

A stylized, light gray tree graphic with a central trunk and several large, rounded branches. Overlaid on the tree are the large red numbers '2009' in a serif font. The numbers are positioned such that they appear to be part of the tree's structure, with the '2' on the left, the '00' in the middle, and the '9' on the right, all resting on the trunk and branches.

2009

Update of the 2000 Master Plan:  
Focus on Academic Facilities

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# 1. Teaching Space Analysis

## Introduction

As part of the update of the Grinnell College 2000 Master Plan, Shepley Bulfinch analyzed the use of teaching spaces across the campus. The goal was to understand not only the current use of classrooms, seminar rooms, lecture halls, computer classrooms and teaching labs, but to also look at the impact of the Noyce renovations and the addition of the Joe Rosenfield Center seminar rooms on teaching space utilization across the campus. The study also identifies the ideal number of teaching spaces and mix of room capacities to serve Grinnell into the future.

## Methodology

Course data from Spring and Fall 2008 semesters was supplied by the Registrar's Office. Data clean up included removing classes that had no enrollment and combining cross-registered courses. For these courses, the enrollment was totaled and one record was retained for each course. Classes that met in faculty offices, thesis meetings, and other credit bearing but non-regular classes were also removed, so that the final analysis

files contained only courses that met in Registrar or departmentally controlled classrooms, teaching labs and studios.

As the campus space inventory had not been updated since 2000, there was not a current list of all teaching spaces that accurately portrayed room capacities, classroom type, or control (Registrar or departmental). It took several iterative rounds with the Registrar to develop the list of teaching spaces on campus. Some rooms are initially scheduled by departments, and then the Registrar can schedule other classes in the remaining open slots. These rooms are considered in these analyses to be departmentally controlled.

## Teaching Spaces

In the Fall of 2008, 109 teaching spaces were available for courses. Rooms were categorized as Seminar, Classroom, Lecture Hall, Computer Classroom, or Teaching Lab. Seminar rooms are defined, for this study, as rooms with either one central table or several tables that can be put together to create a central table or ring of tables. Classrooms are defined as those rooms that contain tablet arm-



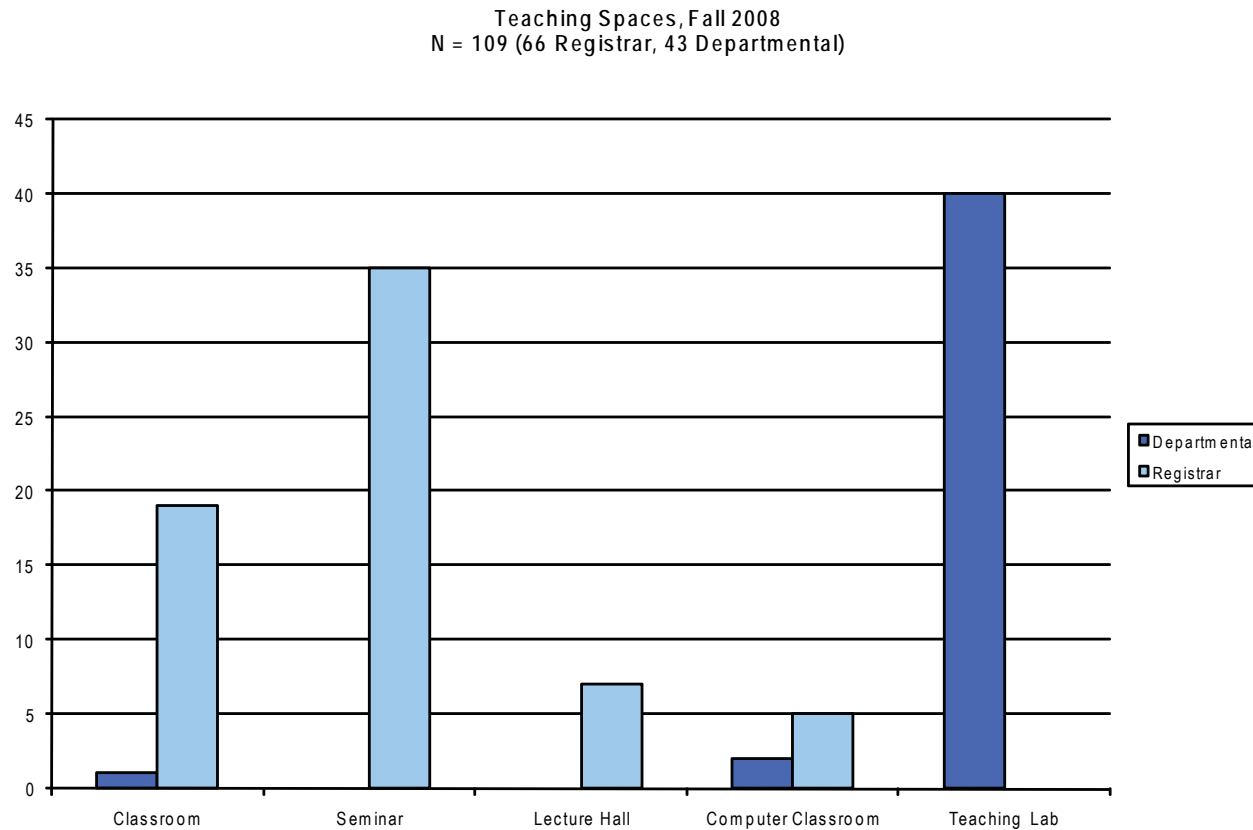
chairs (typically moveable, although ARH 305 (aka the "Star Trek" room) has fixed tablet armchairs. Lecture halls have fixed seating and are sloped or tiered. Computer classrooms have computer workstations for pairs or single students. Teaching labs are all departmentally controlled; they include science teaching labs, art and performing art studios. Of the 109 rooms, 66 are controlled by the Registrar and 43 by departments. [Figure 1] The 109 rooms total 95,910 Net Assignable Square Feet (NASF) and contain 3,178 seats or stations.

**The 109  
teaching  
spaces at  
Grinnell  
contain 3,178  
seats**

## Utilization

There are three major utilization rates that are calculated for teaching spaces: Station Size, Class Hour Utilization, and

Figure 1: Teaching Space by Type



Seat Utilization. For the purposes of this report we will use the most recent semester, Fall 2008, to discuss utilization. Appendix A shows the utilization rates by room.

### Station Size

Station size is the average area (square feet - SF) per seat in a room. It is derived by dividing the total SF by the number of student seats.

Target rates for each type of teaching space vary. Lecture halls generally have the lowest SF/seat due to the efficiencies of fixed seating. Oftentimes they are less than 20 SF/seat.

Classrooms have in the past been held to very tight standards; many state college systems still require 20 SF/seat or less for classrooms. This standard is increasingly being called into question as a result of research on the impact of the physical setting to learning. Tablet armchairs are still in use at Grinnell and other peer institutions, though tablet armchairs are also becoming the topic of much debate.

In order to provide the College with the most flexibility in its teaching spaces, we are recommending a target of 30 - 35

SF/seat for both classrooms and seminar rooms. This target station size will allow the College, if it chooses, to transition more rooms to small tables and chairs on wheels for maximum flexibility. Even if the College retains table armchairs in some rooms, this station size target will result in much more comfortable and flexible teaching and learning spaces.

The station size target for computer classrooms ranges from 35 - 45 SF/seat, depending on the peripherals that may be required.

Teaching labs have widely varying target station sizes, depending on the type of lab. They are often 45 SF/seat or larger.

Grinnell's classrooms and seminar rooms are below the target station size, at 23 SF/seat, on average [Figure 2A]. Lecture halls are within the target at 20 SF/seat, and computer classrooms are below target, at 28 SF/seat. Teaching labs range between departments from an average of 24 SF/seat to 80 SF/seat, with an overall average of 66 SF/seat.

Within room type, station size does vary between rooms controlled by the Registrar and those controlled by department [Figure 2B]. Generally, departmentally

Figure 2A: Station Size by Type

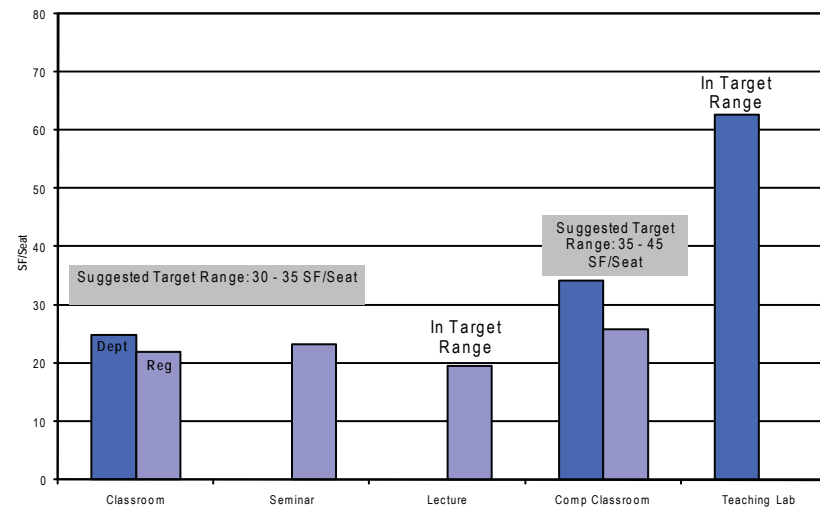
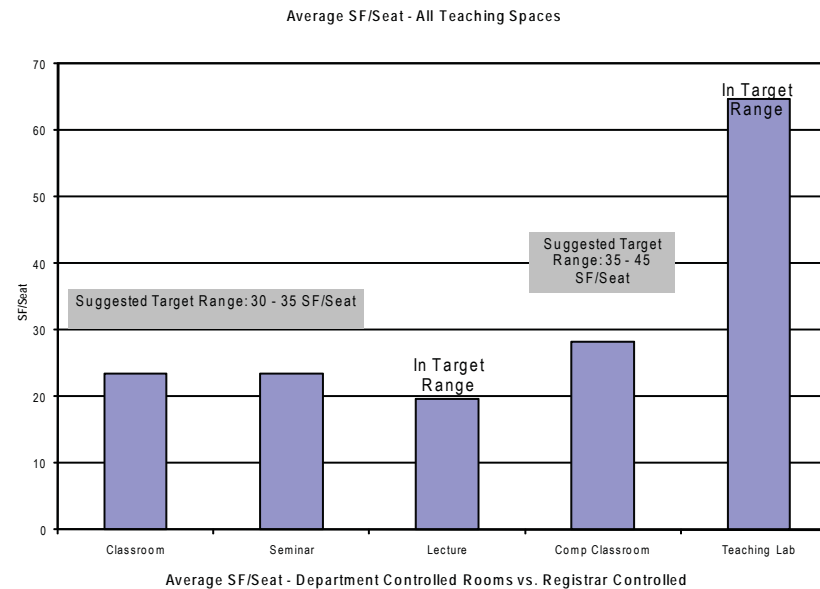
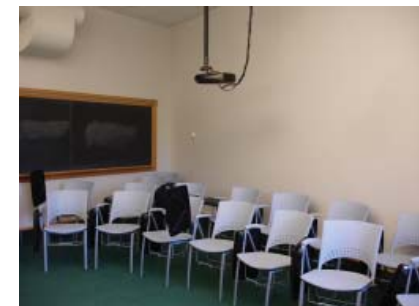


Figure 2B: Station Size - Departmental Control vs. Registrar



controlled spaces have slightly higher station sizes than Registrar controlled spaces, though still below the station size targets.

### Class Hour Utilization

Class hour utilization looks at how many hours a room is in use for classes as a percentage of the total time available from the course schedule. Grinnell's current schedule allows for 35 legal hours of course meetings per week. The JRC rooms are not scheduled for classes before and after the lunch hour, and

Figure 3A: Class Hour Utilization by Type

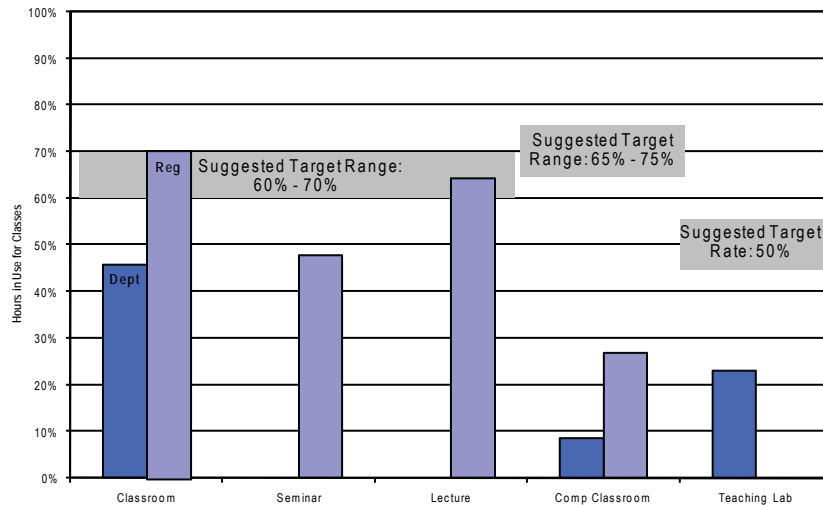
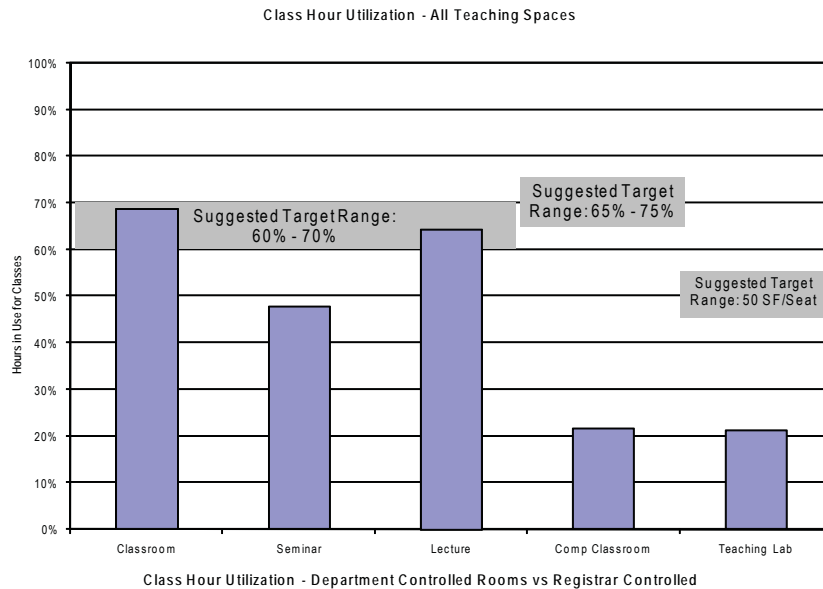


Figure 3B: Class Hour Utilization - Departmental Control vs. Registrar

therefore have a class hour week of 25 hours.

As with station size, target utilization rates vary by teaching space. For classrooms, seminar rooms and lecture halls we recommended a target rate between 60-70%. This target provides some flexibility for scheduling, and assumes that 100% efficiency of use is neither possible nor desirable.

The target class hour utilization rate for computer classrooms is slightly higher than classrooms, seminar rooms and lecture halls due to the higher cost associated with creating and maintaining these spaces. The hardware and utilities are significant costs. Ideally these spaces would be utilized between 65-75% to maximize the utilization of these resources.

Teaching labs generally have the lowest target class hour utilization of all teaching spaces due to their specialized nature and function. We have suggested a target utilization rate of 50% for teaching labs to allow for setup and other unique requirements for the teaching that occurs in these spaces.

Grinnell's classrooms and lecture halls

both fall within the target utilization range [Figure 3A]. The utilization of seminar rooms is below the target range with an average of 48%.

Computer classrooms at Grinnell also have low utilization with an average utilization of 22%. Several of the available computer classrooms are used less than

**Seminar rooms  
are used for  
classes only  
about 17 hours  
a week**

15% of the available course hours. The utilization of teaching labs is also low at 21%.

Grinnell's Registrar controlled classrooms, and computer classrooms achieve better class hour utilization than their departmentally controlled counterparts [Figure 3B]. Ideally both Registrar and departmentally controlled teaching

spaces would have relatively equal utilizations.

## Seat Utilization

Seat utilization is a measure of how many seats are filled when a classroom is in use. A standard target range for classrooms, seminar rooms, and lecture halls is 60-70%, to allow for some “wiggle room” to accommodate the fluctuation of course enrollments during add-drop periods.

For computer classrooms and teaching labs the target utilizations are higher because they are more expensive to build than classrooms or seminar rooms, and have specialized equipment. We recommend a seat utilization target of 75 - 85%.

The seat utilization for classrooms and seminar rooms at Grinnell both fall within the suggested target range at around 63% [Figure 4, A]. Lecture halls have a much lower seat utilization with an average of 32% of the seats filled when occupied by a class. Computer classrooms and teaching labs both have seat utilizations around 54%.

On average, Registrar controlled spaces are more full when classes are in session

than departmentally controlled spaces [Figure 4B].

## Summary

The analyses show that Grinnell’s classrooms and seminar rooms are very crowded in terms of station size, very full (seat utilization is high), and are in use more than 60% of the course hour week. Ideally we would want to reduce the number of seats in these teaching spaces in order to increase the square footage per seat. An analysis of this process, “right-sizing,” will be explored later in the document.

Lecture halls are very well used (class hour utilization), and are in the target range for station size. However, they are not very full when classes are held. Few classes can fill the capacity of the lecture halls at Grinnell, even though the College needs them for other, non-class purposes. The use of lecture halls for classes rather than appropriately sized rooms will be discussed in more detail later in this report.

Teaching labs, while in the target range for station size, are below target in both class hour and seat utilization. At a small

Figure 4A: Seat Utilization by Type

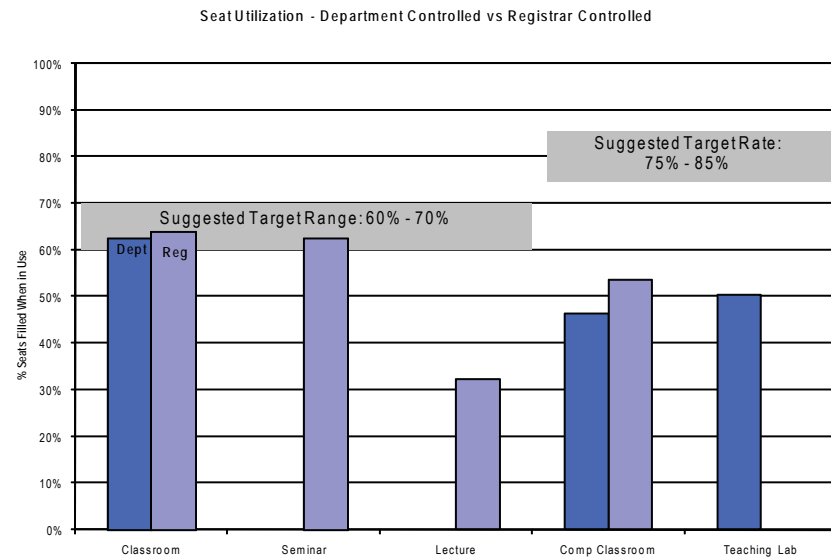
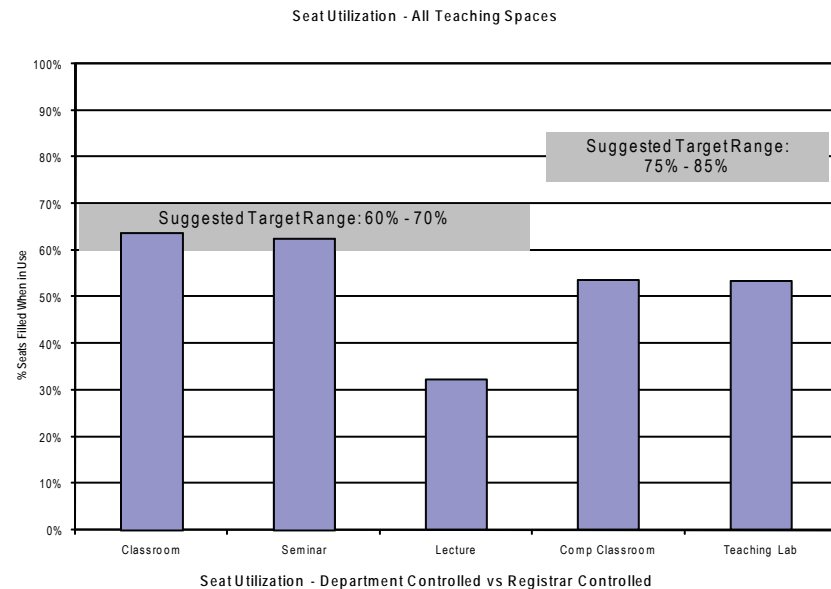
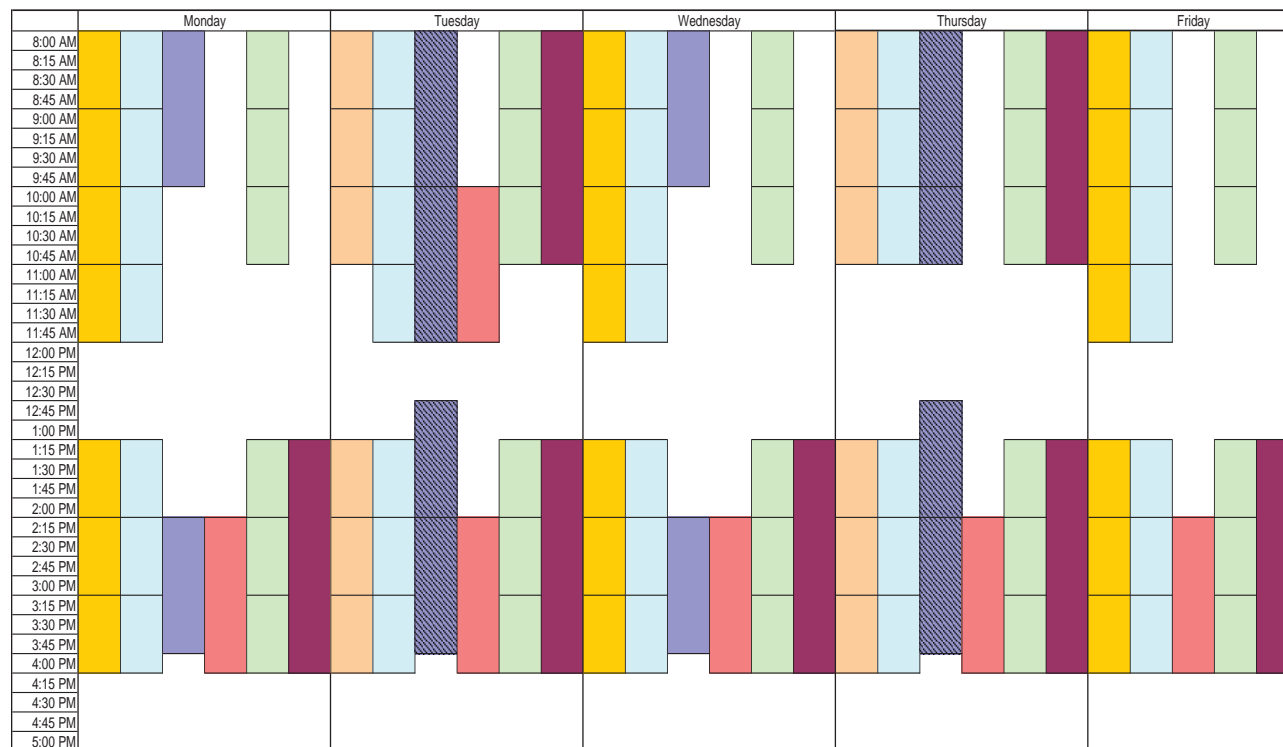


Figure 4B: SeatUtilization - Departmental Control vs. Registrar



Figure 5: Class Schedule Blocks



- Approved Course Times**
- One hour three days per week (MWF - 7 slots)
  - One hour two days per week (TTH - 6 slots)
  - One hour four days per week (MTWF or MWTHF - 14 slots)
  - Two hours two days per week (MW or TTH - 6 slots)
  - Two hours one day per week (6 slots)
  - One hour five days per week (6 slots)
  - Laboratories - 3 hours one day a week (7 slots)
- Total of 52 possible slots

school such as Grinnell, there is a need to provide specific types of rooms (organic chemistry, for example) even though there may only be one class offered per semester, and perhaps not even every semester. The 50% target may not be appropriate for Grinnell.

Computer classrooms are relatively under utilized. Some options to improve their utilization will be discussed later in this report.

## Scheduling

Another important set of metrics is the fit of courses into the current block schedule, as well as the spread of courses across the day and week.

## Block Schedule

The current Grinnell time block schedule [Figure 5] allows for 52 course meeting options across a 35 hour course week (the JRC classrooms are available for 25 hours per week based on an abbreviated schedule). Grinnell has a 10-minute pass time between classes, so a one-hour slot is equivalent to a 50-minute class period. The course time options range from 100 minutes a week (two hour slots, one day per week) to 300 minutes a week (three

Figure 6: Spring 08 Use of Legal Time Blocks

hour slots, two days per week).

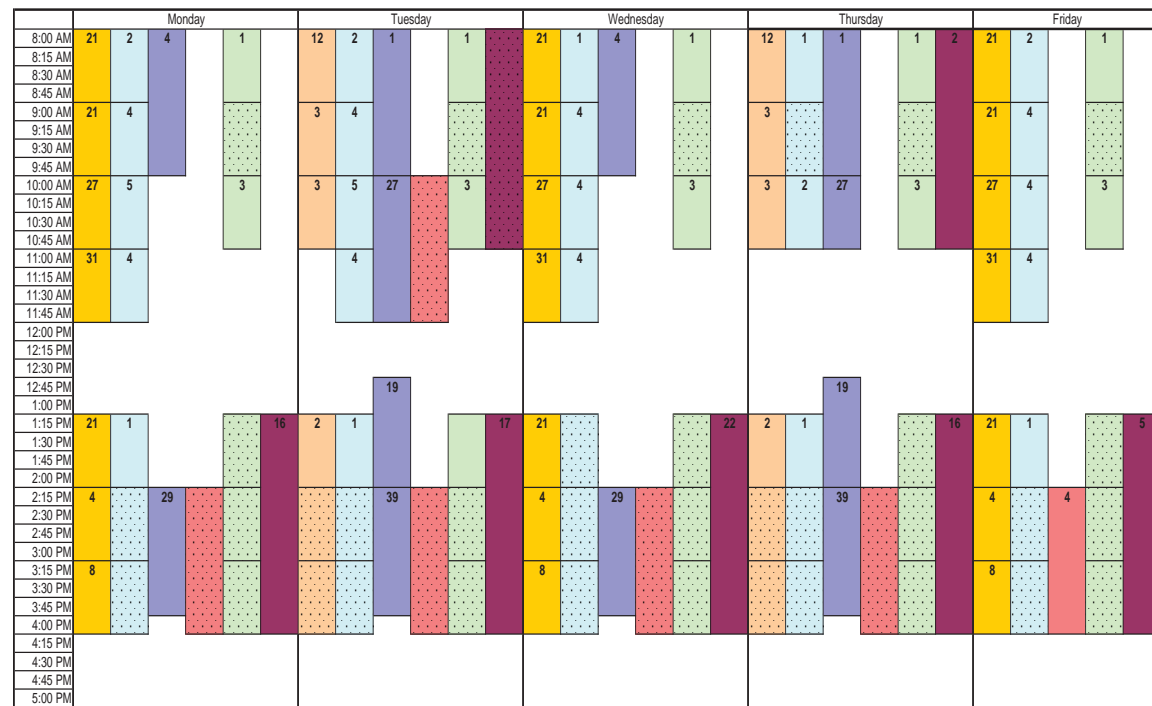
The Grinnell schedule is fairly complicated with so many slots available, and does not follow the traditional MWF three meetings / TTH two meetings schedule still seen on many campuses.

Figure 6 shows the courses that took place during legal time-slots for the Spring 2008 semester. Only 34 of the 52 available course slots were used, and 50 courses fell outside of the legal schedule [Figure 7]. These non-standard, or illegal blocks are described in detail later in the report.

During the Fall 2008 semester there was a slightly better distribution of legal courses, likely due to the First-year Tutorials which take place on Tuesdays and Thursdays [Figure 8]. Forty of the 52 available course slots were utilized, with 61 courses meeting outside of legal time-blocks [Figure 9].

Since many time slots are not used, and other class patterns exist that are not reflected in the legal course slots, we recommend that Grinnell consider streamlining its course schedule.

An additional schedule issue that has been raised many times is whether the

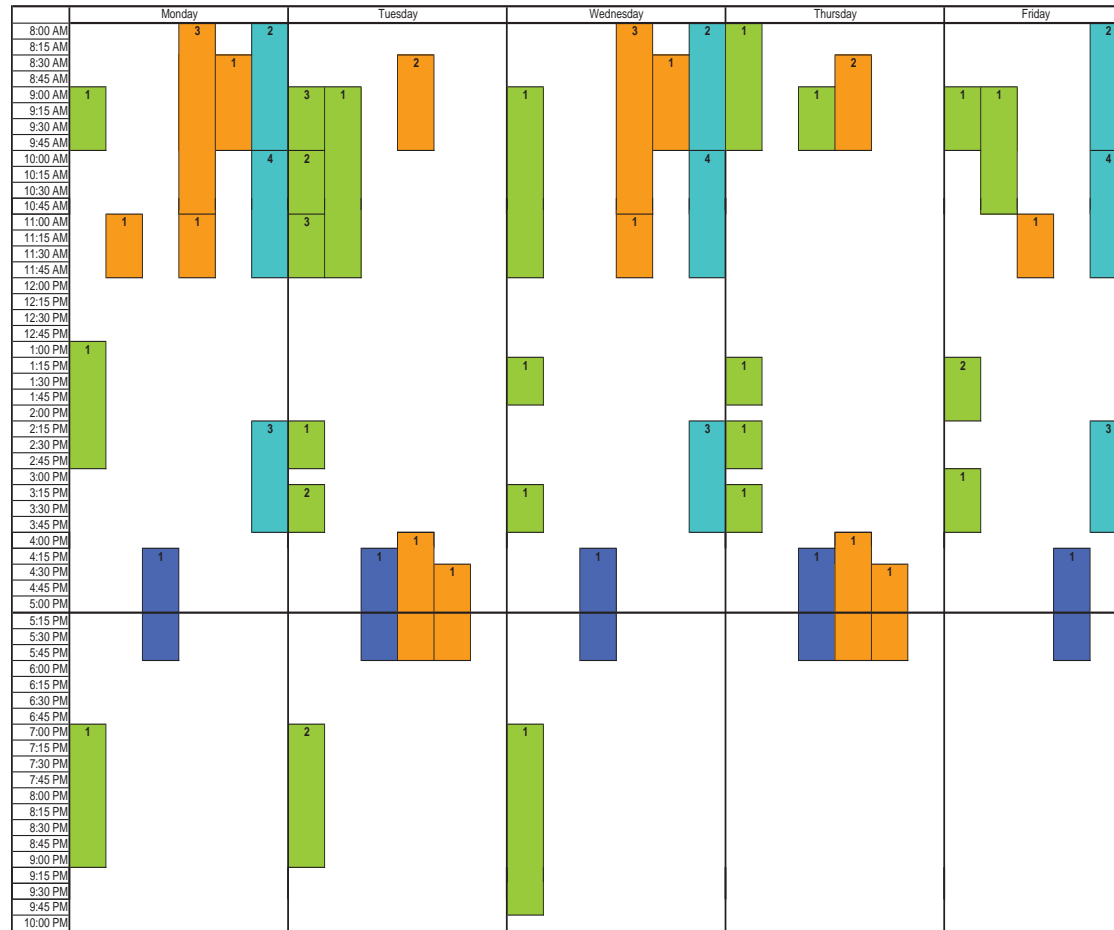


Approved Course Times		Length of Slot	Spring # of Classes	Spring # of Slots
	- One hour three days per week (MWF - 7 slots)	150 minutes	133 Classes *	7/7
	- One hour two days per week (TTH - 6 slots)	100 minutes	20 Classes	4/6
	- One hour four days per week (MTWF or MWTHF - 14 slots)	200 minutes	16 Classes **	8/16
	- Two hours two days per week (MW or TTH - 6 slots)	200 minutes	119 Classes	6/6
	- Two hours one day per week (6 slots)	100 minutes	4 Classes	1/6
	- One hour five days per week (6 slots)	250 minutes	4 Classes	2/6
	- Laboratories - 3 hours per day, up to 2 days per week (7 slots)	150 minutes	64 Classes	6/7

Total of 52 possible slots      360 Total Legal Classes      34/52  
 50 Total Illegal Classes  
 410 Total Classes

Notes:  
 \* There are some afternoon courses that begin at 1:00PM or 3:00 PM instead of the prescribed 1:15 or 3:15, these have been included but should be addressed.  
 \*\* Includes permutations MTWTH and MTTHF. Also there are no MWTHF courses this semester

Figure 7: Spring 08 Classes in Illegal Time Blocks



Illegal Course Times		# of Classes
Green	- One Day per Week Illegal (M, T, W, TH, F)	31 Classes
Orange	- Two Days Per Week Illegal (MW)	9 Classes
Cyan	- Three Days Per Week Illegal (MWF)	9 Classes
Blue	- Five Days Per Week Illegal (MTWTHF)	1 Classes

50 Total number of Illegal Classes

**50 classes met at non-standard times in Spring 2008**

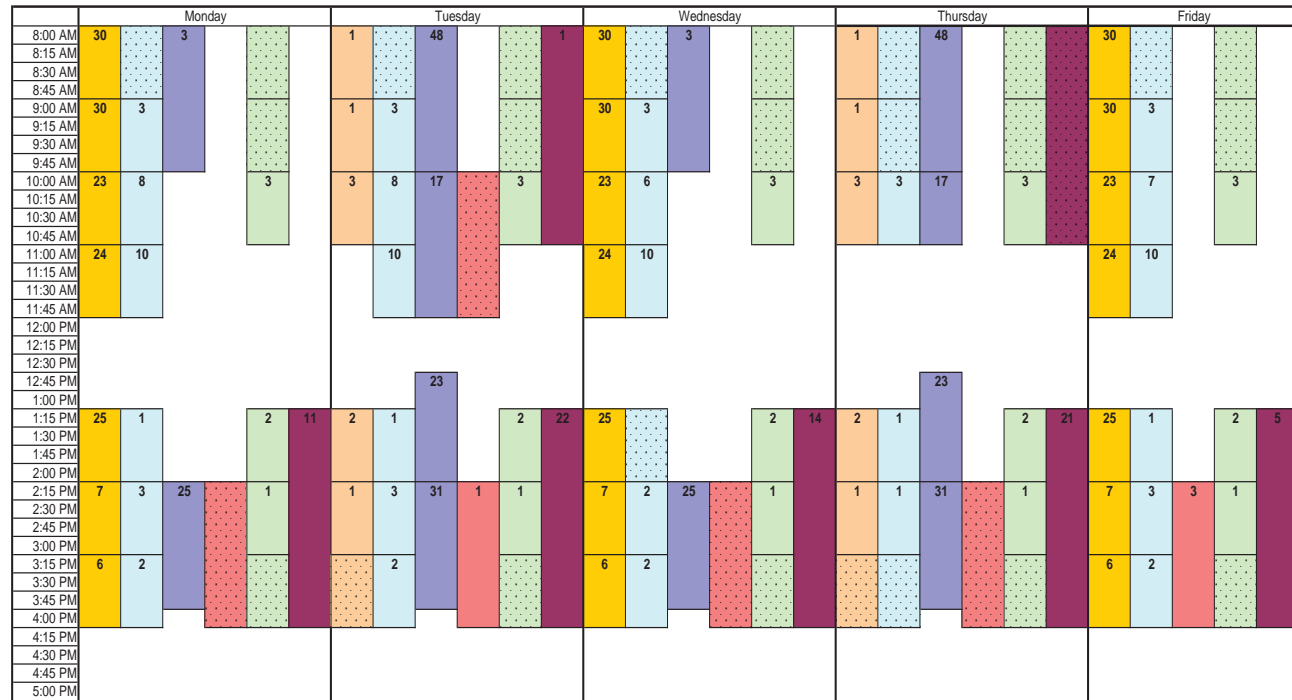
Figure 8: Fall 08 Use of Legal Time Blocks

50 minute class block provides sufficient time for the discussion based pedagogy that is the hallmark of many courses at Grinnell. In our classroom observations, it was apparent that 15-20 minutes of class time is often used for handouts, housekeeping items, late arrivals, etc., and that real discussion does not begin to occur until around the 40 minute mark.

Obviously, considering a major change to the schedule to accommodate longer class sessions is not an easy decision, but if the College does intend to contemplate it, recommendations relative to the number and size of teaching spaces must be put on hold. During one of our discussions a faculty member noted that the course schedule has not changed in 30 years, while teaching methods and pedagogy have changed at a great pace over the same period.

### Classes by Day and Time

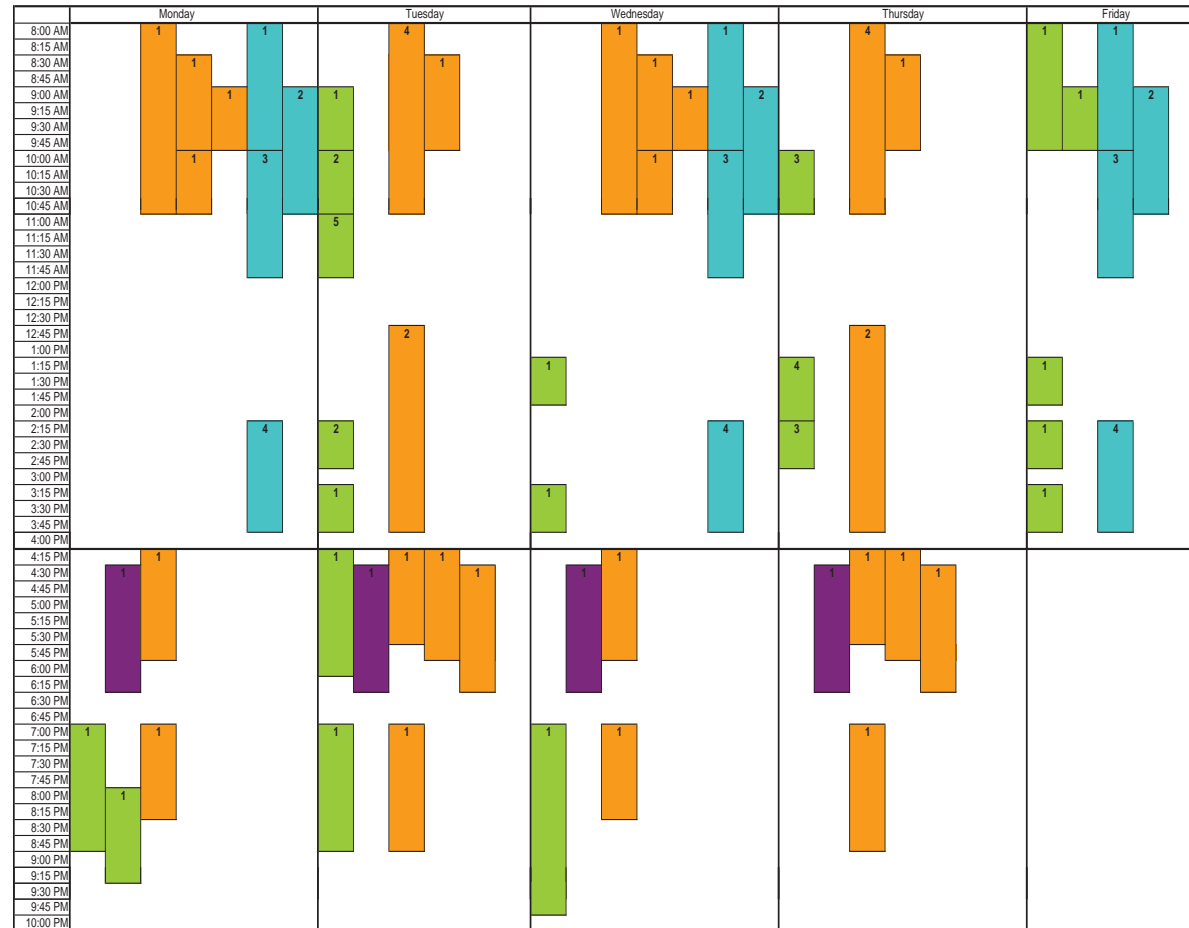
Ideally, 20% of the courses each semester would occur on each day. Similarly, courses should be evenly spread across the course of the day to maximize utilization and the availability of classrooms, as well as facilitating student's ability to



Approved Course Times			
Color	Description	Length of Slot	# of Slots Used
Yellow	- One hour three days per week (MWF - 7 slots)	150 minutes	7/7
Orange	- One hour two days per week (TTH - 6 slots)	100 minutes	5/6
Light Blue	- One hour four days per week (MTWF or MWTHF - 14 slots)	200 minutes	11/16
Dark Blue	- Two hours two days per week (MW or TTH - 6 slots)	200 minutes	6/6
Red	- Two hours one day per week (6 slots)	100 minutes	2/6
Green	- One hour five days per week (6 slots)	250 minutes	3/6
Purple	- Laboratories - 3 hours per day, up to 2 days per week (7 slots)	150 minutes	6/7
Total of 52 possible slots			40/52
		399 Total Legal Classes	
		61 Total Illegal Classes	
		460 Total Classes	

Notes:  
 \* There are some afternoon courses that begin at 1:00PM or 3:00 PM instead of the perscribed 1:15 or 3:15, these have been included but should be addressed.  
 \*\* Includes permutations MTWTH and MTTHF. Also there are no MWTHF courses this semester

Figure 9: Fall 08 Classes in Illegal Time Blocks



Illegal Course Times	
■ - One Day per Week Illegal (M, T, W, TH, F)	# of Classes 33 Classes
■ - Two Days Per Week Illegal (MW, TTH)	17 Classes
■ - Three Days Per Week Illegal (MWF)	10 Classes
■ - Four Days Per Week Illegal (MTWTH)	1 Classes

61 Total Number of Illegal Classes

**61 courses met at non-standard times in Fall 2008**

schedule courses by reducing conflicts (some students we met with have indicated that this is a problem). Figures 10 A & B show the percentage of courses that are scheduled on a particular day of the week. In both semesters, Mondays and Wednesdays were heavily scheduled. Tuesdays and Thursdays were better utilized in the Fall semester than the Spring, most likely due to the First-year Tutorials. Fridays were surprisingly well utilized.

### Courses Meeting Outside of the Legal Time Blocks

We analyzed the courses that did not meet within the legal schedule. There were several common themes that emerged. Grinnell should consider whether there are real pedagogical reasons for these exceptions to continue, and, if so, change the legal time blocks to incorporate them. Some cases seem to be catering to special requests that may not have a pedagogical basis, and are creating inefficiencies in room use. These should be brought into the legal schedule to improve utilization.

**Language labs:** Many language class labs fall outside of the legal MTWF or

MWTHF one-hour, four-days-a-week schedule, or the MTWTHF one-hour, five-days-a-week schedule. In some cases the lab and the course could be accommodated within the legal block schedule (i.e., the lab occurs at the same time as the 4 day a week course, in a different room). Several courses have two lab sections that meet at incongruous times on the fourth or fifth day. Are there pedagogical reasons that these courses need to fall outside of the legal block schedule? Ideally these fourth or fifth day labs would occur at the same time and in the same room as the regular class (if there were more than one lab section then the second section would need to meet in a different location, or at another time).

**300 minute courses:** There are a number of courses that meet three days a week for one hour and fifty minutes. There were 6 classes in this category during both the Spring 2008 semester and Fall 2008 semesters. These are Science labs and some special topics courses.

**Odd fourth or fifth meetings:** In addition to language courses, there are several other courses that have an odd (different

Figure 10A: Percentage of Classes by Day, Spring 2008

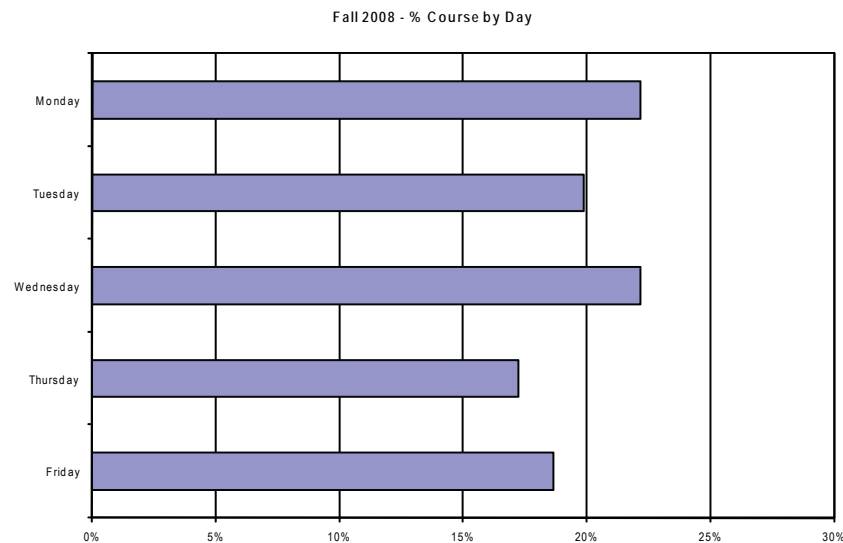
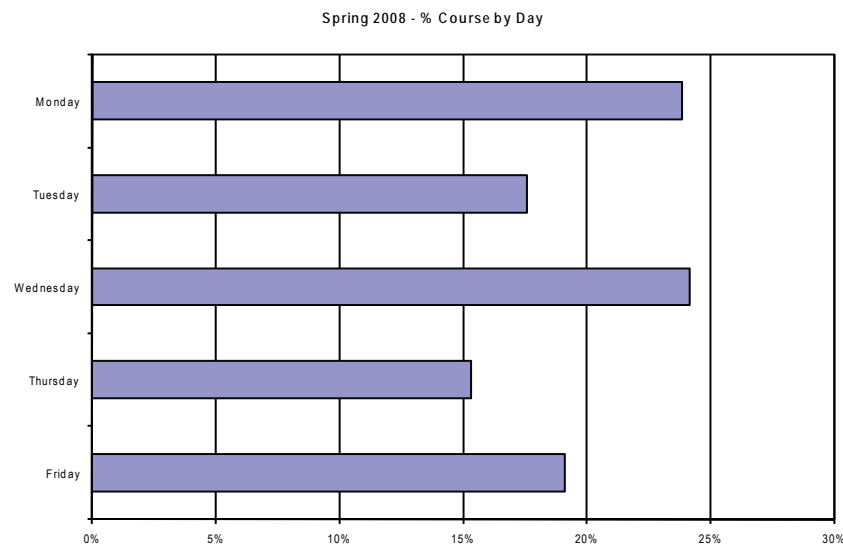


Figure 10B: Percentage of Classes by Day, Fall 2008

time, and sometimes, location) fourth or fifth meeting with respect to their standard meeting time. The tendency seems to be division independent. Again, unless there is some pedagogical reason, it is recommended to move these courses into the legal four or five days a week time blocks. This will not only improve room use, but will make it easier for students in reducing conflicts in their schedules.

**160 minute courses:** There are at least two courses during the Spring and Fall 2008 semesters that run for 160 minutes. These courses meet two days a week for one hour and twenty minutes. Is there a pedagogical reason that these courses run for this amount of time instead of meeting in the legal two hours two day a week block?

**One-hour, two-days-per-week courses:** The current legal schedule allows for courses to meet on Tuesdays and Thursdays for one hour. There are, however, several courses that meet on Mondays and Wednesdays for one hour. It seems that it would be easy to accommodate courses of this length into the current legal schedule, and may improve overall utilization of Tuesdays and Thursdays.

**50 minute courses:** There are several courses that meet only once a week for fifty minutes. Should the legal time blocks be changed to reflect this pattern?

**Practicum:** Practicum courses tend to happen after 4:00 P.M. and run into the evening. The legal course blocks should be changed to reflect this scheduling practice.

### JRC / Noyce Impacts

Another area of analysis was the impact on utilization, if any, of the new JRC and Noyce teaching spaces, particularly in classrooms and seminar rooms in ARH and Carnegie.

From the Fall semester of 2006 to the Fall semester 2008, the College has increased the total number of teaching spaces on campus from 94 to 109. During this same period the total number of seats in teaching spaces on campus rose from 2,732 to 3,160 seats. During this period the average course enrollment has shifted only slightly from 15 to 16 students.

Based on this data, one would anticipate that seat utilization as well as class hour

utilization would have decreased over time. Appendix B outlines the historical utilization data from the Fall semester 2006 to the Fall semester of 2008. The following utilization discussions are based on the information in the Appendix B.

### Classroom Utilization

Utilization of classrooms in ARH, Bucksbaum and Goodnow have all remained relatively constant over time.

ARH classrooms tend to be used more during the Fall semesters, with average class hour utilization between 70% in 2006 and 80% in 2008. These higher fall utilizations are more than likely due to an increased demand on spaces for First-year Tutorial classes. The Spring utilizations are between 69% in 2007, and 61% in 2008. The ARH classrooms are heavily utilized.

The number of available classrooms in Noyce shifted each semester as the complex was expanded and renovated. Between Fall 2006 and Fall 2008 the hour utilization of classrooms in Noyce fell from 72% to 61% as the number of available classrooms doubled over the same period. Seat utilization has



remained relatively constant over the same period.

There appears to be some capacity in Noyce to alleviate the high utilization rates in ARH.

### Seminar Room Utilization

Over the period of Fall 2006 to Fall 2008 the class hour utilization of ARH seminar rooms fell off from an average of 57% to 45%, with a consistent seat utilization around 60%. A similar trend was seen in the Bucksbaum seminar rooms which

fell from 57% to 49% with a flat trend in seat utilization around 63%.

Carnegie seminar rooms had a relatively consistent seat and class hour utilization between 43% and 48%. The single seminar room in Goodnow (109) has consistent utilization with the exception of the Spring semester 2008 when it was not used at all for classes. If the college decides to right-size classrooms, this space would become too small for classes. The seminar rooms in Mears Cottage and Steiner followed a similar trend as the seminar rooms in ARH and Bucksbaum with utilization falling over the same period.

The Rosenfield seminar rooms have seen a shift in usage during the same period as well. When the JRC classrooms were introduced in the Fall of 2006 their hour utilization was 32%. From 2006 to fall 2008 the hour utilization rose dramatically to 53%. This increase in utilization coupled with declines in ARH, suggest that faculty have been willing to move out of their building to teach in a better room.

The two smallest seminar spaces in the Rosenfield Center (204 & 205) were

used for classes during the Fall 2006 semester, but have not been scheduled since, most likely because they are too small to be effective for most of the classes on campus.

In Noyce seminar rooms, class hour utilization rose from 36% to 39%.

Although seminar rooms are less heavily scheduled than classrooms on campus, and have lower station sizes, many courses at Grinnell have significant portions of the discussion based learning that these spaces support. The difficulty



is how to create spaces that facilitate discussion in rooms with more than 18 seats, when the traditional seminar layout is not successful.

### Lecture Hall Utilization

The utilization of lecture halls (rooms with fixed tiered seating) was fairly constant between Fall 2006 and Fall 2008. Most of the lecture halls were at or above 60% class hour utilization. Seat utilization on average was relatively low in all of the lecture halls since the largest classes on campus are on the order of 30-40 students and the median seat count in lecture halls on campus is 72 seats.

The exception to this is the case study room in the basement of Steiner which had a high hour utilization rate, between 69-77%, and was within the target seat utilization of 60%.

There has been some discussion about the availability of classrooms that can suit larger courses. According to some faculty, many of the classes in lecture halls are apparently scheduled there due to a lack of other appropriate teaching spaces on campus at that time slot.

The students we met with feel that the Noyce lecture halls are successful since

they “don’t notice how large the room is,” they “forget about the back row [when it is empty].” They also liked the “collegiate feel” of ARH 102, even though the room has twice as many seats as needed for even the largest classes.

Lecture halls are designed to meet multiple functions. While the larger ones are not appropriate for most Grinnell courses, they are needed for other non-class events.

### Computer Classroom Utilization

Between Fall 2006 and Fall 2008, the number of computer classrooms more than doubled from 4 to 11. The average class hour utilization of computer classrooms fell from 28 to 19% during this period, with some computer classrooms not being used at all during some semesters. Seat utilization fell from 55% to 45%.

Computer teaching seats are more costly than regular class seats, due to utilities, hardware, and higher maintenance costs; therefore they should have higher seat utilization than regular classrooms or seminar rooms.

The larger question is how to efficiently schedule computer classrooms so that



they can be well utilized during the teaching week, and also remain available for students between these periods as open labs.

Some students expressed a need for more open computer lab availability (and also expressed interest in having a computer classroom in JRC that would be available for extended hours).

One possibility may be to reduce the hours per week that some computer classrooms are available for classes, as is done in the JRC seminar rooms. This would allow computer classrooms to be utilized as open labs more hours of the week.

Another option would be use some of the computer classrooms as dedicated open computer labs, increasing the seat and hour utilization of the other computer classrooms. Dedicating computer classrooms as open labs would also address another problem that has been raised - networked printers in computer classrooms will start printing during a class session from a file sent remotely. If some rooms were dedicated for classes only the networked printers could be removed from them, eliminating the distraction.



### Teaching Lab Utilization

Teaching labs and studios typically have lower hour utilization targets to account for set up time and the specialized nature of the teaching that occurs in them. A typical target is 50% utilization, but may need to be lower for Grinnell. On the other hand, the target for seat utilization should be 75 - 85%, since these seats are expensive to construct.

The teaching labs/studios in Bucksbaum had an average hour utilization of 19% to 20% between Fall 2006 and Fall

2008. Average seat utilization across the Bucksbaum spaces increased from 33% to 39% over the same time interval. The Goodnow teaching lab for Anthropology is generally not used during the Fall semester for classes due to the curricular needs of the Anthropology department.

Like all other spaces in Noyce, teaching labs increased in number between Fall 2006 and Fall 2008. With this increase the hour utilization of the Noyce teaching labs fell from a high of 28% in Spring semester of 2007 to an average 21% hour utilization in Fall semester of 2008. The seat utilization remained very near the target range, between 61% and 71%.

Jim Swartz has noted that certain teaching labs in Noyce are very specific in their use and setup and support courses that are only offered once per semester, or on a rotating semester schedule. As such, there is a certain amount of inefficiency built into the science teaching lab layout. Furthermore, it was noted that many of the unused teaching labs are often used by MAP students during the semester, or for long term independent study projects.

### Summary

Since many of the ARH classrooms have class hour utilizations of nearly 80%, the use of classrooms in Noyce should be encouraged. If rooms are right-sized there will necessarily be a shift of class locations. The use of the largest lecture halls for classes should be discouraged. If there were more rooms of the appropriate size for smaller classes, then seating classes with enrollments over 25 into appropriate size rooms without having to use large lecture halls should be possible.

The lecture halls in Noyce provide a good model for classes over 25. These tiered lecture halls have two rows of seating at the same height to allow for group collaboration. Students feel that these lecture halls don't feel as empty as some of the other lecture halls when smaller classes are placed in these spaces, since smaller classes simply occupy the front rows of the lecture hall.

Another model to explore is the case study room. Steiner 106 is built on this model but suffers from poor sightlines. A well designed case study room would support a larger class in discussion

based format.

It is hoped that the historical utilization data [Appendix B] will provide a framework for the future, allowing the College to track utilization rates and change course as necessary to maximize efficiencies and utilization of existing and future spaces.

## Classes of More than 20 Students

As noted earlier, many faculty feel there is an inadequate number of teaching spaces suitable for courses with enrollments over 20. Additional analyses were conducted to understand the nature of the problem (if in fact it exists).

Of courses with enrollments between 21

and 25 students, 91 were offered during the Spring 2008 semester and 93 in the Fall semester. There were 40 courses with enrollments between 26 to 30 students in the Spring of 2008, and 38 courses in the Fall. The Spring semester 2008 had 13 courses with enrollments over 30, and there were 9 courses of this size in the Fall semester.

Table 1 illustrates the distribution of courses with enrollments over 20 by semester, along with the number of classrooms in each building that would support classes of that size. The number of available slots per room is calculated using the ratio of seven classes per room per semester (60% class hour utilization). During both semesters there were sufficient teaching spaces to support the number of courses scheduled. Among all

teaching spaces with capacities over 20 students there are 280 available slots in 12 rooms. At most there have been 145 classes with enrollments over 20. While there may not be enough slots available in the 21-25 enrollment range relative to the number of courses, some of these courses could be seated in 26-30 seat rooms, where there are more slots available than classes.

It appears that the number of rooms with seat capacities over 20 is sufficient when compared to historical demand.

## Classes of More Than 20 Students by Day and Time

The next factor investigated was when larger classes occur. Are they scheduled at the same time, thus overwhelming the number of rooms available?

As shown in Figures 11 A & B, classes with enrollments greater than 20 tend to occur on Monday, Wednesday and Friday during both semesters. Spring 2008 courses with enrollments between 21 and 25 students occur mostly on Monday, Wednesdays and Fridays with a smaller percentage taking place on Tuesdays or Thursdays. For courses with enrollments between 26 and 30 students, Monday, Wednesday, and Friday again had the majority of classes, with fewer on Tuesday and Thursday. Even more courses with more than 30 students occurred on Monday, Wednesday and Friday, with very few on Tuesday and Thursday. Fall 2008 had a similar distribution.

Improving utilization on Tuesdays and Thursdays could help reduce the demand for classrooms of this size. An-

Building	# of Courses																	
	S08		F08		# of Rooms	Avail. Slots	S08		F08		# of Rooms	Avail. Slots	S08		F08		# of Rooms	Avail. Slots
	21-25		26-30				31+		Totals >20									
ARH	30	29	1	7	6	42	15	12	3	1	4	28	48	42	11	77		
Bucksbaum	5	5	3	21	1	7	3	1	0	4	1	7	8	10	5	35		
Goodnow	4	2	0	0	0	0	0	0	0	0	0	0	4	2	0	0		
JRC	0	4	0	0	1	7	0	0	1	0	0	0	1	4	1	7		
Noyce	40	43	5	35	3	21	18	23	7	3	11	77	65	69	19	133		
Steiner	12	10	3	3	0	0	4	2	2	1	1	7	18	13	4	28		
<b>Totals</b>	<b>91</b>	<b>93</b>	<b>12</b>	<b>66</b>	<b>11</b>	<b>77</b>	<b>40</b>	<b>38</b>	<b>126</b>	<b>9</b>	<b>17</b>	<b>119</b>	<b>145</b>	<b>140</b>	<b>40</b>	<b>280</b>		

Table 1: Classes of More Than 20 by Building

Figure 11A: Percentage of Classes of More Than 20 Students by Day, Spring 2008

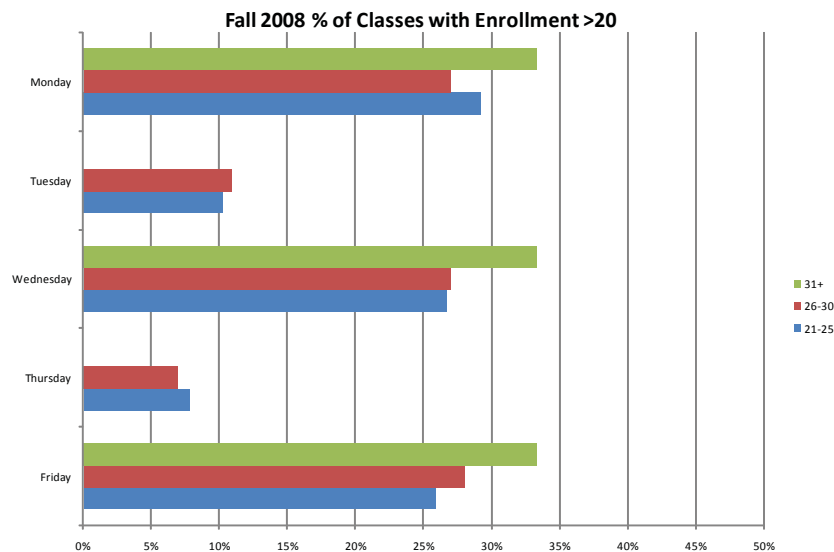
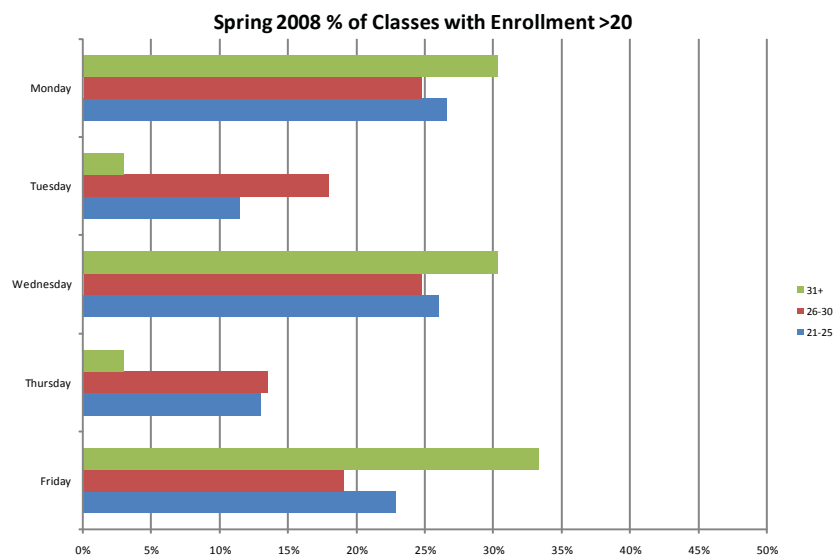


Figure 11B: Percentage of Classes of More Than 20 Students by Day, Fall 2008

other option would be encourage faculty to teach in other buildings. Currently the majority of teaching spaces suitable for courses with enrollments greater than 20 students are in Noyce and ARH, but there is some unused capacity in Bucksbaum.

Appendix C shows at course enrollments across hours of the week. Courses over 20 students tended to fall in the mornings on Mondays, Wednesdays and Fridays over both semesters, with fewer in the afternoons. Larger courses tended to be better spread across the day on Tuesdays and Thursdays, with the exception of Tuesdays in the Fall 2008 where there were many more courses between 21-25 from 10:00 A.M. to 4:00 P.M., than courses over 25. Courses over 30 students occupy a much smaller percentage of the course week and generally tend to happen across the day.

While there seem to be a sufficient number of teaching spaces suitable for courses with enrollments greater than 20, the grouping of larger courses on Monday, Wednesday and Friday, along with the further clustering around the morning blocks on those days, greatly reduces the availability of appropriately

sized teaching spaces. Working to identify those courses which require these teaching spaces and spread them more evenly across the course week should result in more balanced hour and seat utilization, as well as improved availability.

### Balance of Room Capacities to Course Enrollments

Another factor to examine is the balance between the capacities of classrooms and the enrollments of courses. We look at this for classrooms, seminar rooms, lecture halls and computer classrooms (regardless of control), a total of 66 rooms, but not teaching labs, since courses that need to meet in teaching labs cannot meet in other room types. Since a room can contain several classes, we look at the percentage of rooms in various size categories compared to the percentage of course enrollments in those same categories. Figures 12 A & B show the balance between courses and rooms for the Spring and Fall 2008 semesters. Currently, there are not enough rooms that hold 15 seats or less compared to the percentage of classes with these enrollments, and there is a greater

percentage of rooms with more than 26 seats as compared to the percentage of course with those enrollments. Seat utilization rates are affected by such an imbalance; smaller classes will get placed in larger rooms as there are not enough of the right capacity, this “bump-up” phenomenon then can affect the ability to seat larger classes. Classes that are placed in rooms much larger than needed are often not good teaching or learning experiences.

However, it is important to remember that at Grinnell many rooms have very low station sizes - they contain more seats than they should to be a comfortable learning environment. A right-sizing exercise must be undertaken to determine the ideal capacities of rooms and then see how that compares to the enrollments.

### Right-Sizing

The objective of right-sizing is to increase the station size of rooms with moveable furniture closer to the target rates. However, the impact of doing so must be understood before it is done as it will change the balance of rooms in certain size categories and may result in a lack

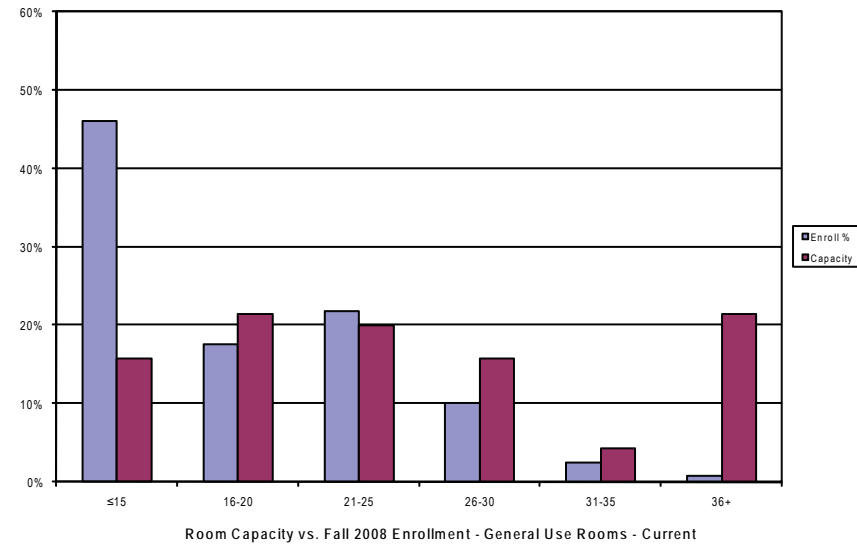
of rooms of a particular, needed, size.

Right-sizing is suggested only in classrooms and seminar rooms. Lecture halls can be right-sized only through renovation (which might be an eventual recommendation for ARH 102, as an example), and teaching labs either have fixed benches or stations or are otherwise sized at a certain capacity to meet their specialized teaching requirements.

Currently there are 66 rooms controlled by the Registrar - 19 classrooms, 35 seminar rooms, 7 lecture halls, and 5 computer classrooms - containing a total of 1,927 seats [Appendix D lists these rooms with both before and after right-sizing seat counts]. The right-sizing station size used for rooms less than 600 SF was 30 SF/seat, with 35 SF/seat used for larger rooms. Rightsizing of these 66 rooms would result in a loss of 345 seats. Figure 13A shows the balance between enrollments and rooms after right-sizing. While the percentage of rooms of less than 20 seats now better matches the course with those enrollments, there would be a problem with an insufficient percentage of rooms with 21 to 25 seats. Since we generally recommend that the seat utilization target be

Figure 12A: Capacity vs. Enrollment, Spring 2008

Room Capacity vs. Spring 2008 Enrollment - General Use Rooms - Current



Room Capacity vs. Fall 2008 Enrollment - General Use Rooms - Current

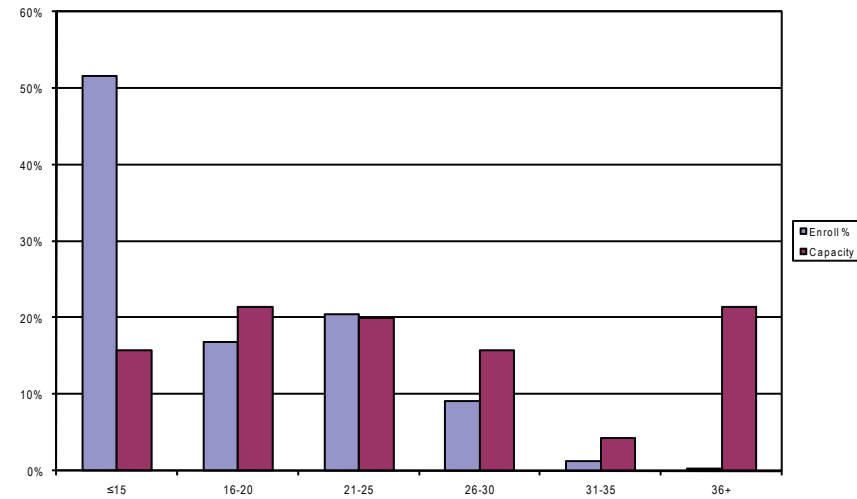


Figure 12B: Capacity vs. Enrollment, Fall 2008

Figure 13A: Capacity vs. Enrollment, Right-Sized

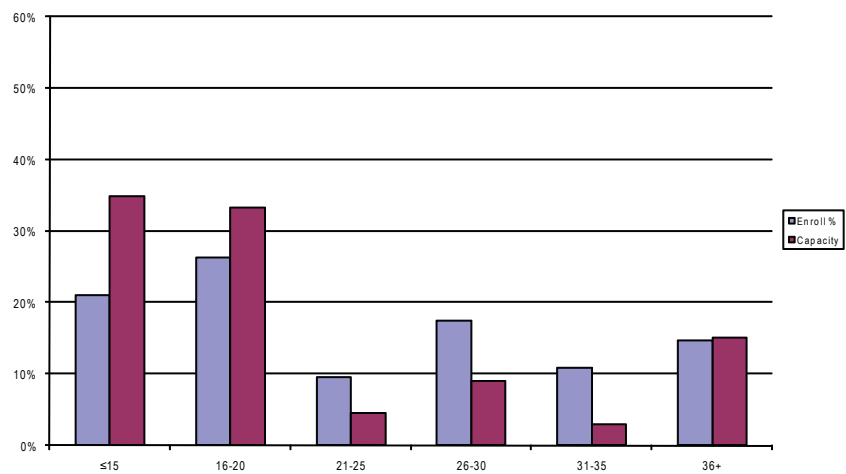
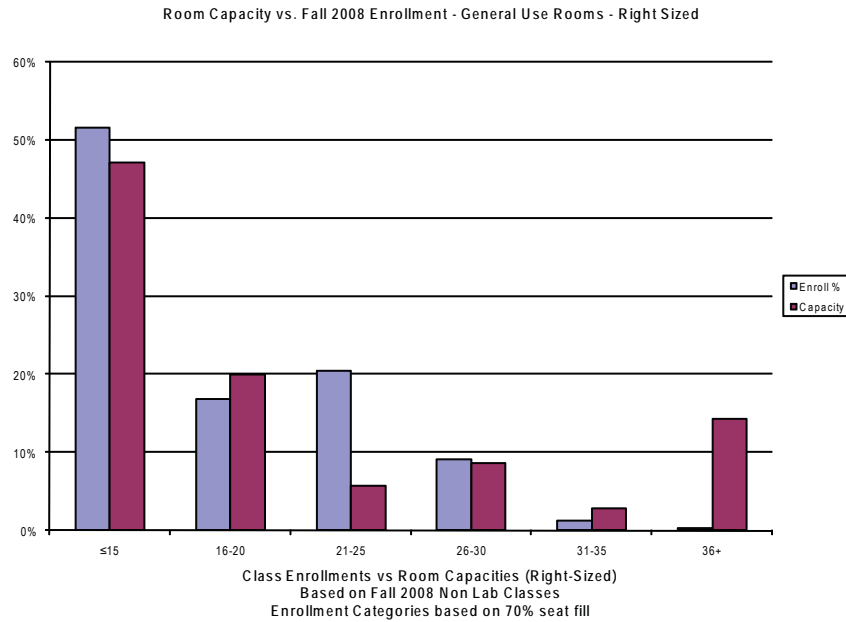


Figure 13B: Capacity vs. Enrollment, Right-Sized, at 70% Seat Fill

around 67%, looking at the balance of room capacities and enrollments with a 70% seat fill [Figure 13B] results in more than enough capacity in rooms with 20 seats or less, but shortages in rooms with seat of 21-35.

In addition, right-sizing the existing rooms leaves some of them with less than 15 seats. We have been asked by the College to not plan teaching spaces of less than 15 seats. Any room that cannot hold 15 seats and be close to the target station size should be re-purposed to meet other space needs. Right-sizing would eliminate 17 rooms due to seat count less than 15 [Appendix D].

Right-sizing alone will not provide Grinnell with the correct balance of room capacities as compared to current enrollments. Projecting classroom needs will provide more information on what sizes of rooms are needed, and future work to develop various transitional scenarios between the current classroom pool and the ideal will need to look at right-sizing at a room by room level.

## Projecting Classroom Needs

There are several aspects that need to be considered when projecting classroom needs. The total number of rooms that will allow all classes to be seated within the target efficiencies must be calculated. The number of rooms of various capacities then needs to be determined. These calculations assume that certain things remain stable at Grinnell - the class hour week (35 hours), the distribution of course sizes, and the average course time per week. Any changes to the class schedule will affect the projected needs.

Table 2 shows the calculations to determine the total number of general purpose rooms needed. The number of courses, the total enrollment and the total semester hours of those courses, are for classes that do not require a teaching lab or studio.

One test calculation that is done is to look at the ratio of the total number of seats currently in general purpose rooms and the current enrollment. A standard rule of thumb is that a campus does not require more seats than 75% of the enrollment, since there is no point in time

where all of the students are in class at the same time (and some of them will be in teaching labs).

Currently, Grinnell has 1,972 seats in 66 rooms that are Registrar controlled. Seventy-five percent of the current enrollment is 1,133. The campus has 794 more seats in general purpose rooms than are needed.

As noted earlier, right-sizing would result in 17 rooms that would have capacities less than 15. In addition, we recommend that three other rooms be taken out of the classroom pool: Carnegie 313 and 314, as they do not have windows, and Goodnow 105, as it has an awkward shape and support columns in the middle of the room. Taking these 20 rooms out of the classroom pool would leave 1,355 seats in 46 rooms. Further analyses to be done later in the project will examine some of the rooms with slightly less than 15 seats after right-sizing may be retained at a lower SF/seat.

To determine the number of general purpose rooms used, we calculate the numbers of hours available out of the class hour week, using a 60% class hour utilization rate. With 21 hours available

out of 35, and an average hours per course per week, Grinnell can sit seven (7) courses in each room.

There are two different ways to then calculate the total number of rooms needed, which result in slightly different numbers. One method divides the total number of courses (397) by the number of courses that can be scheduled in each room (7), resulting in 57 rooms. The second method divides the semester hours (1,255) by the hours per course (3) by the number of courses per room (7), resulting in 60 rooms.

It is general practice to use the higher of these two numbers as a minimum num-

ber of general use rooms. If possible, it is best to supply a few more classrooms that this number to provide some additional scheduling flexibility. Therefore we would recommend a minimum number of general use classrooms of 63-64 for Grinnell. Currently, with 66 Registrar controlled general use rooms, Grinnell has enough rooms to meet needs. But as demonstrated earlier in this report, these rooms are not the right balance of capacities as compared to enrollments, and right-sizing will not only not completely correct this imbalance but will reduce the number of rooms to 46 - 18 less than we would recommend.

Ultimately Grinnell will need to develop a plan that would create rooms of the correct capacities to meet needs that cannot be achieved within the existing pool of rooms. This may require renovation of existing spaces or new construction. An interim plan will need to be developed to improve classroom quality with the existing rooms until new spaces can be created.

#### General Use Classroom Needs (Current Enrollment) (Fall 08)

Enrollment	# Courses	Course Enrollment	Semester Hours	Seats Available	Seats/Enr	Seats needed (75% of enroll)
1,511	397	6,522	1,255	1,972	1.31	1,133
Hours Per Week	Hour Utiliz. Factor	Hours Available	Hours per Course	Courses per Room		
35	0.6	21.00	3.00	7		
Rooms Needed						
57 (= Courses / Courses per Room )						
60 (= Semester Hours / Hours per Course / Courses per Room)						

Table 2: Classroom Needs Calculation

## Recommendations

The following recommendations are based on these analyses:

- Grinnell should develop a classroom policy that articulates the target utilization rates for each type of teaching space.
- Grinnell should review its block schedule with a goal of streamlining it by reducing the number of legal time slots, creating legal time slots for regularly, pedagogically appropriate schedules, and work towards having all classes meet in a legal schedule framework.
- Grinnell should work with Shepley to model scenarios that will transition the College from its current pool of classrooms to its ideal pool over the next several years.
- Grinnell should decide upon a minimum classroom design standard that addresses sightlines, technology, placement of black/white boards relative to video screens, furniture, finishes, lighting controls, HVAC, and acoustics and work towards renovating rooms that will remain teaching spaces to this standard.
- Grinnell should explore with Shepley the creation of some experimental teaching spaces and assess their effectiveness; applying lessons learned to future teaching space projects.