

# **SECTION II. PART 3: SPACE NEEDS ANALYSIS**

**Part 1. Introduction**

**Part 2. Baseline Data**

**Part 3. Space Needs Finding**

**Part 4. Space Utilization**

**Part 5. Building Usage by Time of Day**

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## 3.1 INTRODUCTION

Understanding current and future space needs is a critical component to the design and implementation of the St. Olaf Framework Plan. A space needs analysis quantifies demand and demonstrates the potential need for new facilities and/or major repurposing of existing space. This section provides an overview of the analytical process, key findings, and implications for the Framework Plan.

Specific goals and objectives of the space needs analysis are as follows:

- Objective assessment of physical assets on the campus
- Understand how classrooms and laboratories are being used and benchmark against other colleges or St. Olaf aspirations
- Portray optimum space needs by functional area at target enrollment and staffing levels
- Analyze the difference between the optimum space needs from a quantitative perspective
- Strategize the physical response to the planning objectives as suggested by the space needs outcomes

### Analytical Process

The space needs analysis primarily consists of developing and refining a space needs model that incorporates the following data and criteria:

- Federal Index Classification Manual (FICM) (i.e., space taxonomy)
- Existing space inventory (provided by St. Olaf College)
- Current and projected student enrollment (provided by St. Olaf College)
- Current and projected faculty/staff projections (provided by St. Olaf College)

- Spring 2015 class schedule and registrants (provided by St. Olaf College)
- General guidelines developed by the Association for Learning Environments (formerly known as Council for Educational Facility Planners International – CEFPI)
- Perkins+Will square footage benchmark data from campuses throughout the United States
- Stakeholder feedback regarding conditions and needs specific to St. Olaf College

Figure X-1 provides a conceptual depiction of the process and inputs of the space needs model.

### Definitions

Although description of the space needs model is generally meant to be intuitive, there are two important terms that refer to the measurement of space that require definition. The first term is Assignable Square Feet (ASF). This refers to usable space assigned to a program (e.g., classroom, lab, dining facility, fitness center, etc.). It is measured from inside wall to inside wall and excludes public restrooms, elevator areas, stairwells, egress corridors, main circulation paths, mechanical/electrical/plumbing spaces, and structural areas. In contrast, Gross Square Feet (GSF) is a more encompassing measurement that includes all space within a building's footprint. When inventorying space, use of ASF is helpful for purposes of making comparisons from type of space category to another. However, when demand for space is translated into a need for new buildings facilities, it is critical that ASF be converted into GSF.

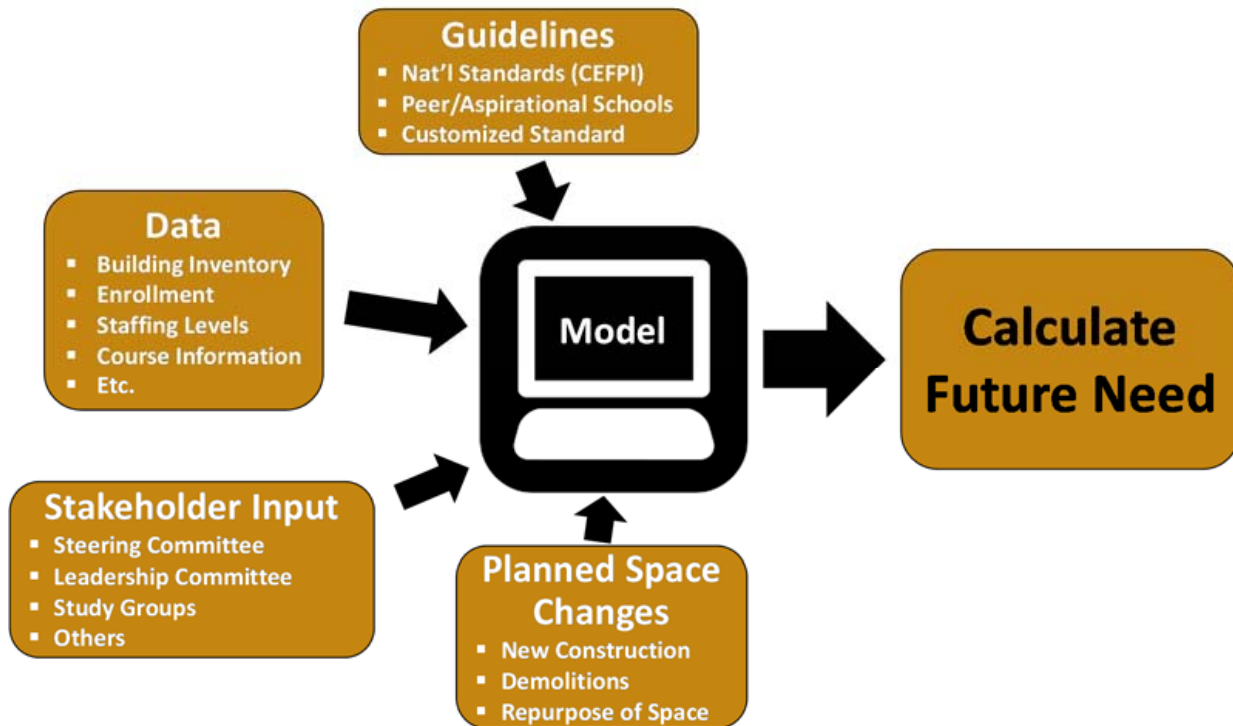


Figure X-1: Conceptual Process and Inputs of the Space Needs Model

## 3.2 BASELINE DATA

This section presents baseline data used to populate the space needs model. The baseline data serve as the foundation or starting point with which the space needs calculations are based. All the baseline data was provided by St. Olaf College. It is important to note that the baseline data is a snapshot in time, and the point in time used for this analysis was August 2015. Unless otherwise noted, all data is from the Spring 2015 term.

### Enrollment

As of Spring 2015, there were 3,034 full time equivalent (FTE) students at St. Olaf College. Many of the calculations used in the space needs model are based on student FTEs. It has been assumed for purposes of the Framework Plan that enrollment will not substantively change in the near future.

### Faculty/Staff Counts

As of Fall 2015, there were 995 faculty and staff employed at St. Olaf College. For planning purposes, however, it is important to differentiate between employees based on their appointment level and whether they support academic or administrative functions of the college. There are 422 academic faculty and staff; of which, 363 have an appointment of 0.5 or higher, which guarantees them dedicated office space. There are also 573 administrative staff; of which, 461 have an appointment of 0.5 or higher.

### Building Inventory

Facilities staff conducted an inventory of all the existing space on campus in August and September 2015. Each space was classified based on the Federal Index Classification Manual (FICM). Assignable Square Feet were measured for each space. In total, about 836,000 square feet was classified. Table X-1 lists

the amount of ASF for each major FICM category and its percentage of the total. Athletic/Physical Education/Recreation represent the single largest category with just over 187,000 ASF or 22% of all the classified space. Office and related service areas, however, are a close second with over 170,000 ASF or 20% of all classified space. The smallest categories are Special Use with 3,200 ASF and Student Healthcare with 865 ASF, both of which account for less than 1% of all classified space.

### **Course Information**

All Spring 2015 courses scheduled through the Registrar were provided with the following information:

- Course number
- Course title
- Building and room number
- Classroom type (general classroom or lab/studio)
- Meeting times
- Day(s) of the week
- Department
- Classroom seating capacity (per the Registrar)
- Course registrants
- Maximum registrants (per the Registrar)

## **3.3 SPACE NEEDS FINDINGS**

### **Overall Space Needs**

Figure X-2 presents data on the amount of existing space by major use categories as well as a guideline for appropriate levels of space based on enrollment, staffing levels, instructional needs, and conditions specific to St. Olaf College. The Academic and Student Life groupings appear to have a surplus of space. Meanwhile, the Library, Administrative, Athletics/Recreation, and Facilities Support groups have a deficit of existing space.

Athletics/Recreation has the largest calculated discrepancy. This is largely because of two reasons. One, St. Olaf has a very high level of participation in extracurricular sports, especially for a Division III school, with 27 different intercollegiate teams. Two, there are very few facilities that are dedicated exclusively to the Athletics department for use as practice or competition space. This means significant portions of the Skoglund Athletic Center and the Tostrud Center serve multiple purposes, including instruction, recreation space, and athletic space. If it is assumed that St. Olaf has a goal to provide adequate space for all these various sports-related needs, then there would need to be an additional 72,000 ASF of Athletic/Recreation space.

Functional Classification of Space (FICM)	ASF	Pct.
Classrooms & Related Service Areas (100s)	57,768	6.9%
Instructional Labs/Studios & Related Service Areas (210,215)	79,106	9.5%
Open Labs & Related Service Areas (220,225)	20,248	2.4%
Research Labs & Related Service Areas (250,255)	26,735	3.2%
Office & Related Service Areas (300s)	170,431	20.4%
Library (400s)	103,768	12.4%
Physical Education/Recreation/Athletics (520,525)	187,091	22.4%
Special Use (500s)	3,210	0.4%
Assembly & Exhibit (610-625)	42,072	5.0%
General Use (600s)	90,626	10.8%
Support (700s)	53,933	6.5%
Student Healthcare (800s)	865	0.1%
<b>Total</b>	<b>835,853</b>	<b>100.0%</b>

Table X-1: Existing Space Organized by Functional Classification

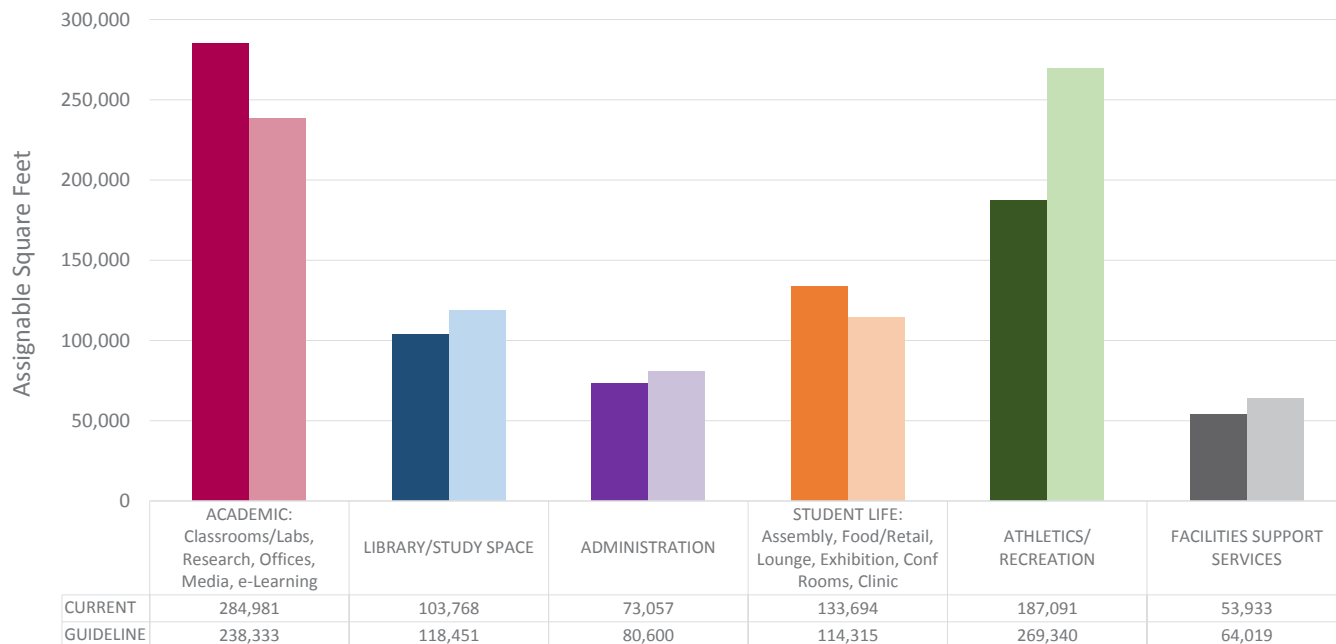


Figure X-2: Campus Space Needs by General Use Categories

### **Academic Space Needs**

Figure X-3 breaks down the detail by academic subcategory of where space is currently at a surplus or deficit. General Classrooms and Open Labs appear to be close to the calculated guideline. Media Production and e-Learning Support and relatively small categories. However, the Instructional Labs, Academic Offices, and Research space category appear to have a significant surplus of space.

### **Library/Study Space**

Figure X-4 provides a little more insight into the current supply and demand for Library/Study space. The current amount of Stacks/Processing space appears to be closely aligned with the calculated guideline. Study space, however, has a significant deficit of space. This is attributed to recent trends in the evolution of study space. There is a strong trend toward more informal seating and study space. New standards suggest that as much as 35% of all formal or traditional seats that are located in classrooms and labs require complementary informal study seats for either individual or group study purposes. These trends are impacting the need for more study space as reflected in Figure X-4.

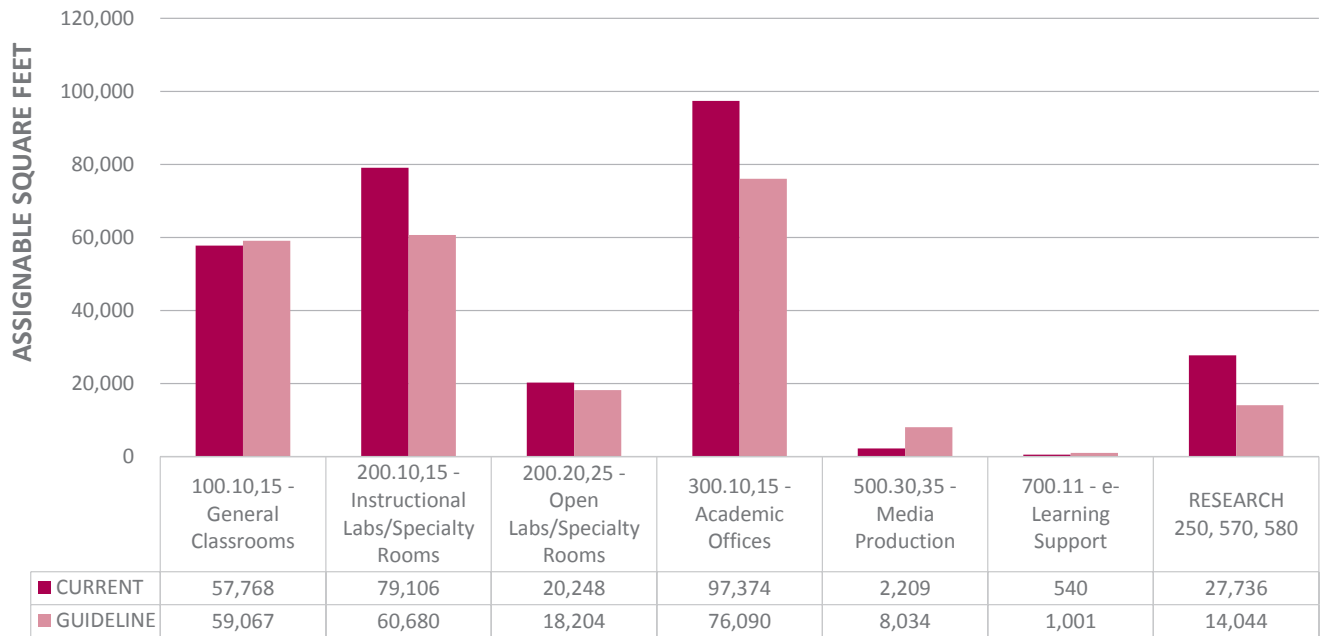


Figure X-3: Academic Space Needs

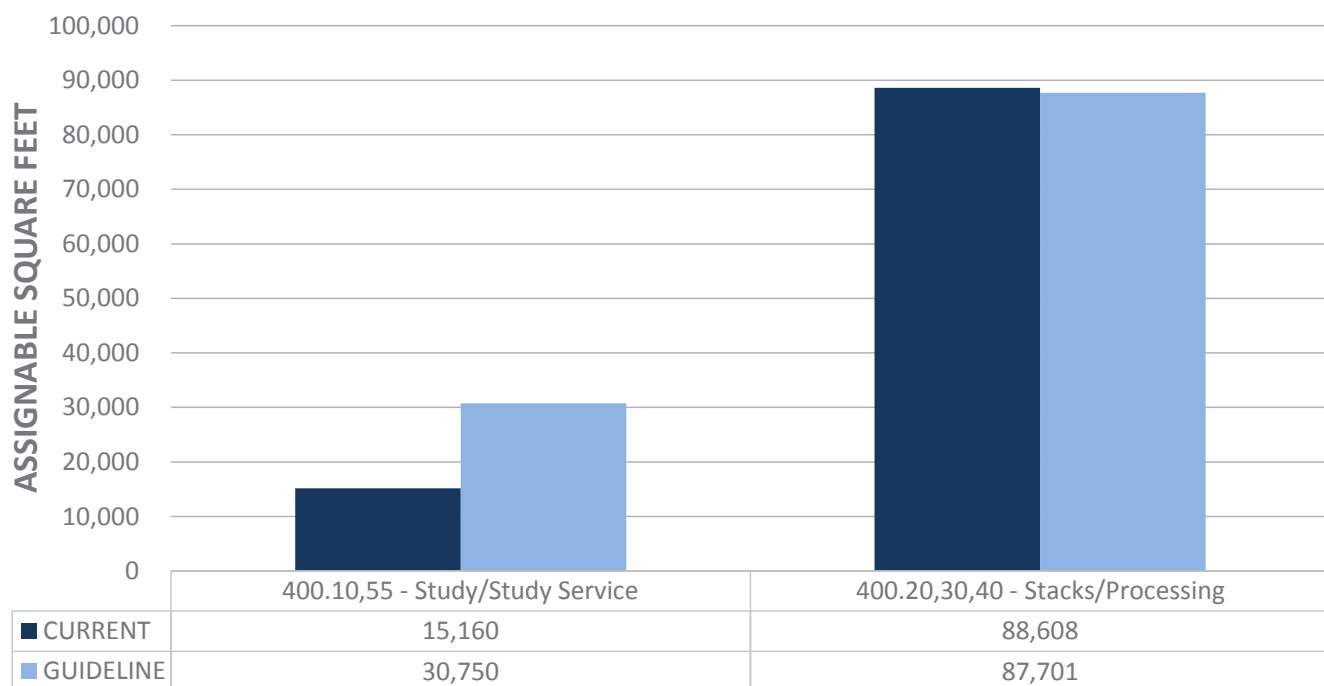


Figure X-4: Library/Study Space Needs



## Student Support Space

Figure X-5 shows that Assembly, Food Facility, Exhibition, and Student Healthcare categories are generally in line with calculated guidelines. This is despite the fact that the guidelines for Assembly and Exhibition space were increased substantially to reflect the heavy arts focus and programming at the school. In contrast, there is a significant surplus of Lounge and Meeting Room space. This may be the result of recent construction and renovation on campus that increased the amount of these types of spaces in anticipation of growing need in these categories.

## 3.4 SPACE UTILIZATION

In support of developing appropriate guidelines for general classroom and lab/studio space, additional research was conducted to determine how these types of spaces are currently being utilized. Many times poor utilization of classroom and lab space can result in a mismatch between desirable spaces and undesirable spaces that can lead to a perception that not enough space exists.

Analyzing how instructional spaces are used has two primary components: room usage and seat usage. Room usage measures how frequently a room is being scheduled, whereas seat usage or utilization refers to how much of a room's capacity is being utilized when a course is scheduled for that room. There are a variety of ways in which space utilization can be measured. Several different methods are presented here in order to provide a deeper understanding of the dynamics that drive how classrooms and labs are used.

General classrooms and labs/studio have very different functions and, therefore, analysis of these types of instructional rooms are treated separately.

## General Classrooms

### Statistical Overview

- General Classrooms with Scheduled Courses = 70 (Spring 2015)
- Total Seat Capacity = 2,479
  - High: 120
  - Low: 8
  - Average: 35
  - Median: 29
- Scheduled Courses in Classrooms = 465
  - Total Potential Seats in all Classroom Courses = 16,685
- Total Registered Students in All Classroom Courses = 9,932 (59.5% of capacity)

### Room Usage

Figure X-6 present the average hours per week classrooms are scheduled based on their size. The dashed red line is St. Olaf College's Weekly Room Usage Goal in hours. Overall, all classrooms average about 21 hours of use per week, which is slightly below the goal of 24.5 hours. Mid-sized rooms, those with between 41 and 50 seats, exceed the goal. Generally, rooms with between 21 and 100 seats are used at or near the usage goal. It is the smallest (20 seats or fewer) and the largest (101 seats or more) that are used well below the goal. This is not uncommon as fewer courses tend to have small or large number of students. Also, in recent years, St. Olaf has had a policy of reducing the number of large courses with the intent of improving pedagogy, which may explain some of the poor room usage among large classrooms.

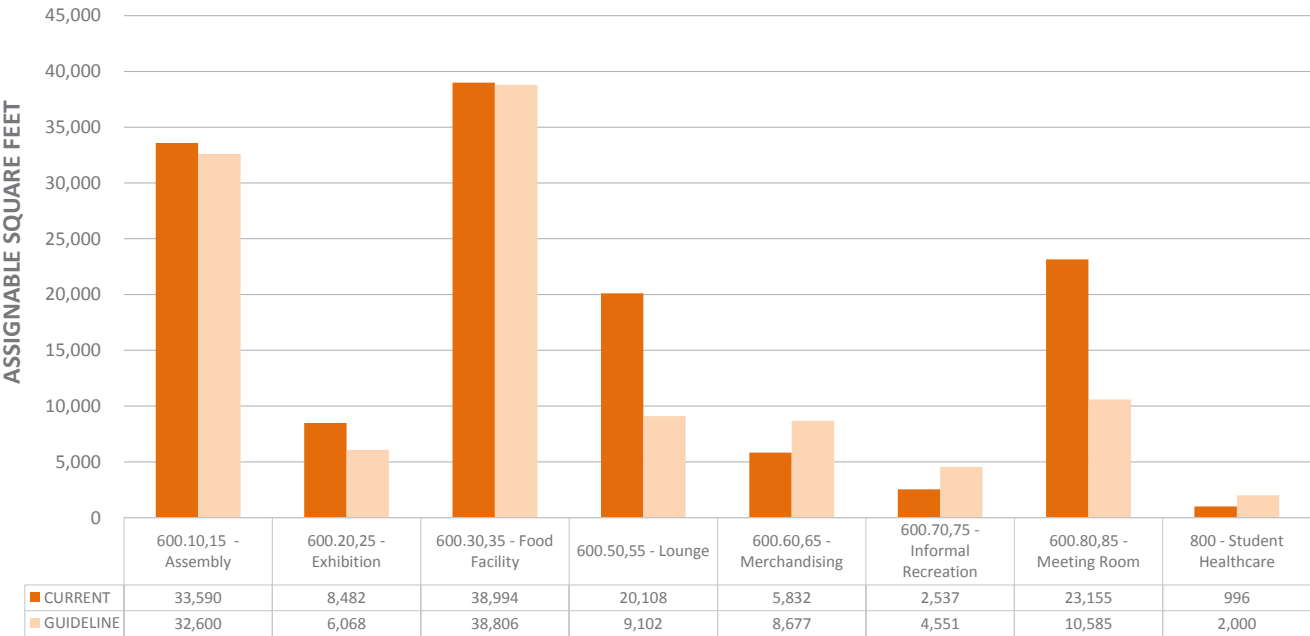


Figure X-5: Student Life Space Needs

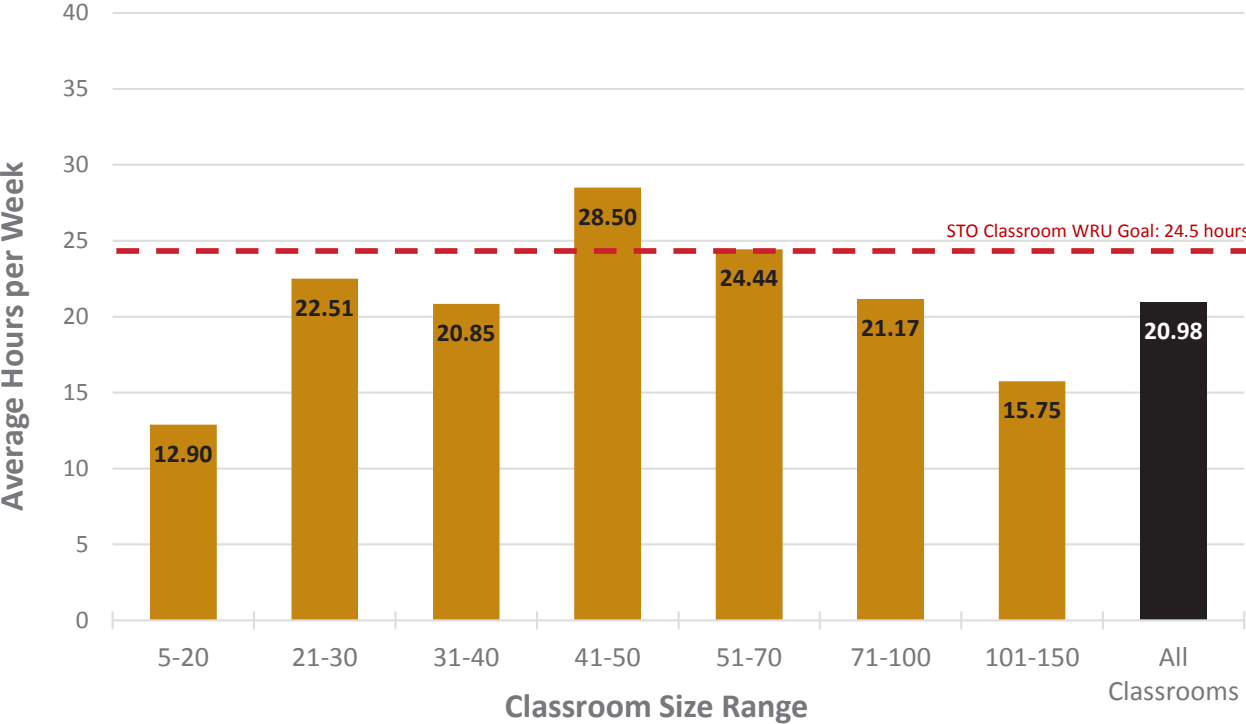
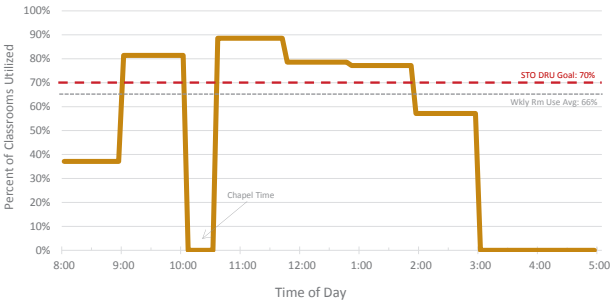


Figure X-6: Classroom Weekly Room Use (Spring 2015)

Figure X-7 tracks how classrooms are used by hour of the day and day of the week. This provides greater insight as to whether some rooms are not being used at particular times of the day or day of the week. Noted on the graphs are also those times of the day St. Olaf reserves for the non-course activities of daily chapel time and weekly community time. Also presented is a weekly composite of room usage. From the graphs, it is evident that room usage peaks between the hours of 9:00am and 3:00pm in which usage goals are commonly met or exceeded. However, early morning hours and mid- to late-afternoon hours is when usage is well below stated goals. However, these are times that also compete heavily with extracurricular activities.

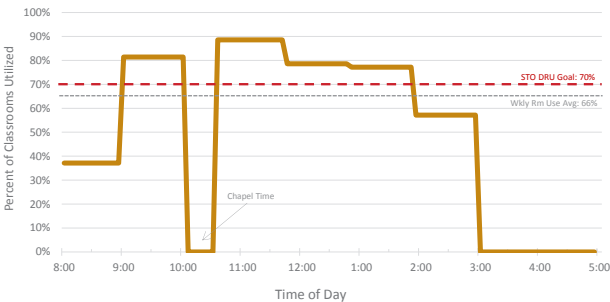
## Monday



## Tuesday



## Wednesday



## Thursday



## Friday



## Weekly Average

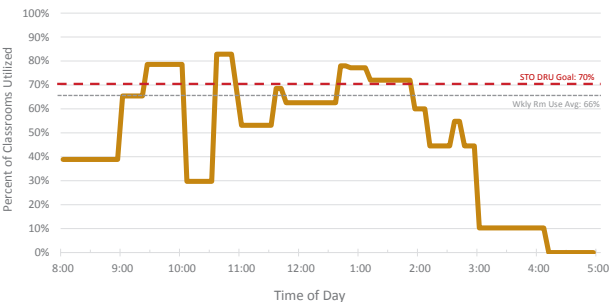


Figure X-7: Classroom Daily Room Use by Time of Day (Spring 2015)

Figure X-8 displays a comparison of course size and room capacity. This reveals how there is a mismatch between the number of small courses and small rooms. Again, some of this can be explained by school policy favoring small course sizes. As a result, though, a significant number of small classes appear to be scheduled in much larger rooms, which may have an impact on the learning environment. However, this also indicates a possible opportunity to repurpose larger rooms in order to better accommodate smaller course sizes. It may also indicate, though, that the room capacities as defined by the registrar may be out of line with the design of current course. This is especially true if there are more course designed around collaborative-learning which have larger per student space needs.

#### *Seat Utilization*

Room usage just focuses on whether a room is being used at given time regardless of how many seats are being occupied. Figure X-10 shows the percentage of available seat hours that are occupied by students depending on the size of the classroom. This requires an extra level of calculations that take into consideration the number of registered students in relation to size of room and how frequently the room is occupied. From the figure, it is evident that the smaller the room size, the higher the seat utilization. This again is somewhat to be expected as large classrooms clearly are able to accommodate classes of all sizes, which means seat utilization will decline if an increasing number of smaller classes are scheduled in large classrooms. Overall, though, seat utilization is around 59%, which is only slightly below the 65% goal.

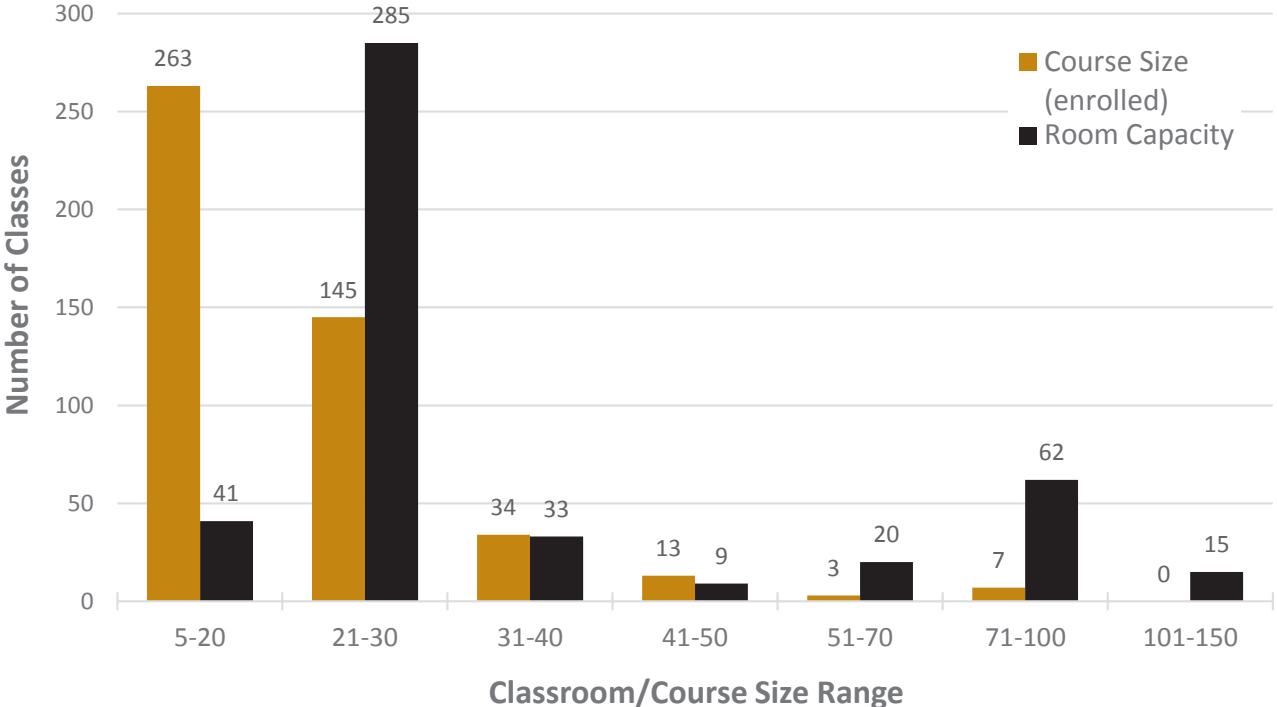


Figure X-8: Number of Campus-wide General Classroom Classes by Enrolled Class Size and Room Capacity (Spring 2015)

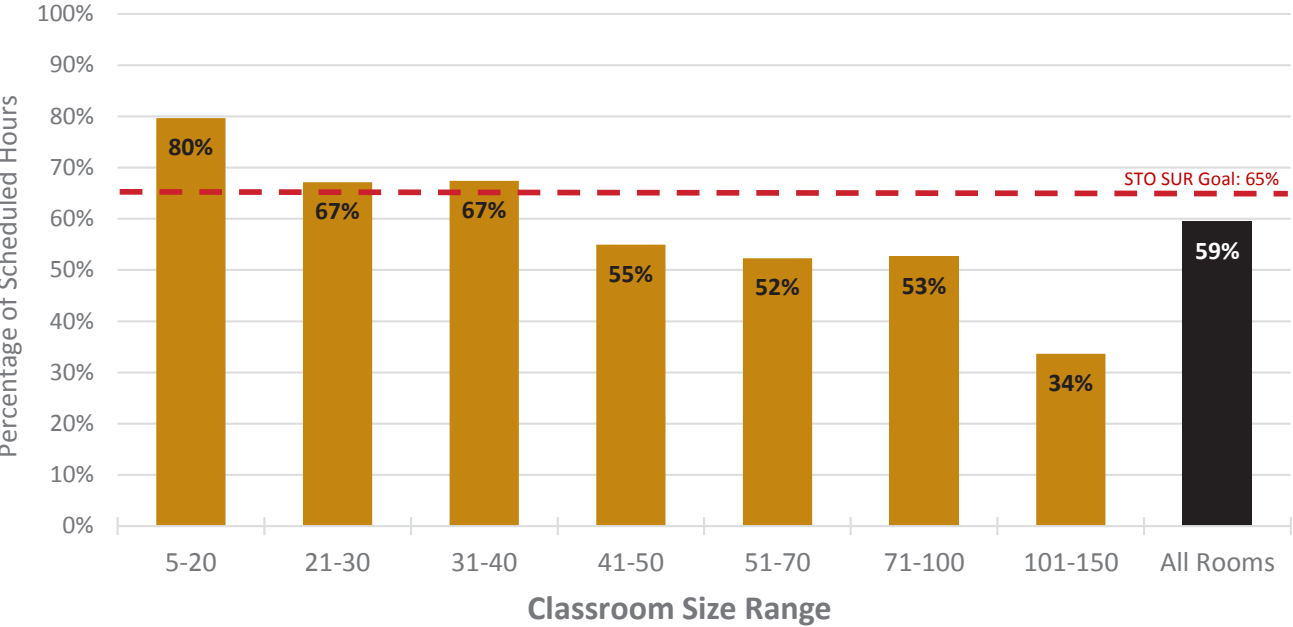


Figure X-10: Classroom Seat Utilization Rate (Spring 2015)

Figure X-11 provides the greatest level of detail regarding seat utilization. It depicts all 70 classrooms that had scheduled course in Spring 2015 and the average number of seats filled in each room relative to its capacity and 65% utilization goal. Smaller classrooms appear to more frequently meet or exceed the utilization goal. Although larger rooms tend to meet the goal as frequently, in many cases they are close to the goal and sometimes even exceed it.

### **Labs/Studios**

#### *Statistical Overview*

- Labs/Studios with Scheduled Courses = 54 (Spring 2015)
- Total Station (i.e. seat) Capacity = 1,606\*
  - High: 124\*
  - Low: 12
  - Avg: 30\*
  - Median: 30
- Scheduled Courses in Labs/Studios = 189
  - Total Potential Stations in all Lab/Studio Courses = 8,670\*
- Total Registered Students in All Lab/Studio Courses = 4,862

\* Does not include courses in gymnasias

### **Lab/Studio Usage**

Figure X-12 presents data on the average number of hours per week labs and studios are scheduled based on the size of the room. Overall, the average hours of use per week is 10, which is half the goal of 20 hours. Unlike general classrooms, there is not a strong correlation between size of the lab/studio and its level of usage. This is due largely to the specialized nature of lab and studio spaces, which are not as flexible as general classrooms and typically cannot accommodate a variety course types. Therefore, the number of courses that can be scheduled in them is limited, which explains why room usage is much lower than compared to general classrooms.

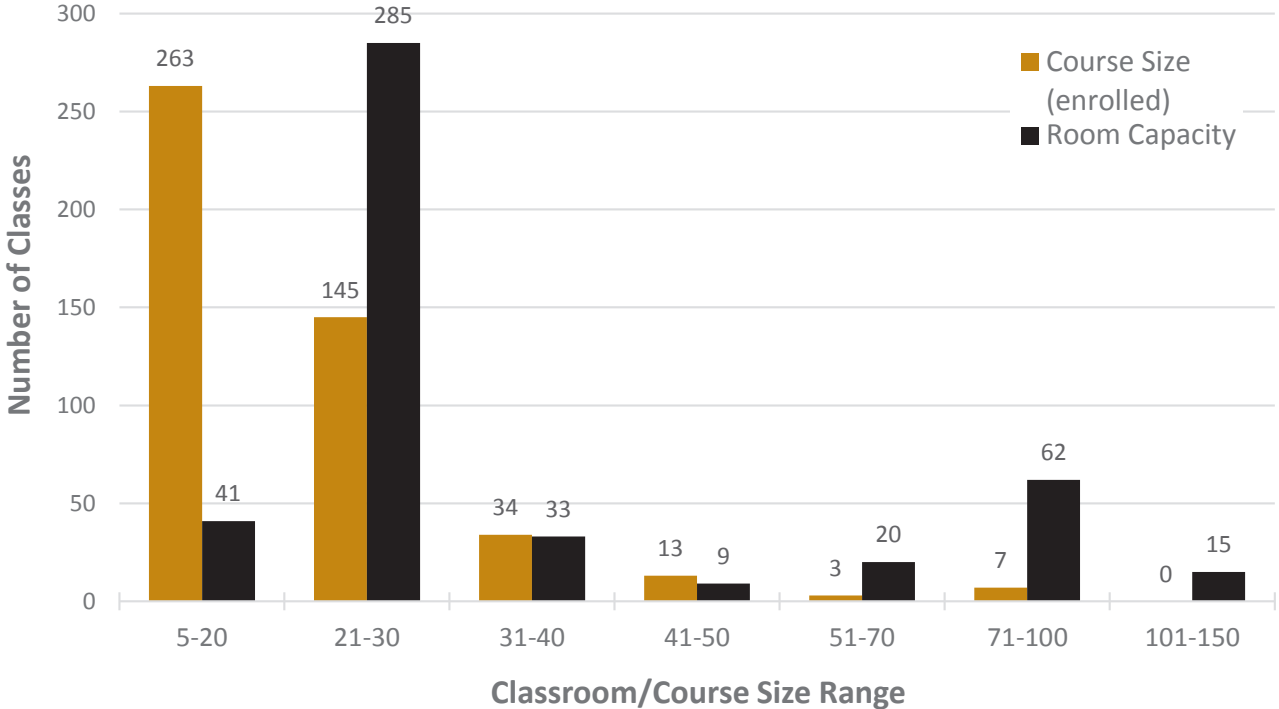


Figure X-11: Seat Utilization by Classroom (Spring 2015)

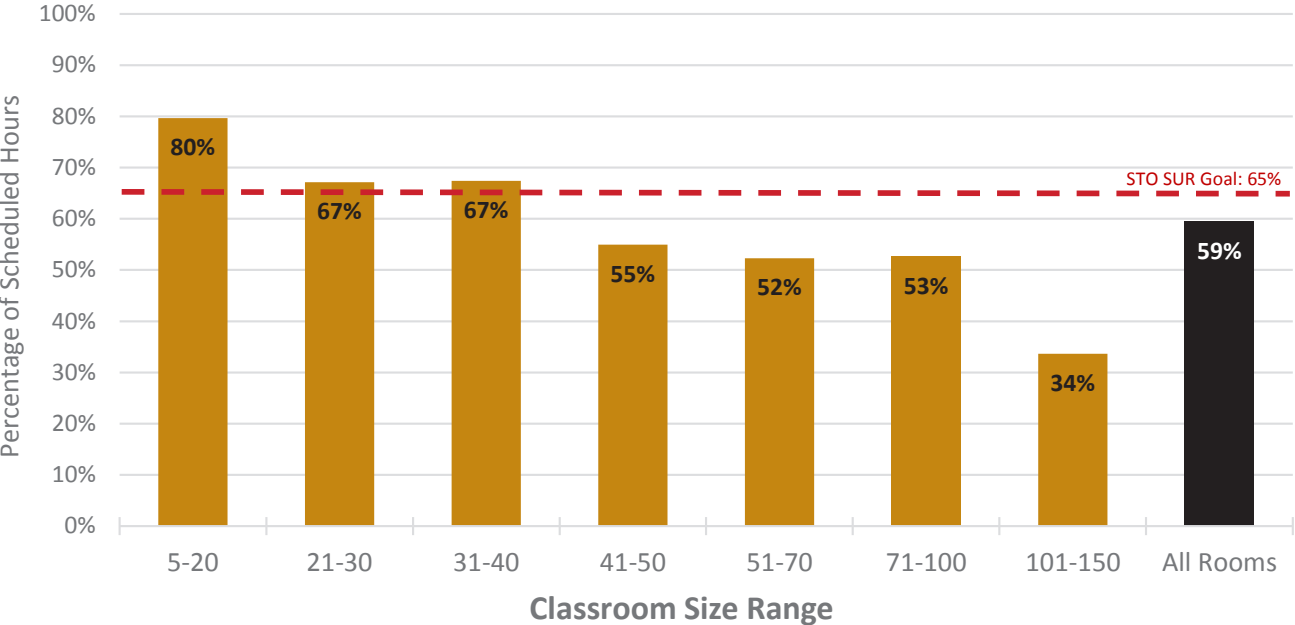


Figure X-12: Lab/Studio Weekly Room Use (Spring 2015)



Figure X-13 breaks down room usage by type of room. This is helpful because labs and studios differ significantly based on how they are used. Science Labs and Art Studios are used the most, but still fall well below the goal of 20 hours per week of usage. Athletic studios are used the least. In addition to their unique nature, which makes flexible scheduling difficult, labs and studios are also challenged by the fact that they have inconsistent scheduling patterns that may require, for example, a longer block of time at odd times of day that precludes the space being scheduled for other courses.

Figure X-14 displays how labs and studios are used each day of the week and time of day. In general, Mondays, Wednesdays, and Fridays have lower overall usage with peaks occurring in the mid-afternoon. This is likely due to the prevalence of lecture components of many courses being scheduled during the mornings of Monday, Wednesday, and Friday. In contrast,

Tuesdays and Thursdays have much stronger overall usage with peaks occurring in the mid-morning. The only times during the week when usage approaches the goal of 57% of labs and studios is mid-morning on Tuesdays and Thursdays.

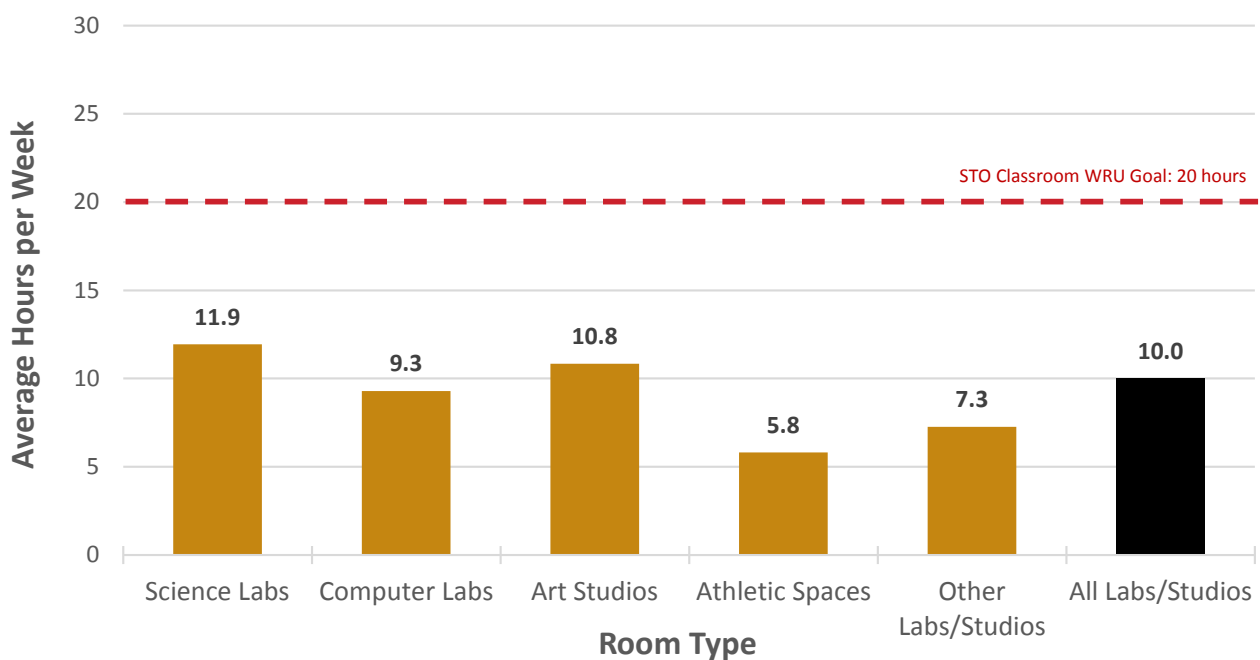
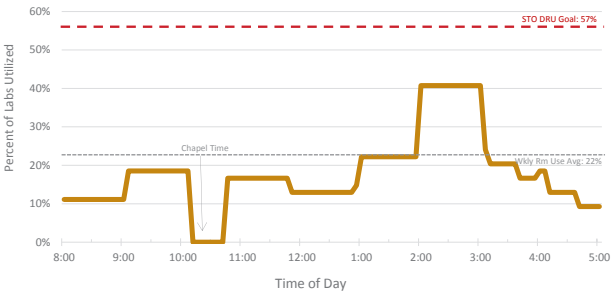
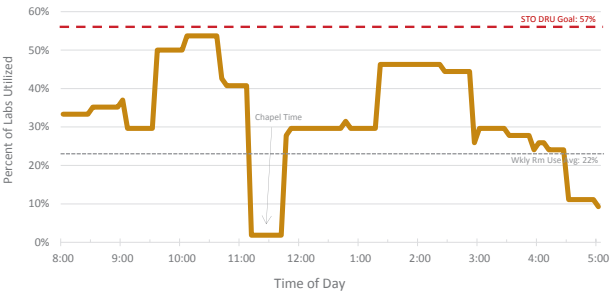


Figure X-13: Lab/Studio Weekly Room Use by Room Type (Spring 2015)

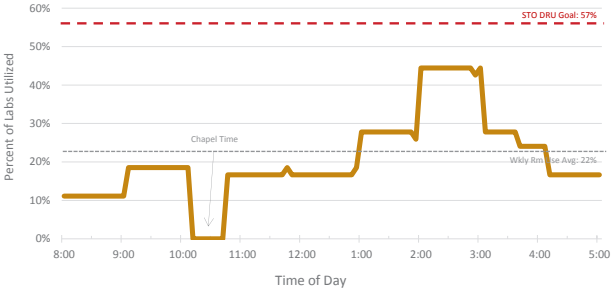
## Monday



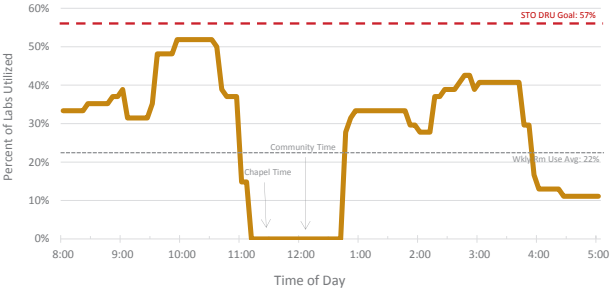
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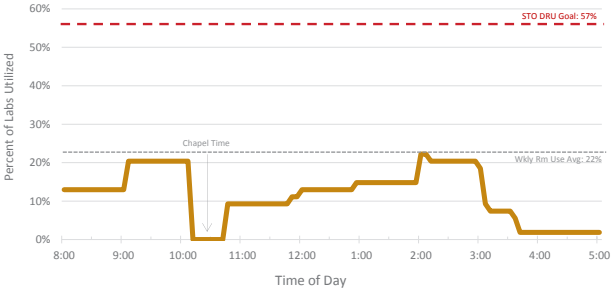
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## Weekly Average

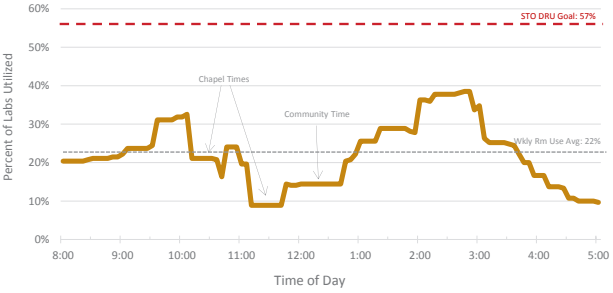
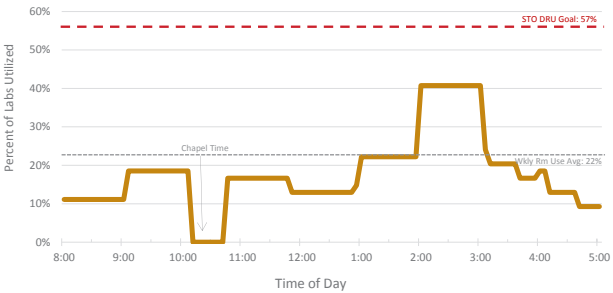


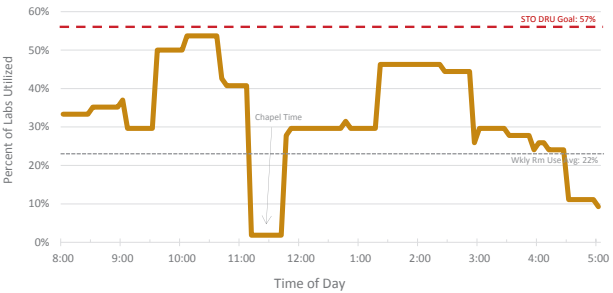
Figure X-14: Daily Lab/Studio Room Use (Spring 2015)

Figure X-15 illustrates how types of labs can vary significantly in when they are used. The figure isolates the usage of Science Labs by day of week and hour of the day. These types of labs have a very strong orientation to being used in the afternoon. So strong, that several days each week usage exceeds the 57% threshold of use during these time.

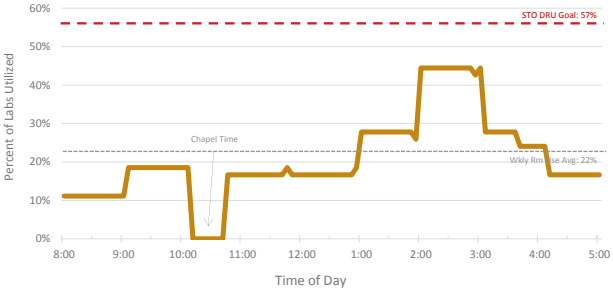
## Monday



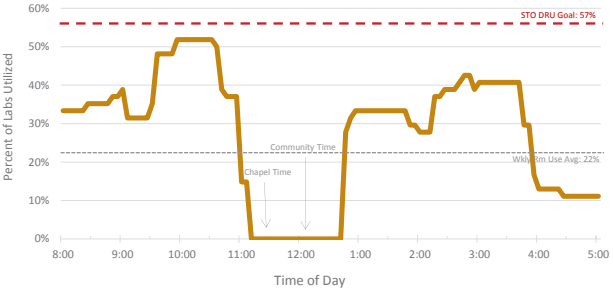
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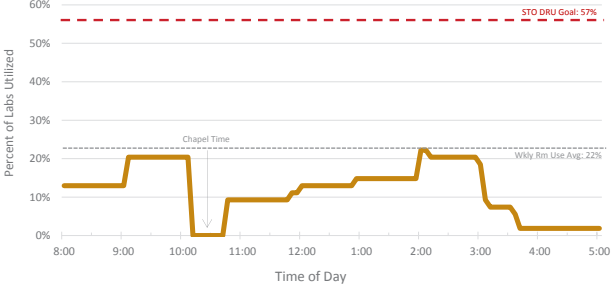
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## Weekly Average

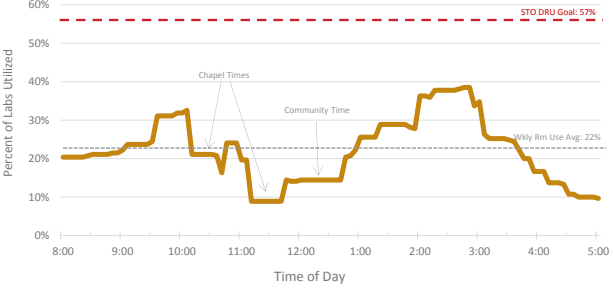


Figure X-15: Daily Science Lab Room Use (Spring 2015)

## **Seat Utilization**

Figure X-16 shows seat utilization by size of lab/studio. Overall, seat utilization is 56%, which is well below the utilization goal of 85%. The goal for utilizing lab and studio space is higher than general classrooms because these spaces are more difficult to schedule. Therefore, when scheduled, they should be utilized at a higher rate. Labs with smaller student capacities have higher utilization rates than. Utilization of lab and studio spaces, however, can also be impacted by the amount of square footage each student requires when using the space. Large equipment needs for certain types of labs may, for example, require a substantial amount of space on a per student basis. If room capacities are not adequately measured, this would result in lower or higher utilization rates per the school's goal.

When looking at labs/studios by type, Athletic studios have the highest rate of seat utilization at 86%, which is just over the goal of 85%. However, this does not include courses in gymnasiums, which can vary considerably because of the extremely large size of the space. Computer Labs are the next highest level of utilization at 68%. Art Studios and Other Labs/Studios have the lowest utilization. Again, this may be a reflection of the fact that Arts Studios have a strong need to be highly flexible in the size of the courses they accommodate.

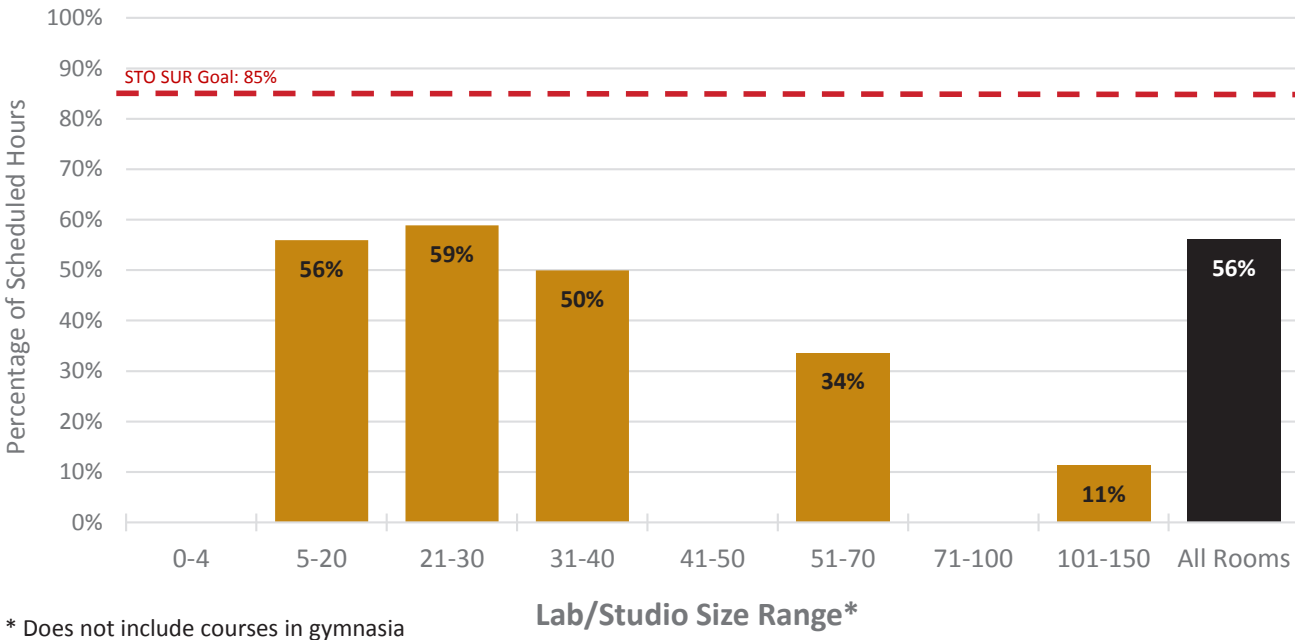


Figure X-16: Lab/Studio Seat Utilization Rate by Room Size – All Labs/Studios (Spring 2015)

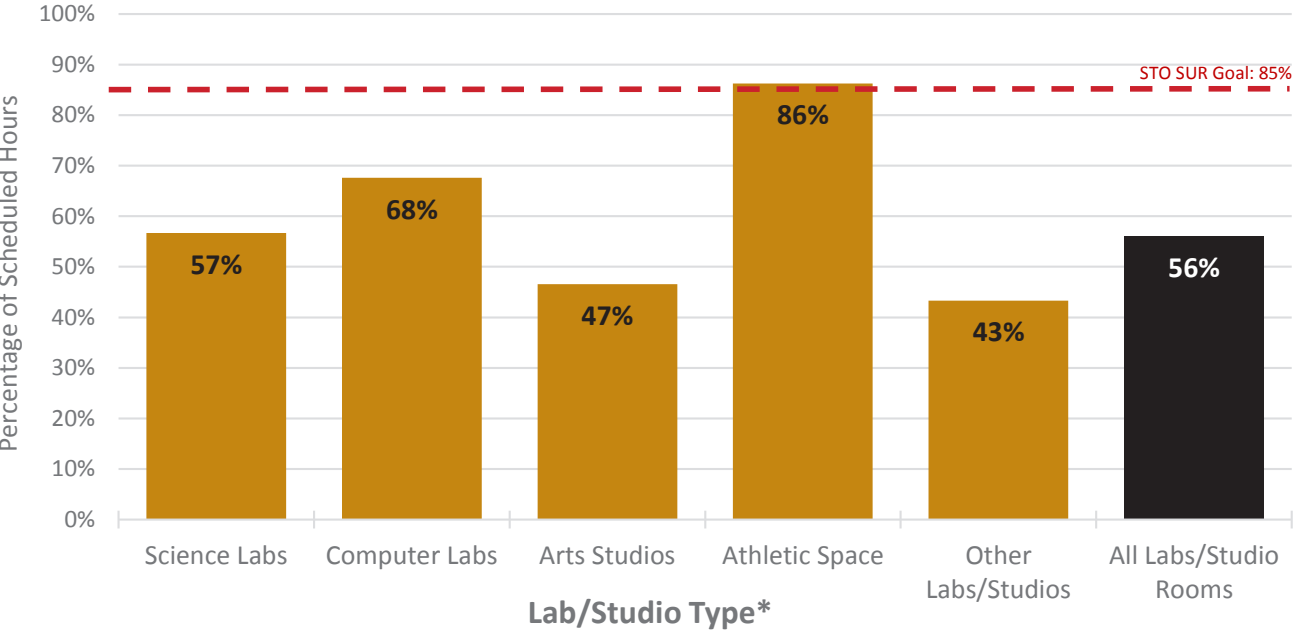


Figure X-17: Lab/Studio Seat Utilization by Room Type (Spring 2015)

Figure X-18 lists the average seat utilization for each of the 52 labs/studios scheduled for courses in Spring 2015. (This does include courses in gymnasias.) The vast majority of labs and studios have a capacity of 30 seats or less. Those with a larger capacity, clearly have very low utilization rates.

activities from the Science District in the morning hours to the Athletic District in the evening hours with the Arts and Student Center districts having a consistent level of scheduled student activity throughout the day but at much lower volumes.

### **3.5 BUILDING USAGE BY TIME OF DAY**

Measuring the use of buildings throughout the day can provide meaningful insight on how the focus of activity can shift from one part of campus to another. The course schedule was augmented with data on other scheduled student activities (e.g., intramural sports, student organizations, rehearsals, etc.) to create a more clear picture of where students may be concentrated. It should be noted that the extracurricular student activity captured in this analysis is an estimate based on known student organizations and departmental activities. It does not include informal student activities or organizations, student worship, non-scheduled recreation, or study groups.

Because buildings are already somewhat clustered based on similar activities, the data analyzed on building usage was aggregated at a "district" level. For example, an Arts District was defined as Christiansen Hall of Music, Dittmann Center, and the Speech-Theater Building. An Athletics District was defined as the Skoglund Athletic Center and the Tostrud Center. A Science District was defined as Tomson Hall, Regents Hall, Holland Hall, and Old Main.

Figures X-19 through X-22 show the number of students in each campus district by time of day. Black bars note scheduled class or lab activities, whereas the gold bars depict scheduled, non-class activities. Based on the figures, there is a pronounced shift in scheduled student

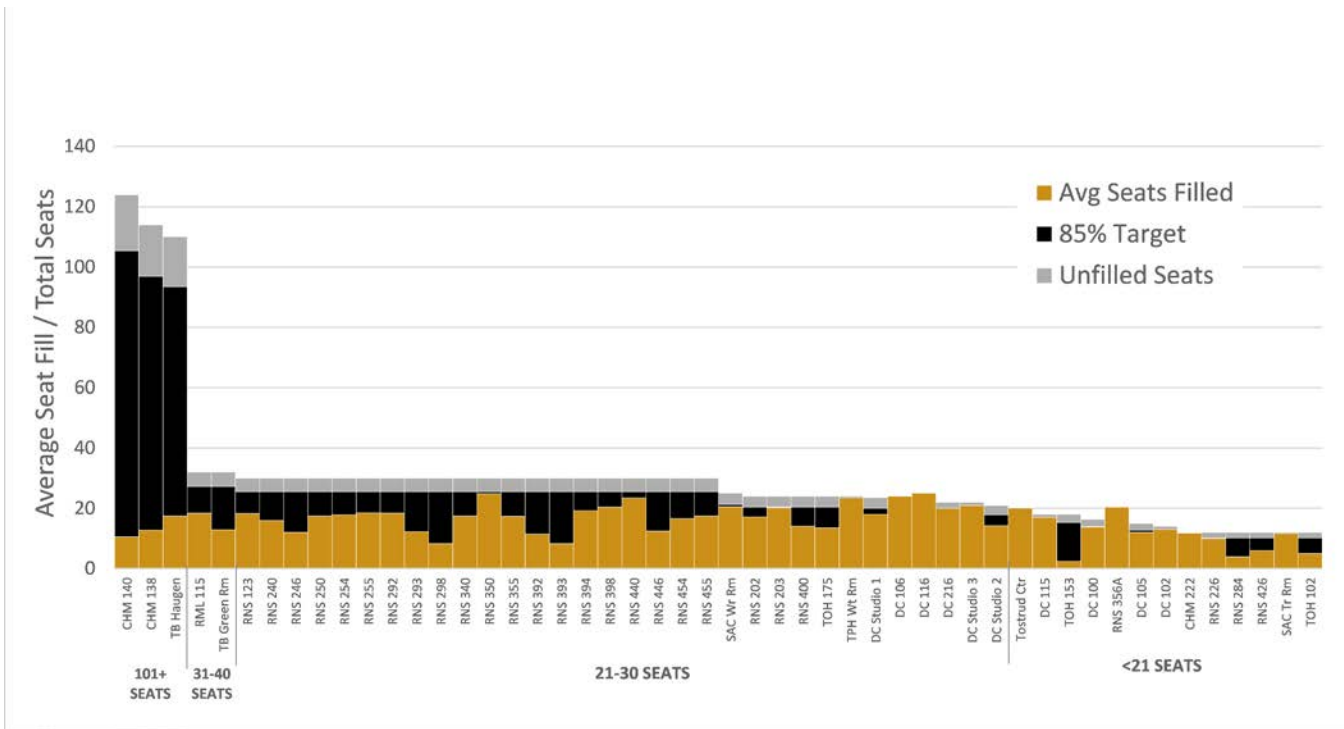


Figure X-18: Seat Utilization by Lab/Studio (Spring 2015)



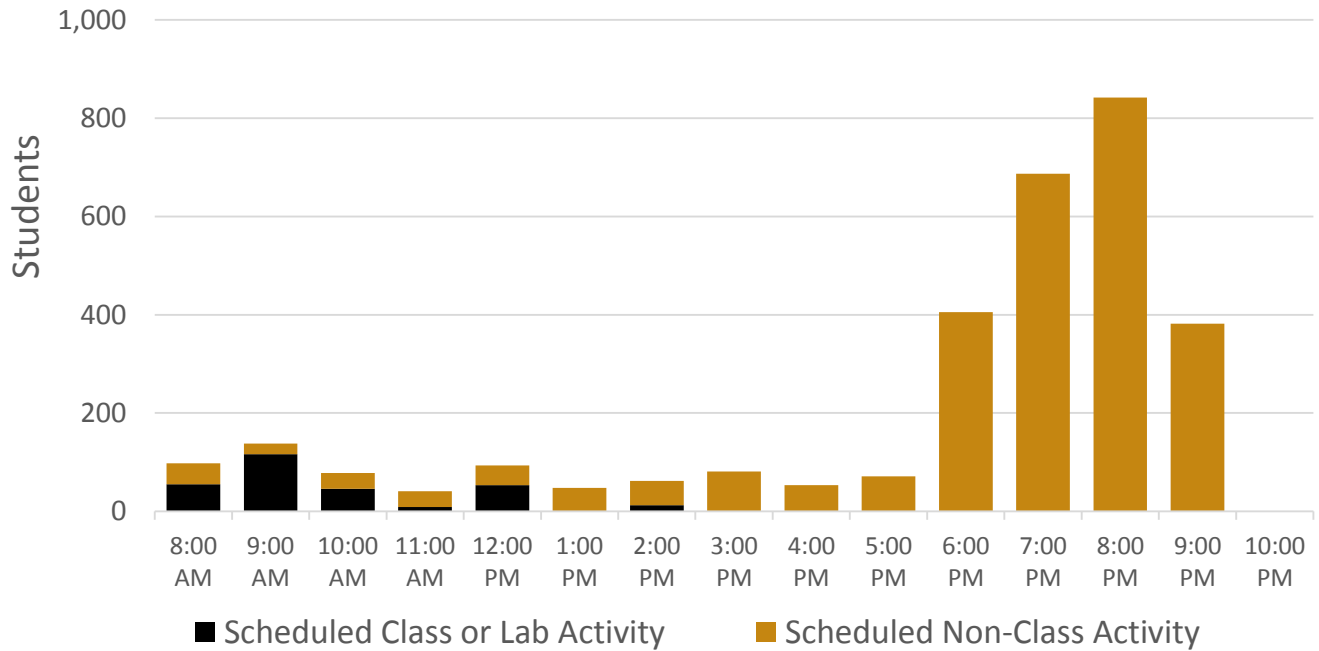


Figure X-19: Athletic District (Skoglund, Tostrud)

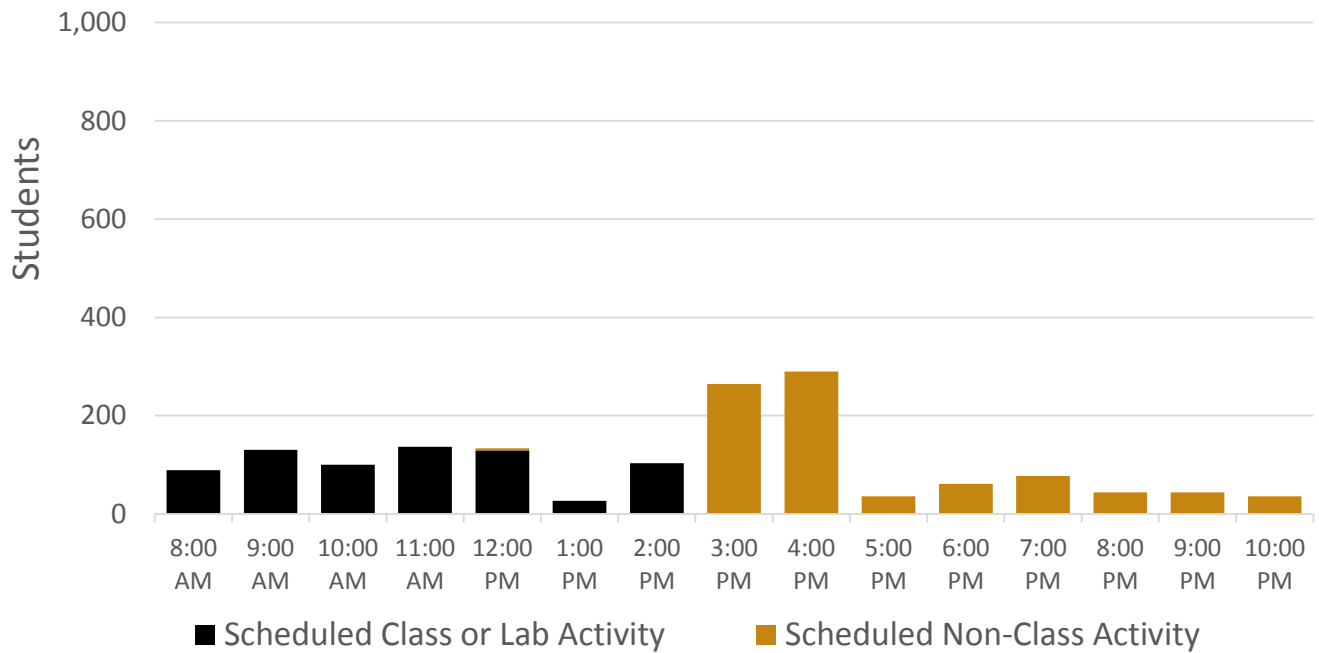


Figure X-20: Arts District (Christiansen, Dittmann, Speech-Theater)

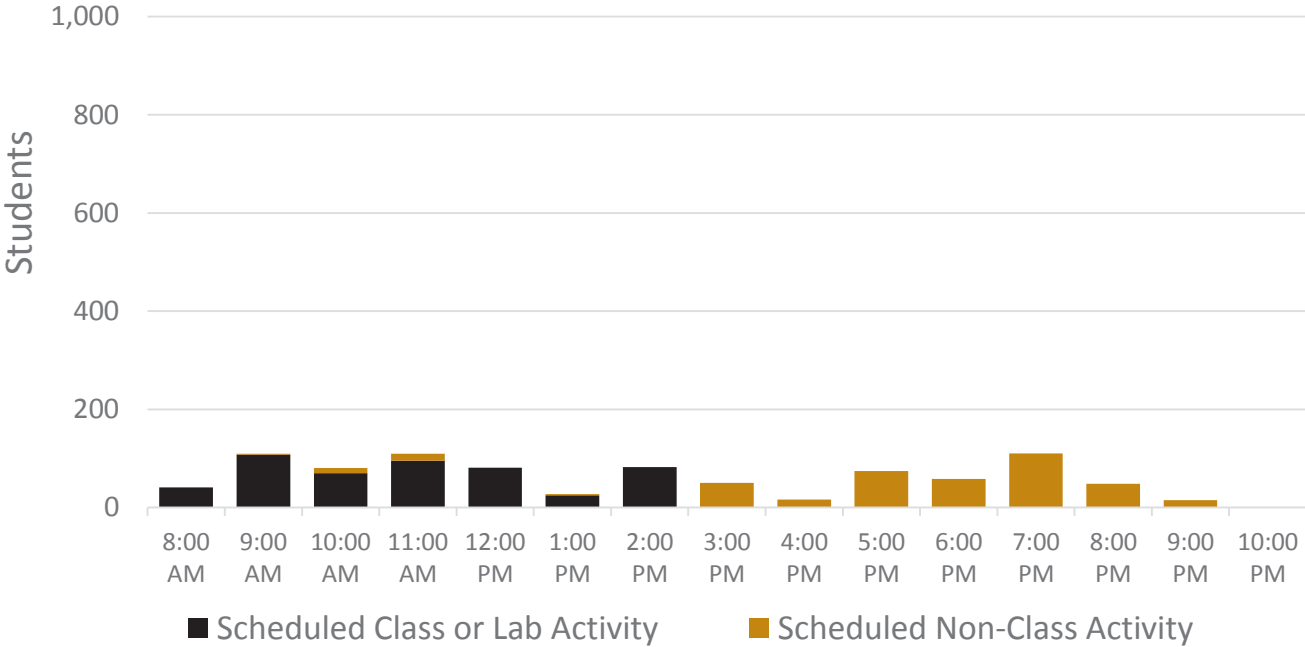


Figure X-21: Student Center District (Boe Chapel, Buntrock Commons, Rolvaag Memorial Library)

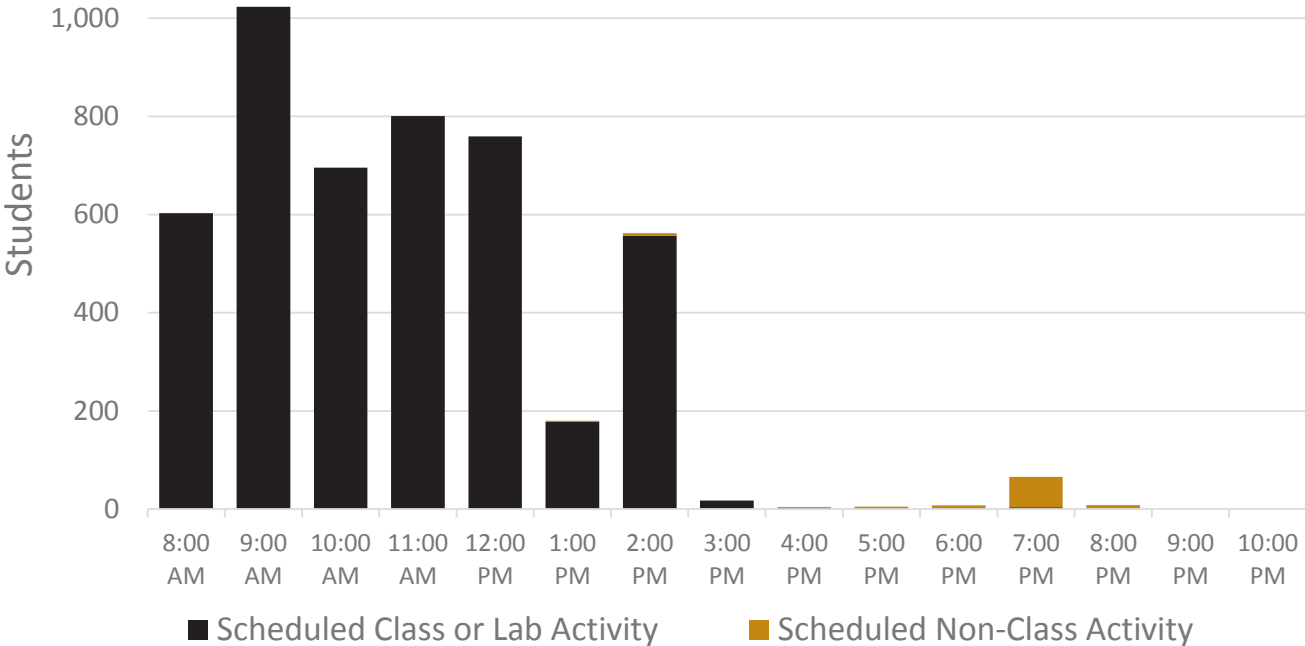


Figure X-22: Science District (Tomson, Regents, Holland, Old Main)