Cornell University

Classroom Space Guidelines

Approved by the Space Use Advisory Committee; 1/19/17

GIVEN

Classrooms are critical to Cornell's core mission of education and thus need to be available in sufficient number, size and configurations to provide venues commensurate with the needs of instructors including enabling existing and innovative pedagogical approaches. Every classroom should also be accessible, safe, comfortable, and functionally supportive of the instructor and student objectives.

Classroom space, like all created space on campus, obligates the University to significant, on-going operating and maintenance expenses, and therefore must be actively managed as a resource and responsibility.

INTENT

These guidelines were developed to help academic and administrative units on the Ithaca main campus plan for and allocate classroom space in accordance with the Cornell University Space Management Principles approved by the Capital Funding & Priorities Committee on April 24, 2012, as well as the Space Management Principles as applied to Cornell Instructional Space, approved by the Space Use Advisory Committee on March 17, 2014.

The guideline measures identified here – Assignable Square Feet per Station, Assignable Square Feet per Classroom, Room Utilization Rate, and Seat Fill – can be used to measure utilization of existing rooms and to plan for new spaces. These measures assess the "supply" of rooms and can be applied to individual rooms, or rooms in a portfolio (e.g., by college, by building, by campus) depending on the assessment or planning objective.

For renovations and new construction projects, project managers in Infrastructure, Properties and Planning (IPP) and the units will refer to this document when working with project stakeholders and architects during the planning and design phases. The guidelines can be used in conjunction with one another and with analyses of class demand to determine the proper sizing and number of rooms needed for efficient space utilization and class delivery. For renovations of existing space, building constraints may require adaptation of these guidelines. Exceptions to the guidelines, for whatever reason, will require approval through the project approval process. In New York State facilities, State University of New York (SUNY) space guidelines, available through project management, must also be considered. Universal design standards and ADA requirements must always be considered when applying the guidelines and designing classrooms.

Academic and administrative units should ensure that any unit-specific space policies or guidelines align with the information provided in this document.

DEFINITIONS (PEDAGOGY)

Active Learning: Any mode of instruction whereby students are engaging with the content by more than just listening and taking notes. Active Learning can describe brief periods of engagement during a lecture as well as pedagogies that use most of the class time in activities other than lecture. Frequently, but not always, students work together during active learning.

Lecture: Instructor presents content, students listen, take notes, ask or answer questions of the professor. Often content is displayed on lecture slides or board at front of the room. Student focus is on the front of the classroom and/or on the instructor.

Lecture + Active Learning: Mix of lecture and active learning across the class period. The students may go back and forth between these modes of learning several times during a class and thus need to be able to quickly change focus from forward facing to group facing.

Groupwork/Design: Students are given a problem or task to work on in small groups for most of the class time. Students face inwards towards their groups, seated around tables or in tablet arm or barrel chairs turned towards the group. Instructor mixes interacting with small groups and with entire class at once.

Seminar: Small class seated around a common table with the instructor. Class discussion plays a large role in the instruction.

Discussion, Flexible Group: Class has mixed modes of teaching including some lecturing, some whole class or large group discussions and some groupwork where group size may vary by activity or class. Seating needs to quickly adapt to various configurations and focuses.

DEFINITIONS (SPACE)

Adjusted Room Utilization: A measure of the effectiveness of a Room Utilization Rate in achieving a target.

Assignable Square Feet: The area of a space measured within its interior walls, measured in square feet.

Barrel chairs: Chairs that have attached tablets, are on wheels and swivel. These chairs take more space than a standard tablet arm chair, but also allow for more flexible teaching as students can quickly turn between attention centers and group discussions.

Classroom: A room or space used primarily for instruction classes and that is not tied to a specific subject or discipline by equipment in the room or the configuration of the space. Includes general-purpose classrooms, lecture halls, recitation rooms, seminar rooms, and other spaces used primarily for scheduled, non-laboratory instruction. Inventoried as room type 110.

Room Utilization Rate (RUR): The number of hours per week that a room is used for scheduled instruction compared to the number of hours the room is available, expressed as a percentage.

Seat Fill: The percentage of seats occupied for those times when a room is in use. This variable measures the match between section (class) size and room size. Also known as Station Occupancy Ratio, it can be calculated for one class, for one room, or for an aggregation of rooms.

Station: A student seat in a classroom.

ASSIGNABLE SQUARE FEET PER STATION

Assignable Square Feet per Station (ASF/Station or ASF/S) guidelines are applied to existing rooms to understand whether the number of instructional seats is too high, too low, or on target for the pedagogical preference. The measure is a simple calculation of the size of the room (in square feet) divided by the number of instructional seats in the room. This metric can be applied in high-level evaluations (i.e., assessments of existing rooms) and in planning. Service space, aisles (circulation) and the instructor's area in the room are all included in the measure of the room square footage.

ASF/S guidelines are applied to classroom projects in design or construction to design rooms that will best fit the target class portfolio and pedagogical preferences. ASF/S can be used to estimate the size of a newly planned room based upon the needed number of seats.

ASF/S, identified in Table 1a, is reported as a range to account for the many variations that can be introduced into classroom design, including furniture selection, fixed dimensions of spaces, circulation within rooms, space for the instructor, and space in front of writing surfaces within the room as well as variations in instructional delivery[1].

	Pedagogical Method						
	Lecture			Lecture + Active Learning	Groupwork/ Design	Seminar	Discussion, flexible groups
	Theater seating	*Tables and chair*	*Tablet Arm chairs*	*Seats turn easily forward or to groups*	*Inward facing tables and chairs*	*Seated around large table*	*Tablet arm chairs or barrel chairs, space to turn and move*
Number of Stations	Assignable Square Feet per Station						
1-20	12-15	26-32	25-27	28-32	28-30	28-34	25-27
21-32	13-15	24-28	21-22	24-28	21-26	25-35	23-32
33-50	11-13	20-23	20-21	21-23	22-25	N/R[2]	20-22
51-100	10-12	19-21	19-21	20-24	22-24	N/R	16-24
101-150	10-12	20-22	19-21	20-22	20-26	N/R	16-25
151+	10-12	N/R	N/R	N/R	N/R	N/R	N/R

Table 1a. Optimal range of assignable square feet per station based on pedagogical preference(s) in room.

Assignable Square Feet per Classroom (ASF/Classroom or ASF/C) guidelines, included in Table 1b, are useful when considering repurposing and renovating existing rooms to develop an understanding of reasonable station quantities based on the size of the space available and pedagogical preferences. The ranges represented in the table are based on the maximum station quantity. That is, for each station quantity row:

[1] Examples of classroom layouts that facilitate the various pedagogical methods within the ASF ranges outlined can be found on the Space Planning Resources website at http://dbp.cornell.edu/home/offices/space-planning/resources/ in the document, "Instructional Space Layout Examples."

[2] Not recommended for combination of number of stations and method of pedagogy.

ASF/Classroom (Low) = ASF/Station (Low) x Maximum Stations

ASF/Classroom (High) = ASF/Station (High) x Maximum Stations

	Pedagogical Method						
	Lecture			Lecture + Active Learning	Groupwork/ Design	Seminar	Discussion, flexible groups
	Theater seating	*Tables and chair*	*Tablet Arm chairs*	*Seats turn easily forward or to groups*	*Inward facing tables and chairs*	*Seated around large table*	*Tablet arm chairs or barrel chairs, space to turn and move*
Number of Stations	Assignable Square Feet per Classroom						
1-20	240-300	520-640	500-540	560-640	560-600	560-680	500-540
21-32	416-480	768-896	672-704	768-896	672-832	800-1,120	736-1,024
33-50	550-650	1,000-1,150	1,000-1,020	1,020-1,150	1,100-1,250	N/R	1,000-1,100
51-100	1,000-1,200	1,900-2,100	1,900-2,100	2,000-2,400	2,200-2,400	N/R	1,600-2,400
101-150	1,500-1,800	3,000-3,300	2,850-3,150	3,000-3,300	3,000-3,900	N/R	2,400-3,750
151+	TBD[3]	N/R	N/R	N/R	N/R	N/R	N/R

Table 1b. Optimal range of assignable square feet per classroom based on pedagogical preference(s) in room. Calculations based on the maximum number of stations per instructional capacity range.

WEEKLY ROOM HOURS, ROOM UTILIZATION RATE and ADJUSTED ROOM UTILIZATION

The Cornell faculty-endorsed meeting pattern policy defines an 8:00 a.m. start time and a 4:25 end time for classes on weekdays[4], resulting in classrooms being available 42.1 hours per week for scheduled instruction.

Table 2 identifies the target number of weekly hours that rooms should be used for scheduled instruction, based on a range of instructional capacities. The target, in all cases, is less than 42.1 hours per week because:

1. It is impossible to schedule a classroom at all times. Class change times and a choice of many "standard" class lengths result in classroom transition periods throughout each day.
2. Some vacant time promotes flexibility in scheduling urgent repairs (such as equipment failures) and other non-class activities. Extra time capacity also provides flexibility in taking some rooms off-line for longer periods, such as for an entire semester, during renovations.

The weekly hour targets are also translated into Room Utilization Rate targets, as follows:

RUR Targets (%) = Hours of Use Target / 42.1 Hours * 100

[3] Calculated by multiplying the ASF/Station range of 10-12 times the total number of stations desired.
[4] The policy on scheduling is detailed in Chapter 5, "Class Schedule and Absences," of the Faculty Handbook (https://blogs.cornell.edu/deanoffaculty/files/2015/12/CLASSSCHEDULES-29rj31p.pdf). The promulgated schedule includes evening and weekend class times that are not factored into room utilization rates.

Number of Stations	Hours of Use Target	Room Utilization Rate Target
1-20	25	59%
21-32	25	59%
33-50	25	59%
51-100	25	59%
101-150	20	47%
151+	18	43%

Table 2. Targets for Hours of Use (based on a 42.1-hour schedulable week) and corresponding calculated Room Utilization Rates, by instructional capacity.

Analysis of actual room utilization (use over the course of a week) requires a two-step process. First, the Room Utilization Rate is calculated, by room or group of rooms, as follows:

RUR (%) = Total Minutes of Class Time / 2525 minutes * 100

Then, this actual RUR is compared to the Target RUR to calculate an Adjusted Room Utilization Ratio (ARUR), as follows:

Adjusted Room Utilization Ratio = Room Utilization Rate (actual) / Room Utilization Rate Target

Cornell expects to achieve ARURs of 0.8-1.0.

Example 1: A room with an instructional capacity of 350 is used in one semester for 975 minutes of total class time. The RUR for this room is 39% (975 minutes of class time/2525 minutes available * 100). The ARUR is 0.91 (39% RUR/43% RUR Target for rooms with instructional capacities greater than 151 seats). In this example, the room is achieving effective utilization in terms of use during a week.

Example 2: In one semester, all rooms with instructional capacities of 20 or fewer are used on average for 450 minutes. The RUR for rooms with instructional capacity of $\leq$20 is 18% (450 minutes of class time (average)/2525 minutes available (per room) * 100). The ARUR is 0.31 (18% RUR/59% RUR Target for rooms with instructional capacities of $\leq$20). In this example, the rooms of capacity $\leq$20 are underutilized in terms of use during the week.

SEAT FILL

Seat Fill is a measure (in percentage) of seats occupied for those times when a room is in use. This variable measures the match between section (class) size and room size. Also known as Station Occupancy Ratio, it can be calculated for one class, for one room, or for an aggregation of rooms. It is calculated as follows:

Seat Fill (%) = Total Number of Students, Weekly / (Stations x Hours of Use, Weekly) * 100

Cornell sets an expectation that the Seat Fill for all rooms, regardless of instructional capacity, will range between 60-75% (see Table 3). Rooms with Seat Fills approaching 90-100% will feel crowded. Seat Fills in the target range allow for:

- Students to navigate to seats;
- Space for backpacks and coats;
- Class “shopping” early in the semester;

- Extra attendees, such as students auditing the class, and teaching assistants, graders, and accommodation specialists, and
- Active learning in a traditional classroom where some seats are left empty to allow for instructor access or student movement.

The Target range allows for the typical use of this metric as an average across multiple rooms in a building, college or capacity group and therefore considers that not all rooms are used equally and within every portfolio there are some that are particularly busy and others that are less well used. When considering individual rooms, it is generally true that smaller rooms can and should have Seat Fills at the high end of the acceptable range (even exceeding 75%) and such measures are not usually cause for concern or correction unless they are appearing in many rooms within a portfolio.

The more useful application of this measure is to account for and control small class sizes using rooms with many seats, and thus blocking large class sizes from using these more appropriately-sized rooms. This application is more focused on assuring that rooms are meeting the low target of 60%, that is, that the class enrollment will fill at least 60% of the seats available in the room.

Number of Stations	Seat Fill Target
1-20	60-75%
21-32	
33-50	
51-100	
101-150	
151+	

Table 3. Seat Fill Guidelines, by Instructional Capacity.

OTHER FACTORS THAT MAY IMPACT CLASSROOM UTILIZATION

Classroom space guidelines are generally applied as measures of utilization for a portfolio of rooms in a building or college. The resulting analyses are often averages across rooms, and these averages may obscure outliers that merit special attention. Faculty and students may suffer when rooms are over-utilized while resources are wasted when rooms are under-utilized. It is often helpful to consider the outliers when prioritizing rooms for renovations or repurposing.

Some factors that influence classroom use include:

Geographic Location. Rooms at the perimeter of campus may be used less, while rooms in the core areas, particularly on the major academic quads, may be used more. In general, the density of rooms should reflect population centers of the campus.

Technology and writing surfaces. Audiovisual technology, writing surfaces, and compatibility between the two is often influential in room selection. Low utilization rates may reflect insufficient, mismatched or faulty technology.

Aesthetics. Classrooms with finishes in poor condition, old or inappropriate furniture, bad sightlines, etc. will tend to be underutilized if sufficient, better quality space is available nearby. Classrooms with good aesthetics may be over-utilized, especially where such rooms are outstanding relative to the overall inventory in the area.

RELATED RESOURCES

Cornell Design and Construction Standards: https://cds.fs.cornell.edu/, in particular:

260923 Lighting Controls
013012 Collaborative Spaces
013010 Accessibility for People with Disabilities
087100 Door Hardware
101400 Interior Signage

Planning Guide for the Refurbishment, Renovation, or Construction of Instructional Space Environments. Developed to assist faculty and staff as they consider changing existing instructional spaces or creating new ones. The primary audience is the room user.
https://blogs.cornell.edu/dbpsite/files/2015/09/Space_Planning_Guide_RRCIC-2fn0aa4.pdf

Sample instructional space floor plan layouts, by station quantity and pedagogical method:
http://dbp.cornell.edu/home/offices/space-planning/resources/

PERIODIC REVIEW

Every three years, the Space Management Program Manager will be responsible for consulting with stakeholders and recommending to the Space Use Advisory Committee any revisions to this document.

CONTACT

For questions related to this policy, contact: Space Management Program Manager
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