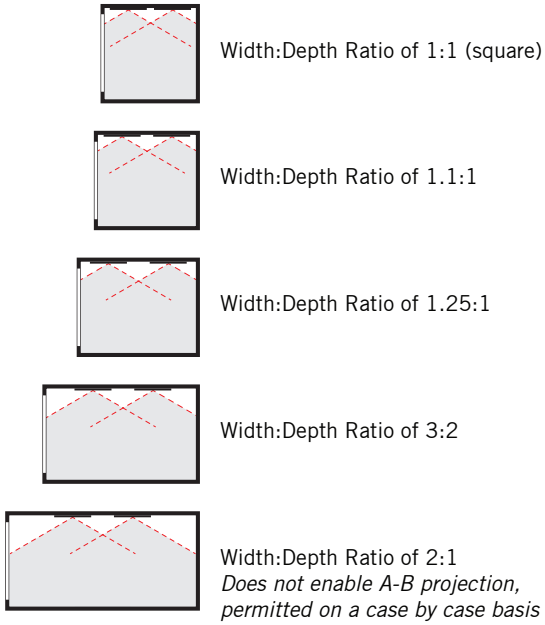
In a typical configuration, one wall of a basic classroom will be designated as the "front" of the room. This wall will contain the primary display surfaces for lecture and other activities to which students will direct their attention.

The classroom front should be on the long dimension of the room to maximize the display surface, position students closer to the display wall, and improve sight lines between the student and instructor. Where possible, it is recommended that this long dimension be oriented perpendicular to the window wall of the room. If the long dimension is parallel to the window wall, the classroom front should still be located there, opposite the window wall.

Designating a classroom front implies a lecture format for instruction. While rooms may not always be employed in this manner, it is recommended that design support the option for a lecture configuration to maximize the versatility of the space.

CLASSROOM ENTRANCE

The classroom entrance should be located at the front of the room to limit the obstruction of available student seating. Large classrooms and lecture halls with occupancy load of 50 or more persons must provide at least two means of egress to meet building code and public assembly requirements. In these rooms, entrances should be located also to minimize conflict with the student seating area.



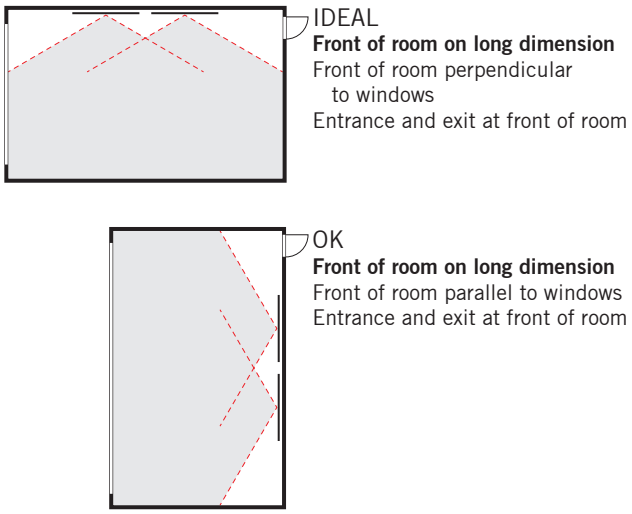


FIGURE 01.12 Well-proportioned classrooms are of a width to depth ratio between 1:1 and 3:2. The classroom front should be located on the long dimension of the classroom. Where possible the long dimension should be perpendicular to the window wall.

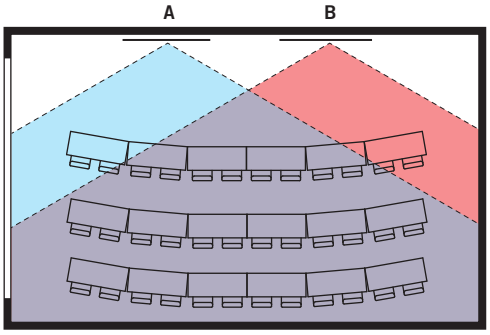
VIEWING ANGLES FOR DISPLAYED IMAGES

Displayed images are a key component of instructional delivery in classrooms. As such, optimal viewing angles for projected images must be considered when planning for and designing classroom spaces. The following viewing angle metric should be employed:

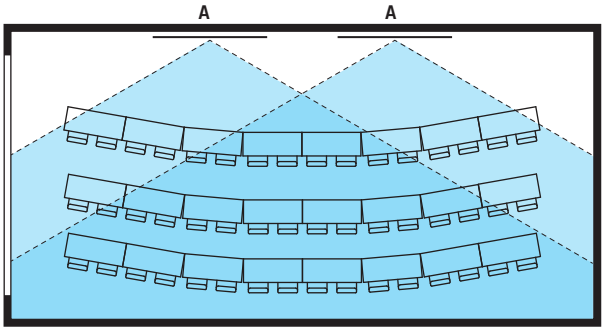
OPTIMAL VIEWING AREA

In plan, the optimal viewing area is located within 30 degrees to each side of the center line of the projection screen or whiteboard. All UAlbany classrooms should enable dual projection with different images (**A**-**B**). **A**-**B** projection enables a broader range of pedagogy, increasing the versatility of classrooms.

In special circumstances driven by existing conditions when classrooms are wider than a 3:2 width to depth ratio, **A**-**B** dual projection will be challenged due to viewing angles at the sides of the room. In these situations **A**-**A** projection will be required to achieve optimal angles for all seats. Compromise between viewing angles and necessary seating capacity should be evaluated on a case-by-case basis.



IDEAL CONFIGURATION



OK, CASE BY CASE SITUATION

FIGURE 01.13 Optimal viewing area for displayed images in two classrooms. In rooms of greater length-to-width proportions, the same image may need to be displayed on both screens (A-A) to expand the optimal viewing area.

VIEWING ANGLES FOR DISPLAYED IMAGES

SIZING THE PROJECTION SCREEN

Projection screen size should be determined by ceiling height and the distance from the screen to the last row of seats. The bottom edge of the screen should be located 42" off of the floor. Image height (**H**) should be no less than 1/6 of the distance between the screen and the last row of seats (**D**), as Figure 01.9 shows.

In new design and situations where the height of dropped-ceilings may be controlled, ceiling heights should accommodate the appropriate image height. Where adjustment of the ceiling height is not possible, such as in most buildings on the Podium, the existing ceiling height (9'-2" to the bottom of the vault) should be maximized. This will particularly be an issue for large classrooms where the distance to the back of the room is the greatest. In these situations it is especially important to locate the classroom front along the long dimension of the space to reduce the distance between the projection screen and the back of the room.

Once the height of the projection screen is determined, the width should be determined by allowing for an aspect ratio of the projected image of 16x10.

FIRST ROW OF SEATS

The first row of seats should be positioned such that the top of the image on the screen is no greater than 35 degrees above the horizontal eye height of most occupants in a seated position. This distance is particularly important for dual projection applications using different images (**A**-**B**), as students will need to view both screens clearly. Some compromises may be made in the front row if necessary, but should be limited as much as possible.

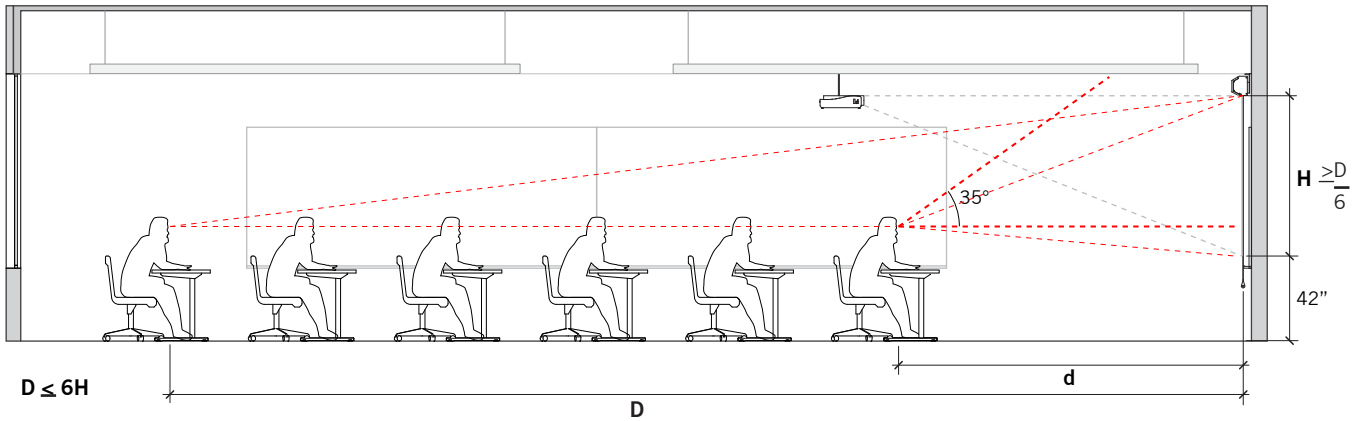
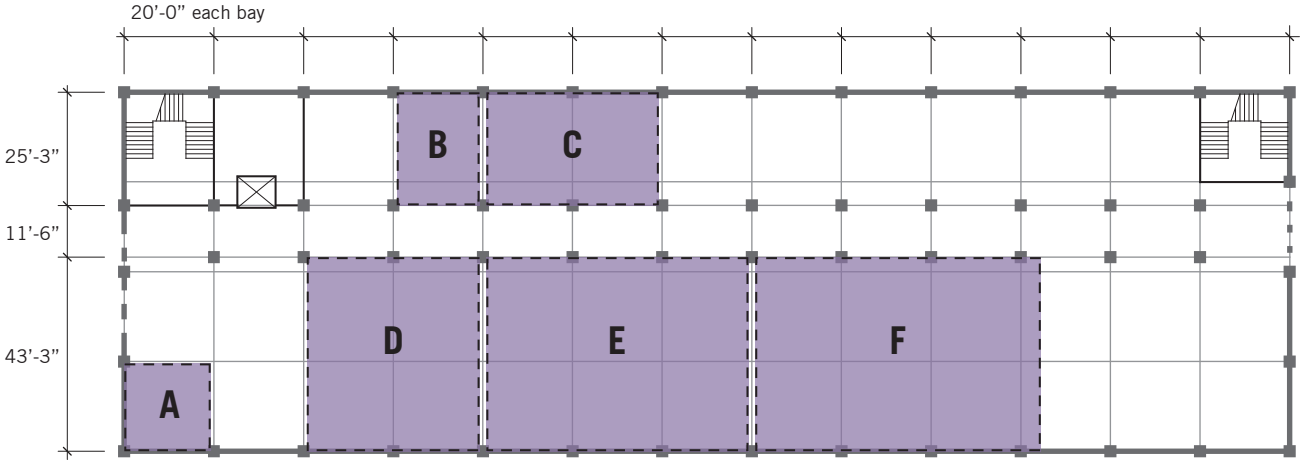


FIGURE 01.14 Geometries for sizing the projection screen and displayed image. The height of the image (**H**) should be no less then 1/6 of the distance to the last row of seats (**D**). The first row of seats should be positioned at a distance (**d**) such that the top of the image is at an angle no greater than 35 degrees above the horizontal eye height of occupants.

CAPABILITIES OF PODIUM BUILDINGS

Buildings on the Podium are capable of providing a wide range of flat-floor classrooms, as the figure below illustrates. The limiting constraint for larger classroom sizes is the available ceiling height and the ability to provide well-proportioned classrooms that can accommodated dual A-B projection.



TYPE	LONG DIMENSION	SHORT DIMENSION	AREA	WIDTH:DEPTH RATIO	CAPABILITIES
A	20'-0"	20'-0"	400 ASF	1:1	Seminar Room (12 Station)
B	25'-3"	20'-0"	500 ASF	1.25:1	Seminar Room (20 or 24 Station)
C	40'-0"	25'-3"	1,010 ASF	1.6:1	Basic Classroom (36 Station) Collaborative Classroom (24 or 36 Station)
D	43'-3"	40'-0"	1,730 ASF	1.1:1	Basic Classroom (75 Station) Collaborative Classroom (60 Station)
E	60'-0"	43'-3"	2,595 ASF	1.4:1	Basic Classroom (100 Station) Collaborative Classroom (75 Station)
F	71'-9"	43'-3"	3,100 ASF	1.6:1	Collaborative Classroom (85 Station)

FIGURE 01.15 Buildings on the Podium are capable of accommodating a wide range of flat-floor classrooms. The diagram above illustrates how six typically-scaled classrooms may be provided in the Business Administration Building (Building 27). Given the consistent Podium grid, this serves as a model for the other podium buildings.

CLASSROOM SCHEDULING TOOLS

SCHEDULING SOFTWARE

The University has adopted the use of specialized software to automate the complex and labor-intensive process of scheduling classrooms and improve classroom utilization. Implementation of the comprehensive university-wide scheduling system is a significant leap forward for the University, moving it toward operational excellence and promoting shared services on an internal level. It is a particularly important tool to implement for the campus right now, in light of the enrollment and faculty growth planned under NY SUNY 2020. EMS will allow the University to be better stewards of our space and temper our anticipated 'growing pains' as programmatic expansion will come faster than we can expand our physical footprint.

All general purpose classrooms on all UAlbany campuses would be scheduled centrally through the Office of the Registrar using the software.

It is recommended that the University maintain a separate calendar (within the software) to document the schedules of all departmentally controlled classrooms. This will allow for transparency and enable complementary use by other University constituents. Any constituent seeking to use department controlled classrooms should be required then to contact the department directly for consideration and approval.

ROOM-SCHEDULER PANELS

All classrooms and group study rooms of 24 stations or less should be equipped with wall-mounted, point of use room-scheduler panels mounted outside the door to allow for on-demand scheduling (Figure 01.10). Such scheduling practices will support student learning beyond formal instruction hours by making spaces available.

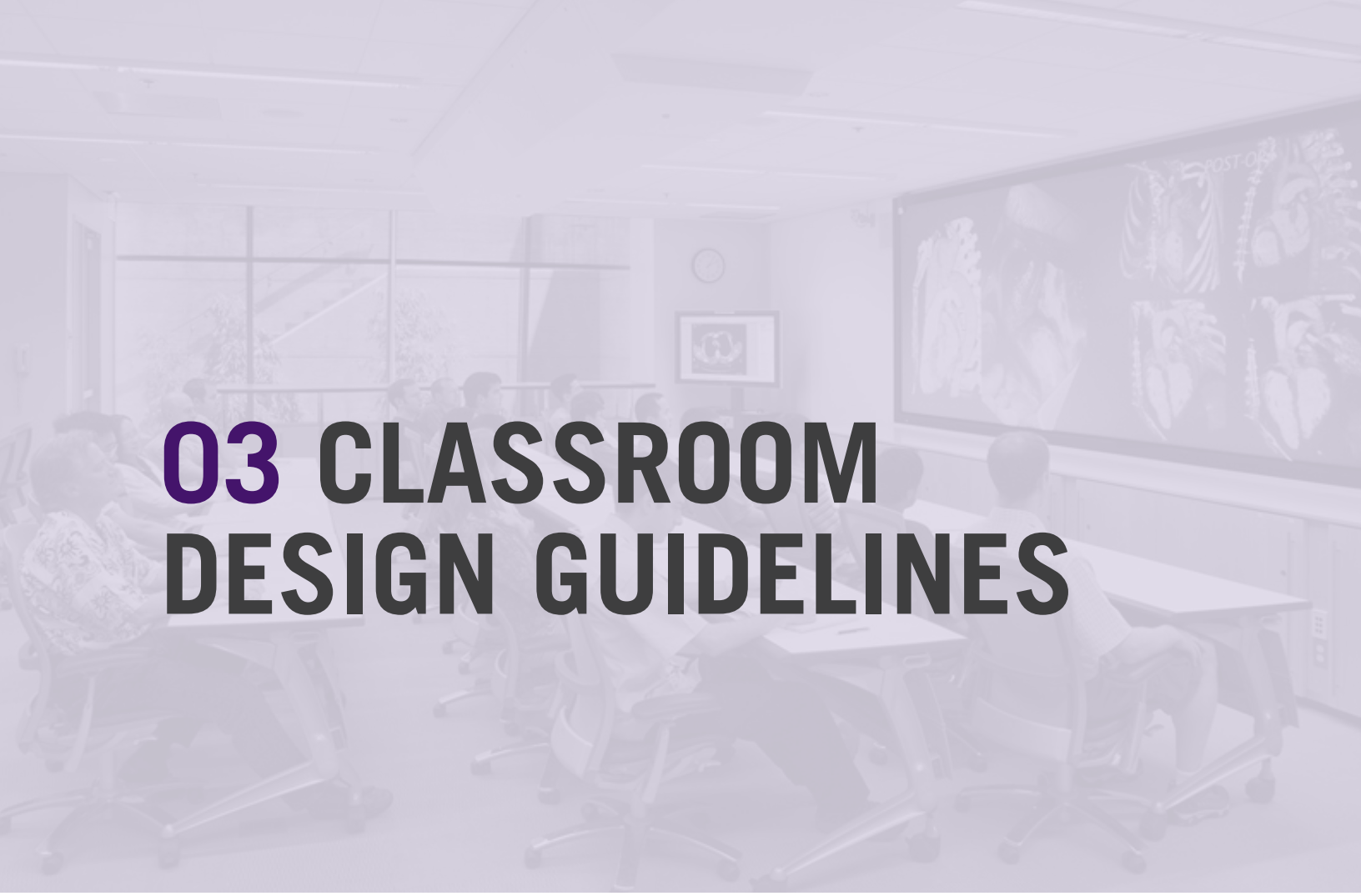
SCHEDULING OTHER FUNCTIONS

Scheduling software also facilitates utilization beyond formal instruction, for weekly or one-time uses. Such functions could include student group study (one-time or recurring), use by student organizations or clubs, meetings that cannot be accommodated in smaller conference rooms, faculty or staff gatherings, etc.

Scheduling for such functions may occur online using the software system, or, for capable rooms, on-demand at the door to the room by using a wall-mounted room-scheduler panel.

It is recommended that a personal UAlbany account be required in order to schedule a room through the software system. The account may be associated with an appropriate access level, depending on the status of the individual: (1) Access to the room, or (2) Access to both the room and the media cabinet. By separating access to the media cabinet, the University can allow access to the room itself to a broader number of constituents.

FIGURE 01.16 FIGURE 09.10 Sample point of use room scheduler panel that should be mounted outside classrooms and group study rooms of 24 stations or less to facilitate on-demand scheduling. The display clearly indicates who controls the room for a given time period.



03 CLASSROOM DESIGN GUIDELINES

INTRODUCTION

The following design guidelines for classrooms contribute to spaces that inspire learning and engagement with others, provide a sense of connectedness, encourage a feeling of communal ownership, and demonstrate the University's commitment to sustainability. The goal of the classroom interior should inspire students and faculty to maintain and respect the space.

Where possible, selected vendors should be those who maintain consistency and longevity in their product lines, for ease of component replacement. Consistency in style of furnishings from year to year is also important.

The design guidelines consist of the following components:

- Accessibility
- Architectural Components
- Mechanical Systems
- Acoustics
- Lighting
- Electrical, Data / Telecom, and Audio Visual Infrastructure
- Technology
- Furniture

ACCESSIBILITY

All classrooms should be designed to comply with the appropriate accessibility codes in accordance with the American National Standards Institute (ANSI) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG). Refer to SUCF Program Directive 1B-2.

Beyond code compliance, classrooms and lecture halls should promote the spirit of accessibility for all users, irrespective of their abilities. This may be achieved by designing and constructing spaces according to the principles of universal design, which are outlined to the right.

Specific design considerations include the following:

- Space and all provisions for an accessible student and instructor station in every classroom.
- Commitment to high indoor air quality to improve the comfort of those with asthma,
- Use of lamps that minimize flicker to reduce distraction and visual triggers for those with various related disabilities.
- Incorporation of infrared broadcasting technology to support assisted listening devices.

Universal Design

Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

EQUITABLE USE

The design is useful and marketable to people with diverse abilities.

FLEXIBILITY IN USE

The design accommodates a wide range of individual preferences and abilities.

SIMPLE AND INTUITIVE USE

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

PERCEPTIBLE INFORMATION

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

TOLERANCE FOR ERROR

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

LOW PHYSICAL EFFORT

The design can be used efficiently and comfortably and with a minimum of fatigue.

SIZE AND SPACE FOR APPROACH AND USE

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

ARCHITECTURAL COMPONENTS

CLASSROOM FLOORS

SEMINAR, BASIC, AND COLLABORATIVE CLASSROOMS

The floors in seminar, basic, and collaborative classrooms should be flat. Flat floors support flexibility, allowing reconfigured or repurposed spaces for evolving pedagogy.

In larger flat-floor classrooms, appropriate attention must be given to viewing angles. It is critical that larger classrooms be oriented with the classroom front on the long dimension of the room, as indicated in the *Classroom Dimensions* section, to maximize the amount of display surface and minimize the distance between the display wall and the last row of seats. The use of dual image projection in larger flat floor classrooms may be employed to expand the optimal viewing area to ensure all students have appropriate views of the projection screens.

The finishes of classroom floors should be carpet tile with rubber base. Carpet tiles allow for local replacement of worn tiles with less waste. Certain specialty classrooms or executive education classrooms may have carpet tile with wood base.

LECTURE HALLS

The existing lecture halls in the Lecture Center on the Uptown Campus and in Page Hall and the Schuyler School on the Downtown Campus should be maintained to meet the University's need for large section instructional spaces. The lecture halls in each of these buildings contain sloped or tiered floors as an existing condition, which should be maintained to provide better viewing angles.

The typical condition for lecture halls in the Lecture Center is a rise from the Podium elevation of negative 25'-4" at the front to negative 18'-7" at the rear (6'-9" vertical elevation), over a horizontal distance of 33'-4". The horizontal distance is divided into nine treads (of 44" depth) and outfitted with fixed table and chair furniture.

This is the condition in all lecture halls except for LC-07 and LC-18, the two largest halls. These halls rise from a Podium elevation of negative 27'-6" at the front to negative 18'-7" at the rear (8'-11" vertical elevation), over a horizontal distance of 50'-0". The horizontal distance is divided into 15 treads (of 40" depth) and outfitted with fixed tablet armchair furniture. The instructor area at the front of the large lecture halls is elevated four steps back to the Podium elevation of 25'-4".

To increase opportunities for student engagement with their peers and provide more work surface area for students, the lecture halls in the Lecture Center should be outfitted with a form of fixed tables and movable chairs when they are redeveloped.

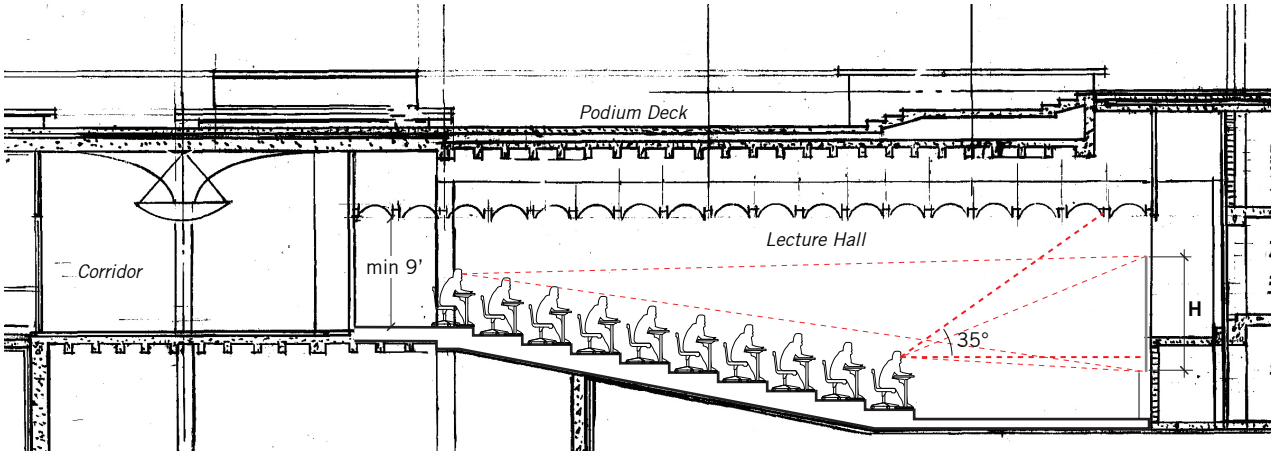
The lecture hall tread depth will impact the style of furniture the room is capable of accommodating. As illustrated in the diagram on the opposite page, if the existing tread depth of 44" is maintained, a very narrow furniture system would be required, but the cost of altering the tread structure would be averted. If the tread structure is altered, a deeper tread depth of 60" is recommended to allow for 24" of writing surface depth and 36" between rows. Given the proportions of the existing lecture halls, it is estimated that seven such tiers could be accommodated in the typical lecture halls.

The use of carpet tile is recommended in lecture halls where instruction is the primary function, such as rooms in the Lecture Center. Other flooring materials may be considered for the lecture halls in the historic buildings on the Downtown Campus as these spaces are more likely to serve multiple functions.

OTHER CONSIDERATIONS

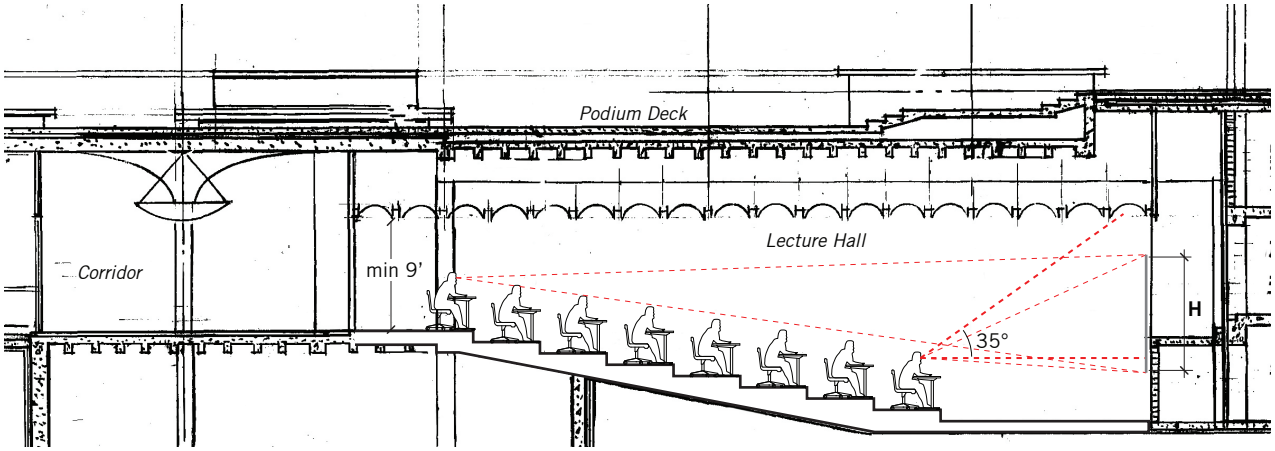
The floor area under any instructor demonstration areas where chemicals may be used should be of an epoxy or other resilient finish for durability.

All flooring materials must conform to the University's green purchasing regulations and guidelines. Suppliers that offer a manufacturer take-back recycling program for demolished carpeting should be given preference.



EXISTING

44” tread depth
7” riser height
10 rows accommodated



RECOMMENDED ADDITIVE SOLUTION

60” tread depth
4.5” riser height - (2) per tread
8 rows accommodated

30 linear inches of writing surface per student should be allowed in both scenarios.

FIGURE 01.17 Existing and recommended viewing angles in tiered lecture halls. Provide lecture seating and egress to meet ADA requirements at top and bottom of lecture hall.

CLASSROOM WALLS

Internal classroom walls should be designed such that studs and GWB run from floor deck to floor deck. Walls should be designed to meet the acoustical standards outlined in the *Acoustics* section, with an STC of 50 or better. Folding and movable walls in classrooms must meet the same acoustic standards and should be specified only for limited, unique needs.

Walls in lecture halls should be designed to provide an optimum acoustical environment for spoken voice functions through the use of fabric-wrapped acoustic panels or other acoustic treatment.

The classroom front wall should contain no protrusions or discontinuities that reduce the writing surface.

Walls should be painted; no wall coverings should be used. Only no- or low-VOC paint should be used to improve indoor air quality, a critical attribute of effective learning environments.

CLASSROOM WHITE BOARDS

Porcelain enamel dry marker whiteboard writing surfaces should be installed in all classrooms and lecture halls. Each whiteboard should have a continuous accessory tray along the bottom edge that is mounted to the board and not to the wall. All whiteboard seams should be flush. White boards should be mounted at a height of 36” above the floor using Z-clips to allow easy removal.

Whiteboard surfaces tend to reflect sound. As such, white boards in classrooms are recommended to be installed with a band of acoustic material located above them.

SEMINAR AND BASIC CLASSROOMS

White boards should be provided on at least two walls in all seminar and basic classrooms, with one of the two walls designated as the classroom front. The mounted whiteboard on the classroom front wall should be sized to cover as much area as possible. It may be installed as one or two components depending on the surface length required.

Additional layers of side-by-side articulating whiteboard should be provided over the base wall-mounted board in basic classrooms. Articulating whiteboard is not required in seminar classrooms due to the small size of the room. The whiteboard on the secondary wall should be positioned to complement the surface on the classroom front wall.

TEAM CLASSROOMS

White boards should be provided on at least three walls in all collaborative classrooms. White boards may be provided on all four walls if the classroom is window-less. The pedagogy of collaborative classrooms necessitates dedicated white boards and projection surfaces or displays for each grouping of students. As such, the positioning of white boards must be reconciled with the location of projection surfaces or displays in accordance with the furniture arrangement.

To promote classroom inventory flexibility, some basic classrooms will be designed so they may be upgraded to collaborative rooms without major renovation. The key consideration for such upgrades is the provision of appropriate infrastructure systems, as outlined in the following Electrical, Telecommunications, and Audio Visual Infrastructure section. Rooms being designed with such potential upgrade should provide embedded power and data junction boxes behind removable white boards to support wire pulls for additional technology components.

LECTURE HALLS

White boards only need to be provided on the front wall of lecture halls. The whiteboard surface should cover as much of the wall as possible. Articulating white boards that move side-to-side and up-and-down should be considered in lecture halls to expand the available writing surface.

CLASSROOM CEILINGS

CEILING HEIGHT

The required ceiling height of classrooms is impacted most directly by the vertical clearances required for lighting and technology components. Where ceiling heights may be controlled, they should be set to the optimal required height. In existing buildings where adjustment of the ceiling height is not possible, the configuration of rooms must accommodate the available ceiling height. In Podium buildings, the typical height from the floor to the top of the vaults, a dimension applicable for ceiling-mounted component applications, is 11'-0". The height from the floor to the bottom of the vaults, applicable for digital image projection and viewing applications, is 9'-2".

The ceiling height for flat floor classrooms must allow for the appropriate height of projected images on the projection screen. As outlined in the *Classroom Dimensions* section, the image height should be no less than 1/6 of the distance between the screen and the last row of seats.

In sloped or tiered lecture halls the ceiling height at the back of the room must exceed 9"-0". The height at the front of the room will be a function of the vertical rise of the room from the front to the back and the required projected image height based on the proportions of the room.

OTHER CONSIDERATIONS

Classroom ceilings should be light in color to reflect light and maximize the effect of natural daylight, as applicable. Ceilings should have a light reflectance coefficient of 80 percent or greater.

The appropriate acoustical treatment should be applied to ceilings, as outlined in the *Acoustics* section.

The appropriate power and data access points should be provided in the ceiling for technology and AV requirements. Access for the maintenance of such components should also be provided where applicable.

Specifying Products and Materials for Sustainability

Consider the following points when specifying products and materials in classrooms to advance UAlbany's sustainability goals.

RECYCLED CONTENT

Specify materials with recycled or post-consumer content to reduce the impact on raw materials.

REGIONALLY SOURCED

Specify materials that are extracted, harvested, and/or manufactured within a 500-mile radius of the University to reduce the energy use associated with transporting materials.

LOW-EMITTING

Specify materials that are low-emitting for improved indoor air quality.

CLASSROOM DOORS AND FRAMES

Classroom doors must operate quietly and should be equipped with door silencers to muffle the noise of the door closing.

Doors should contain vision panels to allow for visibility into and out of the classrooms for safety. The preferred size for the vision panel is 24" high by at least 4" wide, with the bottom edge located 42" off the floor. Appropriately rated glazing may be used for doors in place of vision panels.

Card access control hardware should be installed on the corridor side of each classroom door. All classrooms and group study rooms of 24 stations or fewer should be equipped with wall-mounted room-scheduler panels, which should be mounted outside the door to allow for on-demand scheduling.

Door opening force, hardware, width, thresholds, and maneuvering clearances should comply with ADAAG standards. All classroom doors should conform to the University's Design Standards for Doors and Openings.

CLASSROOM WINDOWS AND WINDOW TREATMENTS

Access to daylight is important in learning environments. Windows or light transfer solutions that provide access to natural light should be included in classrooms when appropriate. The provision needs to be balanced with the need to minimize exterior distractions, the maintenance costs of window shades, the need to maximize whiteboard and projection wall space, and the need for advanced control over lighting or noise.

The presence of windows in classrooms provides both aesthetic and environmental advantages. Windows afford occupants a visual connection to the outdoor, natural world, which research has shown reduces stress and increases attention span, both of which have positive effects on learning. Additionally, windows in classrooms may be operable to provide natural ventilation, which may contribute positively to student learning outcomes and result in energy savings by reducing demands placed on the mechanical HVAC system.

The designated classroom front should never be positioned on a wall with windows, as the presence of windows creates glare for students and reduces the amount of space available for white boards.

Windows in classrooms should be equipped with window treatments in accordance with the University's Design Standards for Furnishings – Window Treatments. Window shade cloth materials should be light colored on the outside to reflect solar heat from the sun and darker colored on the inside for greater visibility. In applications not requiring a full black-out condition, the openness factor should be selected to prevent glare while allowing for visibility and connectedness to the outdoors.

Manually operated window shades are preferable over motorized shades as they are less prone to operator misuse and therefore have a longer lifespan.

CLASSROOM SIGNAGE

SIGNAGE MANUAL

EXTERIOR CLASSROOM SIGNAGE

Classroom signage refers to identifiers both on the exterior and interior of the room. Exterior signage should be placed at each classroom entrance and include a room identifier (in text and braille), room name, and space for printed inserts. If used, wall-mounted room-scheduler panels should be mounted near the exterior room signage.

INTERIOR CLASSROOM SIGNAGE

Interior signage incudes permanent signage and official state or University posting within the classroom. In classrooms capable of alternate room layouts, signage should display the designated layout. Instructions for use as well as a phone number for IT or Help Desk support should be clearly posted near any technology within the classroom. Interior signage should also include mounted space for printed inserts.

All classroom signage should comply with the University's Signage Manual (USM).

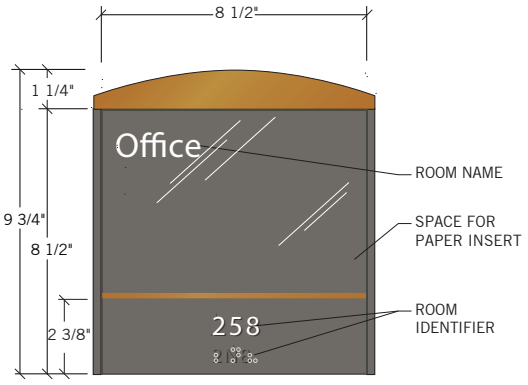


FIGURE 01.18 Exterior Signage: Secondary Room Identifier as specified in the University's Signage Manual (USM).

CLASSROOM INFORMATIONAL SIGNAGE

UAlbany places six signs inside each classroom with information about furniture layouts, AV/IT help desk contact information, emergency contact information, and egress information.

The signs are prepared on letter-sized (8.5" x 11") sheets of paper and are posted in a series of transparent, hard cover display sleeves that are mounted to the wall. The signs are updated manually.

The diagram below illustrates the signage mounting guideline for the six display sleeves. It provides guidelines for the distance from the door and the spacing between the signs.

In cases where the signage display can not be clustered in the 3x2 configuration as shown in the figure below, a proposed layout must be approved by the University.

Style guidelines for classroom informational signage should be included in the subsequent version of UAlbany's Signage Manual.

Signage Performance Specification

The following list of performance specifications are to be referenced and used as a guideline when selecting a specific sign vendor. A sample of the sign must be submitted for approval prior to installation.

- Nominal size: 12 3/4"H x 8 1/4"W x 1/2"D
- Sign cover material: transparent methacrylate
- Trim material (optional): satin brushed stainless steel
- Mounting: per manufacturer's recommendation
- Maintain no less than 3" between each sign to allow enough space for paper to be inserted into the sign sleeve without damage to the paper.
- Accessibility to remove and replace paper must be viable manually, requiring no tools.
- Maintain mounting distance from adjacent classroom elements per the diagrams.

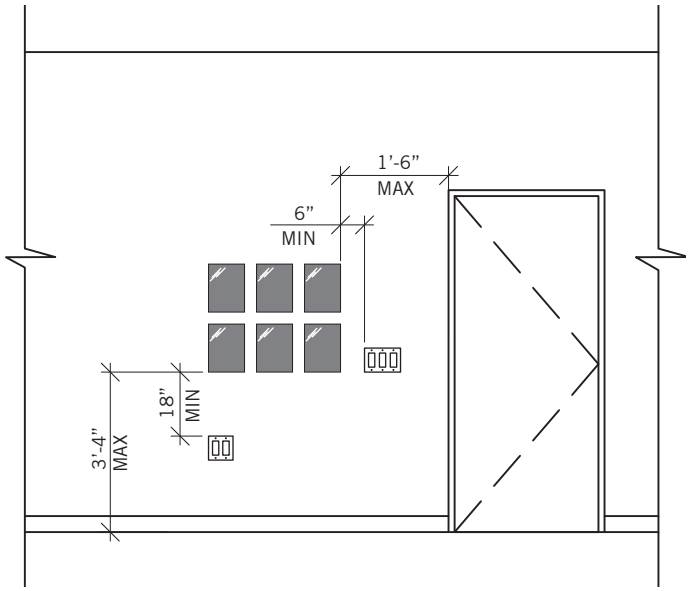


FIGURE 01.19 This elevation depicts a guideline for mounting the signage, including distance from adjacent doors, and distance from outlets and devices.

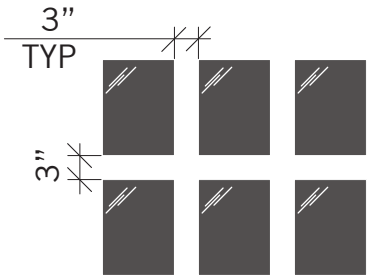


FIGURE 01.20 The signage will be installed in a cluster of six amounting to three signs across and two down. The signs should maintain a distance of 3" from each other.

MECHANICAL SYSTEMS

ACOUSTICAL CONSIDERATIONS

The primary consideration for mechanical systems in relation to classrooms is noise, which may be generated by the vibrations or airflow. Noise associated with mechanical systems should be minimized or mitigated as much as possible.

Duct wrap should be employed on all mechanical duct work to provide sound attenuation in addition to its thermal properties (The University prefers duct wrap as opposed to duct lining).

INDOOR AIR QUALITY AND AIR CIRCULATION

Good indoor air quality is important in classrooms and contributes to student learning and performance. Inadequate indoor air may cause students to experience drowsiness, reducing student learning outcomes. Indoor air quality is affected by conditions that occur both inside and outside of a room, including air circulation and exchange.

The heating, ventilation, and air condition (HVAC) systems serving classrooms must achieve ventilation rates and air changes per hour to conform with the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) standards for *Ventilation for Acceptable IAQ*.

Carbon dioxide (CO_2) monitoring should be provided in classrooms as a means of monitoring air exchange.

To limit potential conflicts between window operation and HVAC systems, automatic controls should be provided to shut off HVAC operation when windows are open.

Air intakes for classrooms should not be located near areas of high vehicular traffic, such as loading docks, trash receptacle areas, outdoor smoking areas, or building exhaust.

Classroom renovation projects should implement a Design Indoor Air Quality Management Plan as well as indoor air quality testing prior to occupancy.

Air circulation supply registers and vents should be located to avoid blowing directly onto student or faculty seating areas. They should also avoid blowing onto projection screens, as screen movement interrupts image display. Air vents must not impact any ceiling microphones that may exist in classrooms.

TEMPERATURE

The temperature of classrooms at UAlbany is determined by the University's *Heating and Cooling (Space Temperature Setpoint) Policy*. The policy defines heating and cooling seasons, occupied and unoccupied hours, and space temperature set points during occupied hours.

Occupied hours are currently defined as Monday through Friday from 8am to 10pm for classrooms and certain laboratories. The hours are extended to include weekends for some spaces.

The target temperatures are within the range that is acceptable to 80 percent of building occupants per ANSI/ASHRAE Standard 55-2004, *Thermal Environmental Conditions for Human Occupancy*.

The relative humidity range for classrooms should typically be maintained at 50 percent, plus or minus ten percent. Rooms with specialized equipment that are sensitive to humidity levels may require additional control.

LIGHTING

Lighting is an important component of the classroom environment. As mentioned, classrooms should be located along an exterior wall as much as possible to provide access to daylight, found to support student learning outcomes as well as reduce energy use. Any available daylight should be supported by an electrical lighting system.

Lighting in classrooms should create an atmosphere that supports engagement and learning. Lighting should be bright, but spaces should not be over-lit. Lighting should be uniform throughout the room, providing ambient illumination with a minimum amount of glare.

TYPES OF LIGHTING

Ambient lighting should be provided in classrooms and lecture halls with fluorescent fixtures, either pendant mounted or recessed, depending on the ceiling type and height. Diffuse lighting should be employed as it makes human faces easier to see, an important factor in promoting engagement in classrooms.

Directional lighting may be used to wash walls with light. This strategy can highlight particular areas or increase the amount of reflected light in a room to make the space feel large and bright.

LIGHTING FIXTURES AND PERFORMANCE

CLASSROOMS IN PODIUM BUILDINGS

Classrooms in Podium buildings will typically have a vaulted ceiling. To maintain the historic integrity of lighting in the space, direct/indirect fixtures should be suspended in the barrel vault, running along the length. Runs should not be continuous, to reduce energy use and light levels. A vertically-oriented acoustic panel should be provided, integrated with lighting fixtures.[1]

Tandem wiring for two-level switching should be provided, with up-light separate from down-light. A semi-parabolic louver facing downward should be provided. Luminaires should have a minimum efficiency of 65 percent.[2]

OTHER CLASSROOMS

Classrooms in non-Podium buildings do not have vaulted ceilings, and as such are not required to maintain historic integrity. As such, the lighting system implemented can be more efficient and flexible. Classrooms should be outfitted with high-reflectance white ceiling tiles and continuous rows of direct/indirect fluorescent pendants.[3]

Refer to the Lighting Master Plan for performance specification details and consult the University's updated design guidelines for updates to the Lighting Master Plan, specifically related to the migration to LED technology associated with recent cost reductions.

LIGHTING LEVELS

Two lighting levels should be provided in classrooms to meet the pedagogical needs of multiple modes of instruction: a general illumination level and a reduced note-taking level.

The Lighting Master Plan provides the following guidelines for lighting levels. The general illumination level should provide 35 to 50 footcandles (fc) on average, maintained, assuming a ballast factor of 0.87 and a light loss factor (LLF) of 0.75.[4] The reduced note-taking illumination level for use during digital projection should provide 5 to 10 footcandles.

Fixture brightness level should be minimized to reduce the reflection on computer and other device screens.

LIGHTING ZONES AND SWITCHING CONTROLS

Classroom and lecture hall lighting should be organized into zones, with switching controls provided for each zone. Basic zones should include a teaching wall zone (**TW**) and a student zone (**S**). If the student zone is large, it may be sub-divided into multiple components to achieve more lighting options.

Classrooms lighting switching controls should be accessed at the room entrance as well as on the classroom's wireless control panel.

Occupancy sensors should be provided on all switches to automatically shut off electric lighting when the room is not in use, reducing the energy consumption.

Classrooms with significant daylight exposure should employ daylight responsive controls to reduce the electrical lighting when daylight is significant, also reducing energy consumption.

1 The University at Albany Lighting Master Plan, Page 108
2 The University at Albany Lighting Master Plan, Drawing LD 4.121-A
3 The University at Albany Lighting Master Plan, Page 158
4 The University at Albany Lighting Master Plan, Drawing LD 4.121-A

Classroom Lighting Goals from the Lighting Master Plan

UAlbany conducted a Lighting Master Plan in 2008. Reference the Plan for design intent, performance metrics and standards, and LEED / sustainability principles related to lighting. The specific fixture recommendation included in the Plan should be used only after confirming with the University, as recommendations in the Plan have since been updated and modified.

ILLUMINANCE

Meet or exceed IESNA illuminance recommendations on desktops and white boards.

BRIGHTNESS

Minimize brightness of fixtures to reduce glare on computer and device screens.

CONTROL

Create capability to control lighting levels. Allow levels and ceiling and wall brightness to be reduced to enable easy viewing of projected images and when day lighting contribution is significant.

NUMBER OF FIXTURES

Keep the number of fixtures as low as possible to reduce cost, energy use, and maintenance complexity.

ENERGY

Reduce energy use by lowering the connected lighting load (as measured through Watts per square foot) and by using occupancy sensors to automatically shut off classroom lighting when the room is not in use.

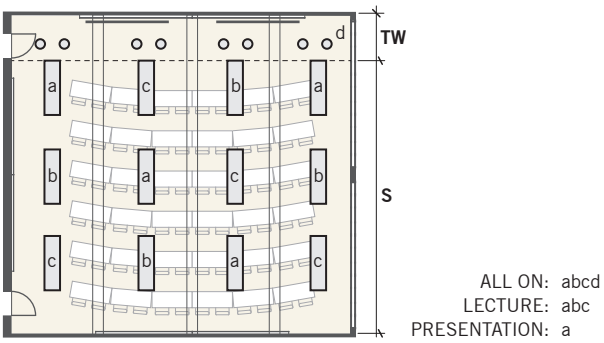


FIGURE 01.21 Designated controls for the teaching wall zone (**TW**) and the student zone (**S**) as well as a sub-divided student zone allows for a variety of lighting levels in the classroom.

ACOUSTICS

A student's ability to hear and understand what is being said in a classroom, either by an instructor or another student, is vital. Poor acoustical conditions may adversely impact a student's speech understanding, attention, and concentration, ultimately affecting their comprehension of the course material and academic performance.

Well-designed classroom and lecture hall acoustics enhance the intelligibility of speech and reduces unwanted background noise. The acoustical performance of classrooms and lecture halls should be measured using the noise reduction coefficient (NRC), reverberation time (RT), and room criteria (RC). Additionally, partitions and materials should be evaluated for their sound transmission class (STC).

NOISE REDUCTION COEFFICIENT

The intelligibility of speech is important in classrooms and lecture halls. As such, it is essential to provide sufficient sound absorption to minimize unwanted sound reflection.

The noise reduction coefficient (NRC) quantifies the ability of a surface to reduce the reflections of sound by absorbing it. The rating extends from 0.00 for a perfectly reflective surface to 1.00 for a perfectly absorptive surface.

To ensure speech intelligibility, high NRC values are recommended for classrooms (closer to 1.00 than 0.00).

ABSORPTIVE MATERIALS

High NRC values are achieved by providing the right distribution of absorptive materials and surfaces within a classroom. Absorptive materials may include acoustical ceiling treatments, acoustical wall treatments, and carpeting on the floors. Additionally, user occupancy increases sound absorption.

Acoustical ceiling treatments should be provided in accordance with the University's Design Standards and Guidelines for Acoustical Ceiling systems through the use of either acoustical ceiling panels or a suspended acoustical ceiling system. The latter system is intended to fit within the vaults in buildings on the Podium. All classroom and lecture hall ceilings should meet the standards for ceiling attenuation class (CAS) of 39 or better and have a NRC value of greater than 0.70.

An acoustical wall system is recommended to be included in a portion of the classroom wall surfaces. More extensive use of acoustical wall treatment should be used in lecture halls to reduce sound transmitted across the large volume.

REVERBERATION TIME

Reverberation time (RT) is the amount of time it takes sound to decay to 60 dB. A lower RT value indicates less echo and therefore improved sound intelligibility. RT is a function of room volume and the sound absorption provided by the room's surfaces. Larger spaces have longer reverberation times than smaller spaces, and therefore require more sound absorption to achieve similar reverberation times.

Classrooms, conference rooms, and lecture halls where speech intelligibility is important benefit from a short RT. This is particularly true for spaces in which a lecture style is intended to be the primary method of instructional delivery. The following RT values are recommended for classrooms and lecture halls:

CUBIC FEET	ASF	RT
< 10,000	1,000*	0.40 - 0.60 seconds
10,001 - 20,000	1,001 - 2,000*	0.60 - 0.08 seconds
20,001+	2,001*+	0.80 - 1.20 seconds

*Assumes a 10' ceiling height

ROOM CRITERIA

Room criteria (RC) level is a rating system of interior noise levels, similar to the more commonly known rating of noise criteria (NC) level. The Classroom Design Guidelines reference RC because it evaluates more frequencies at lower tones, with a range from 16 to 4,000 Hz, as compared with 63 to 8,000 Hz for NC. Background noise at the lower tone level is more likely to occur in classrooms than noise at the higher tone level.

The ASHRAE Handbook of Fundamentals presents acceptable RC levels for various types of spaces. The following are the SUCF-approved RC levels for classrooms:

- Classrooms up to 750 ASF – RC 40
- Classrooms over 750 ASF – RC 35
- Lecture Halls – RC 30 to 35

SOUND TRANSMISSION CLASS

Sound transmission class (STC) is a rating system used to define the sound transmission blocked by a structure, such as a wall, window, or door. The value is established through laboratory testing. The higher STC rating, the better the assembly is at blocking sound transmission from one side to the other.

Partition design for classrooms, whether fixed or movable, is recommended to achieve an STC rating of 50 or better. To enhance the blocking of sound, walls should be designed such that both studs and GWB facing run from floor deck to floor deck.

ELECTRICAL, DATA / TELECOM, AND AUDIO VISUAL INFRASTRUCTURE

Technology needs within classrooms and lecture halls change rapidly as innovation occurs and new technologies are incorporated into pedagogy. Technology typically has a significantly shorter lifespan than a building and may require replacement multiple times before any significant building renovation is needed. Inability to upgrade technology systems and components in classrooms results in antiquated spaces that cannot evolve with pedagogy shifts and keep pace with student learning needs.

It is important to design classrooms with embedded flexibility to accommodate changing technology, achieved through appropriate electrical, telecommunications, and audio visual infrastructure. These infrastructure systems are buried in the walls, floors, and ceilings of buildings and are difficult to access after a building is constructed. Designing the systems with flexibility and capacity for future growth can facilitate easy upgrades without the need for major renovation.

The following considerations should guide the design of classroom electrical, data / telecom, and audio visual systems. The *AV/IT Requirements for Classrooms, Class Labs, Seminar, Conference & Group Study/Team Rooms* matrix on the opposite page presents guidelines recently established by the University.

DAY 1 AND DAY 2 INFRASTRUCTURE

All classrooms and lecture halls should be designed to provide infrastructure to support what is known as Day 1 and Day 2 technology systems. Day 1 technology systems are those that the room will support on the first day it opens. Day 2 technology systems are those that the room may need to support in the future, reflecting technological advances or the University's adoption of additional technologies.

It is important to recognize the inherent "unknown" associated with planning for Day 2 technologies. At the time of original design it is impossible to clearly foresee the extent and nature of future innovations and technological demands on the space. The intention of planning for Day 2 technology is to use available information to incorporate as much adaptability as possible.

ELECTRICAL SYSTEMS

Electrical systems and circuiting in classrooms and lecture halls should be designed to allow for a target of 40 percent (but minimum of 20 percent) future increase in demand for electrical services to the room. The percentage increase should be based on the anticipated future room function that has the highest electrical load. For example, if a basic classroom is being designed to accommodate a more technology-intensive collaborative classroom in its Day 2 configuration, the design must accordingly, take into account the increased electrical demand. The implication of this will be the provision of electrical panels with full loads, but capacity for future expansion.

Wall outlets should be provided at regular intervals around classrooms and lecture halls. In rooms where each student station is expected to be wired, it may be suitable to install a raceway around the perimeter of the room to allow for easy installation.

Even if technology is not installed when a room is built or renovated (for Day 1), electrical service should be provided to the appropriate locations to allow for easy installation in the future.

DATA / TELECOM SYSTEMS

TELECOMMUNICATIONS SERVICE

Every classroom should be connected to campus data / telecommunications networks for voice, data, and video communication according to the guidelines outlined in the University's Division 27100 Design Guidelines and Specifications for Telecommunications. Specifically, the following sections apply to classrooms: 27130 Interior Communications Pathways and 27160 Horizontal Cabling.

According to the guideline, connection points must be provided to the media cabinet (primary work area outlet), a location opposite the media cabinet, and for a wall phone outlet in the front of the room near the door.[1]

HARDWIRE AND WIRELESS

It is UAlbany policy that only University-owned hardware is connected to the system by hardwire. All non-University hardware is to be connected wirelessly. As such, wiring must be provided to the media station, which connects critical instruction applications, but wiring to individual seats in classrooms should not be required in most applications. It may be required only in University computer labs.

Access to the University's wireless network Wi-UAlbany (UA_WPA) should be provided in each classroom using a wireless access portal (WAP). The wireless network will provide the primary means

1 University at Albany Telecommunications Division 27100 Design Guidelines and Specifications.

for users to connect with their personal devices. It is expected that many users will seek to connect with multiple devices, such as a laptop and a tablet, or a tablet and a smartphone.

AUDIO VISUAL SYSTEMS

Conduit, raceway, or cable trays should be installed from the equipment rack location in each classroom or lecture hall to all locations where equipment will be located on Day 1, and if possible, in the future (Day 2). Audio visual equipment that may require connectivity includes the following:

- Display devices (projectors)
- Source devices (DVD or optimal disk storage such as blu-ray players)
- Video capture devices (cameras)
- Signal processing, routing and distribution equipment
- Speech reinforcement and audio conferencing equipment (microphones)
- Sound reinforcement systems (amplification)
- Control systems and switching equipment
- Associated racks / panels
- Collaboration software

AV/IT REQUIREMENTS CLASSROOMS, CLASSLABS, SEMINAR, CONFERENCE & GROUP STUDY/TEAM ROOMS Revised 04/24/14	1 [1] LECTERN EQUIPMENT CABINET (Front of space)	2 EQUIPMENT CABINET (Under table)with seating	3 INSTREUCTUR'S TABLE AND CHAIR	4 ACCESS RESOURCES (Inc internet) VIA SUPPLIED PC W/keyboard and mouse	5 PRESENT POWER POINT VIA SUPPLIED PC	6 PLAYBACK PREV RECORDED VIDEO (PC or iPad)	7 DISPLAY YOUR LAPTOP (HDMI or VGA)	8 DISPLAY A BOOK, OBJECT, SLIDE, OR PHOTO	9 PROVIDE COMPUTER WORKSTATION PER STUDENT	10 PLAY DISC (DVD or BlueRay, ETC.)	11 [2] CONTROL SCREEN(S) and/or LIGHTS AT INSTRUCTOR STATON	12 CONTROL SCREEN(S) and/or LIGHTS AT INSTRUCTOR STATON WIRELESSLY	13 [3] DISPLAY DIGITAL CONTENT SOURCE(S) (projector w/screen or display)	14 ANNOTATE ON SCREEN	15 PLAYBACK RECORDED AUDIO (via PC, iPad, etc.)	16 AUGMENT VOICE LECTURING (wireless/)	17 [4] COLLABORATIVE FILE SOLUTIONS	18 DISPLAY WORKGROUP CONTENT	19 [5] VIDEO CONFERENCING WITH ONE OR MULTIPLE PEOPLE OR SITES	20 JOIN A WEBCONFERENCE OR WEBINAR	21 MAKE CONFERENCE CALL	22 ETHERNET DATA CONNECTION (wired & wireless)	23 DISPLAY CABLE TV	24 RECORD A LECTURE (AUDIO AND/OR VIDEO)	25 DISPLAY A STUDENTS WORKSTATION	26 CUSTOMISED (functionality beyond one of the standards)	27 ROOM SCHEDULER PANEL
CLASSROOMS																											
Level 1 (Laptop Ready)			X				X						X		X							X					
Level 2 (Basic)	X			X	X	X	X			X			X		X							X		X			
Level 3 (Smart)	X			X	X	X	X	X		X			X	X	X	X		X				X		X			
Computer (PC @ each station)	X			X	X	X	X	X	X	X			X	X	X							X			X		
Special																										X	
CLASS LABS																											
Level 1 (Dry – power w//min HVAC, P -Physics, etc.)		X		X	X	X	X						X		X	X						X		X			
Level 2 (Dry/wet- power w/some HVAC, P - Biology, etc.)		X		X	X	X	X						X		X	X						X		X			
Level 3 (Wet high - power, HVAC & P - Chemistry, etc.)		X		X	X	X	X						X		X	X						X		X			
Computer (PC @ each station)	X			X	X	X	X		X	X	X		X		X	X	X	X		X		X			X		
Special																										X	
SEMINAR (10-20 seats typ.)																											X
Level 1		X		X	X	X	X			X			X		X							X					X
Special																										X	X
CONFERENCE (20 seats + typ.)																											
Level 1		X		X	X	X	X						X		X		X		X	X	X	X		X			
Special																										X	
GROUP STUDY/TEAM (6-10 seats typ.)																											X
Level 1							X						X		X							X					X
Level 2		X		X	X	X	X			X			X		X							X					X
Level 3		X		X	X	X	X			X			X		X		X		X			X					X

[1] Lectern is typically part of equipment cabinets and separate when equipment credenzas are utilized
[2] Light and screen controls may also be at wall as appropriate
[3] Multiple projectors, screens and digital displays may also be installed as appropriate
[4] Wowvision was recently installed, but the campus is open to less expensive solutions such as AirMedia to set as the standard.
[5] Vaddio is used on campus, but the campus is open to other solutions to set as the standard

C:\Users\Ecm39\Appdata\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\ENT4XWTP\AV Standards For Classrooms Class Labs Final V1.Docx

FIGURE 01.22 AV/IT Requirements for Classrooms, Class Labs, Seminar, Conference & Group Study/Team Rooms

TECHNOLOGY COMPONENTS

Innovations in technology have fundamentally shifted the paradigm of access to information on a university campus and enabled multi-modal teaching that allows for customized, learning-centric delivery models. UAlbany is committed to providing appropriate technology in its classrooms to support the teaching and learning needs of faculty and students.

Technology should be provided in UAlbany classrooms and lecture halls in a manner that supports technology-enhanced learning by making it available and easy to use, but not intrusive. The effective integration of technology into classrooms and lecture halls requires more than having devices present. Rather, technology must be approached holistically as a part of the classroom design to ensure it functions properly and in an integrated manner to support instruction in a meaningful way.

One critical component of effective technology function is the proper installation of technology infrastructure during the design phase, outlined in the previous section. In contrast to the rapid evolution of technology, the physical classrooms in which learning occurs change at a much slower rate. Therefore, they must be designed with infrastructure systems that allow technology components to change without disturbing the architectural envelope of the space.

BASELINE CLASSROOM TECHNOLOGY

All classrooms and lecture halls must be designed to meet the following "baseline technology" standards. The standards address technology components as well as the supporting infrastructure.

TECHNOLOGY MEDIA CABINET

Each room should contain a media cabinet located against the corridor wall. The media cabinet will contain the room's technology components, which will be controlled using a wireless device. This strategy integrates technology in a non-intrusive manner. It also enables the instructor to provide "shared control" to students or groups, as required for instruction.

The media cabinet should contain the following equipment:

- A personal computer with wireless keyboard and mouse,
- A DVD/CD/VCR player
- A wireless annotation tablet
- A document camera on a pull-out tray
- Wireless microphones
- A wireless control panel
- Auxiliary input ports for portable devices

PROJECTION

The room infrastructure must support two ceiling-mounted projectors and two side-by-side projection screens.

The size of the projection screens should achieve the appropriate image size given the size of the space and student viewing requirements. Screens should be mounted so that a minimum of six feet of whiteboard space remains exposed when one of the screens is in use, and at a distance of 10" to 12" from the wall to allow clearance over whiteboard trays. The screens should be of a matte white finish, which provides a viewing angle of up to 45 degrees on each side the center line. Screens 10' wide and wider should be electrically operated.

In larger rooms, dual-projection technology should be designed immediately to support both same image (A-A) or different image (A-B) projection (Figure 01.8). In smaller classrooms, single-projection technology may be designed initially with the possibility to upgrade later.

OTHER COMPONENTS

Classrooms should also contain the following components:

- Wireless Internet access
- Infrared broadcasting to support assisted listening devices
- Networked control system for remote monitoring and access
- (The provision of a telephone is optional)

COLLABORATIVE CLASSROOM TECHNOLOGY

Collaborative classrooms require additional infrastructure and components. Basic classrooms that are not intended to serve as collaborative classrooms right away but may in the future and should be designed with advanced infrastructure to allow for components to be added without significantly impacting the architectural envelope of the space.

Collaboration classrooms should contain all elements of baseline classroom technology with the addition of the following items.

PROJECTION

Multiple projection or display units must be provided at the rate of one unit per team or grouping of students. As fewer users will be working with each display unit, the image size may be smaller in size.

The display units should be distributed around the room's perimeter in order to allow multiple groups to work simultaneously. However, they should not be mounted along a wall with windows. In addition, the positioning of the display units should not conflict with white boards.

TECHNOLOGY CONNECTION POINTS

Multiple connection points must be provided at the rate of at least one per team or student group. Each point should connect to the local projection unit and must support connection point must support user devices on multiple platforms.

FUNCTION-SPECIFIC TECHNOLOGY

Advanced technology such as video capture, computer classrooms, specialized equipment, etc., may be provided in select rooms on a function-specific basis.

FURNITURE

The University at Albany currently has a wide range of furnishings present in its general purpose classrooms, reflecting the various pedagogy in place at the time the classrooms were designed.

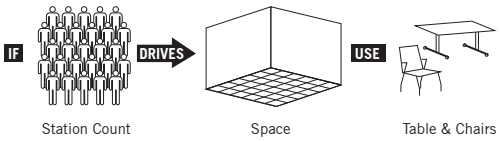
Going forward, the University's design standard is to provide movable tables and chairs in classrooms. This type of furniture best supports the activities associated with the engaged pedagogy the University now promotes, and sees continuing as explained to the right.

All furnishings should carry a 10-year warranty and be supplied by established manufacturers who can provide parts and service for the anticipated life of the items.

SELECTING A FURNITURE STYLE

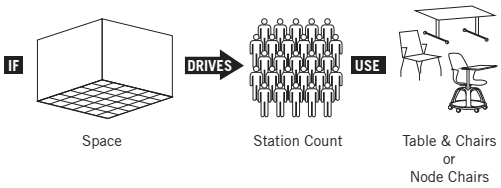
STATION COUNT AS DRIVER = TABLES & CHAIRS

Station count drives room area when classrooms are being designed to accommodate a specific number of students. Using the station count as the classroom size driver is most realistic when a building is being designed or comprehensively renovated and walls can be located to define the ideal area. In this case it is strongly recommended that classrooms use tables and chairs due to the expanded pedagogy that may be accommodated.



CLASSROOM AREA AS DRIVER = TABLES & CHAIRS OR NODE CHAIRS

Alternatively, existing room size drives station count when walls are fixed in place. In these instances, the total square footage of the space and appropriate ASF per station value should drive the station count. This typically occurs when rooms in existing buildings are repurposed and lightly renovated to accommodate classrooms. While tables and chairs are preferred from a pedagogical perspective, node chairs provide a more efficient ASF per station where room size cannot be controlled and a certain station count to be achieved.



Making the Case for Tables and Chairs

STUDENTS USE MORE SUPPLEMENTAL OBJECTS IN THE CLASSROOM TODAY THAN THEY ONCE DID AND REQUIRE MORE SURFACE AREA.

Where as past students primarily transcribed content into a notebook, today, to the degree that they are transcribing content, they are more likely to use a laptop computer. Laptops are wider than notebooks and typically more unwieldy. Furthermore, a laptop computer may be complemented by a notebook, textbook, handouts, or project materials. Students engaged in alternative technologies such as collaborative learning (which rely on moving students to apply knowledge to solving problems), may be required to incorporate additional reference materials.

TABLES AND CHAIRS CREATE MORE EFFECTIVE AND INCLUSIVE CLUSTERS.

While tablet armchairs can be rearranged and grouped, the overall size of the surface they create together is small and not conducive to sharing among users. Tables and chairs can be re-configured to form work groups and discussion groups more effectively than tablet armchairs. Students can sit next to one another, side by side, or across from one another. They can reposition themselves into all of those arrangements with greater ease and work from shared workspace.

TABLES AND CHAIRS ARE MORE COMFORTABLE FOR A BROADER RANGE OF STUDENTS AND A LONGER DURATION.

The students being served by higher education today encompass broader ranges of age groups and sizes than ever before, and classrooms should strive to provide a comfortable learning environment for all students. Additionally, certain course time periods extend well beyond the once typical one-hour to respond to pedagogy drivers and meet the scheduling needs of students. Tables and chairs provide more space and a greater range of options, facilitating increased comfort, which may in turn result in improved concentration and learning.

TABLES AND CHAIRS

SEATING

The typical classroom chair is four-legged without casters. Collaborative rooms and upgraded rooms may use a four-legged chair with casters or a chair with more traditional five-point caster base to facilitate furniture flexibility.

Typical classroom chairs should not have adjustment capabilities. Task chairs for upgraded classrooms should have only minimal adjustment capabilities, preferably with a height adjustment only.

Side chairs may be provided to meet the temporary surge in station needs at the beginning of the semester. Side chairs should stack for storage.

Typical
Classroom Chairs

Collaborative
Classroom Chairs

TABLES

Moveable student tables are recommended to provide 30 linear inches of writing space per student and a minimum depth of 20", achieved by positioning two students at a table of either 60" x 20" or 60" x 24". Where needed, single station tables may be provided with 36" wide clear knee space by 20" deep.

Rows of tables should be spaced at a minimum of 30" apart, with 36" preferred.

NODE CHAIRS

Node chairs should contain a three-legged tripod base with storage and work surface.

INSTRUCTOR STATION

The instruction station is to be provided at a 24" by 36" instructor table. The instructor station should provide direct access to data and power.

MEDIA CABINET

SEMINAR, BASIC, AND COLLABORATIVE CLASSROOMS

In lieu of an instructor podium, seminar, basic, and collaborative classrooms should include a media cabinet containing technology functions located against the corridor wall, and controlled by a wireless device. This strategy integrates technology in a non-intrusive manner and enables the instructor to provide "shared control" of the technology to students or groups, as required for instruction.

The media cabinet should contain the following components:

- PC
- Control panel (wireless)
- DVD/CD/VCR player
- Keyboard and mouse (wireless)
- Annotation tablet (wireless)
- Document camera (pull-out tray)
- Processing equipment
- Switching electronics
- Auxiliary input ports for portable devices
- Wireless microphones
- User's manual

04 APPDENDIX: OVERVIEW OF CLASS LABORATORIES

Class laboratories are formal learning environments where students learn by observing, practicing, exploring, and solving problems. Class labs use hands-on pedagogy and tools and techniques specific to each discipline of study and thus are typically more specialized.

CLASS LABS PLANNING

Class lab planning should consider the following factors:

- Transparency - Transparency between the lab and the building corridor and between the lab and the building exterior provides views into the lab, showcasing the coursework.
- Flexibility - When possible fixed services such as plumbing should be located at the perimeter of the lab to keep the center area as flexible as possible to accommodate multiple pedagogy.
- Interdisciplinary Use - Labs should be designed to accommodate multiple disciplines and levels of course work whereever possible to foster opportunities for interdisciplinary learning and maximize the utilization of high-investment spaces.
- Environmental Sustainability - Labs are often energy and resource-intensive spaces and should be designed for energy efficiency, water use efficiency, and optimized ventilation exchange rates.
- Technology - Technology is an important part of lab-based learning and is used to present information to students and analyze results. Technology should be appropriately integrated into lab environments, considering the need for separation from experimentation surfaces and the need to upgrade as technology evolves.

CATEGORIES OF CLASS LABS

There are many different types of class labs, however they can be summarized into three basic categories. The diagrams to the right present key space planning considerations for each category of class labs.

1 Chemistry and Biochemistry Labs
2 Biology, Environmental, and Physical Sciences Labs
3 Physics and Engineering Labs

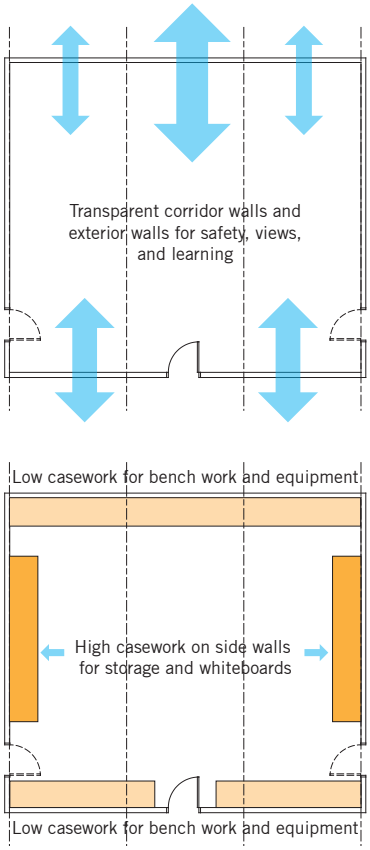


FIGURE 01.23 Class labs should be designed to provide transparency between the lab and the corridor and building exterior. High casework should be located on the side walls.

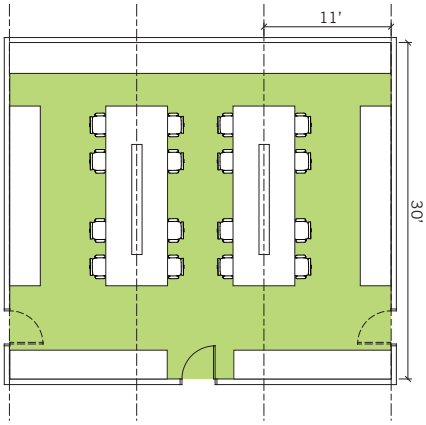
CHEMISTRY AND BIOCHEMISTRY LABS

Space considerations: Central benches fixed for utilities, plumbed services at the perimeter, proportion of hoods to users

Material considerations: Noise management

Equipment and storage: Micro scale equipment, student kits, glassware management, hazardous materials

Uses: Experimentation, rotating groups

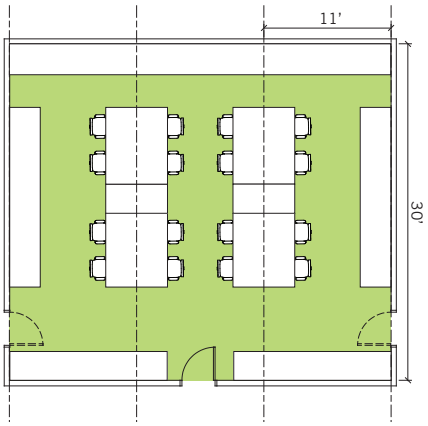


BIOLOGY, ENVIRONMENTAL AND PHYSICAL SCIENCES LABS

Space considerations: Flexible center with movable tables, services and plumbing (wet bench) at the perimeter, easy access to power, distributed equipment

Equipment and storage: Microscopes, racks for growth, workshop kits, chambers, floor basins, specimens, deep sinks, lab air, lab vacuum, physical models, maps

Uses: Experimentation, simulation, prototyping



PHYSICS AND ENGINEERING LABS

Space considerations: Movable tables with ability to dock at the perimeter, movable utilities

Material considerations: Noise and vibration reduction

Equipment and storage: Large apparatuses often requiring structural support, prototyping materials

Uses: Simulations, prototyping

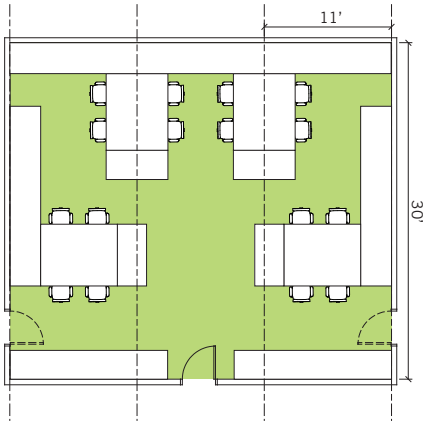


FIGURE 01.24 There are three main categories of class labs, each with different space considerations, equipment and storage needs, and uses.