

# Attendance in Large Engineering Classes and Its Effect on Student Performance

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## Abstract

This paper presents the culmination of a two-year study of an alternative for freshman engineering students to attending a large lecture in their introductory engineering course. During the course of this study, in the fall semester, students were required to be physically present in lecture. Following this, in the spring semester, students were given the choice of either: (1) being physically present, when the lecture was given, or (2) viewing the recorded lecture. The student's in-class attendance was recorded via the *iClicker*<sup>TM</sup> classroom response system. Students who chose to not attend lecture could access the video recording via the *Blackboard*<sup>TM</sup> course management system during the same week the lecture was given.

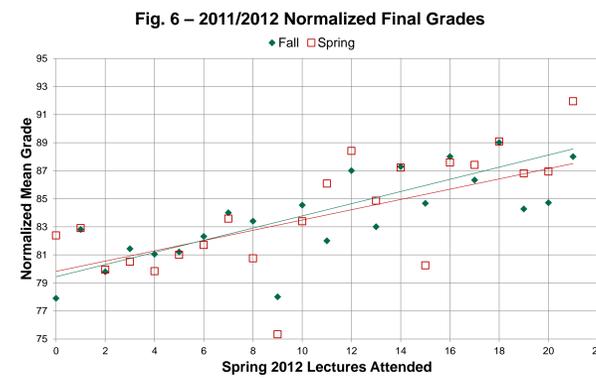
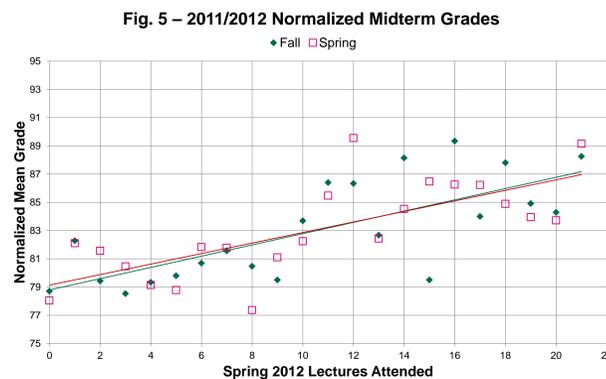
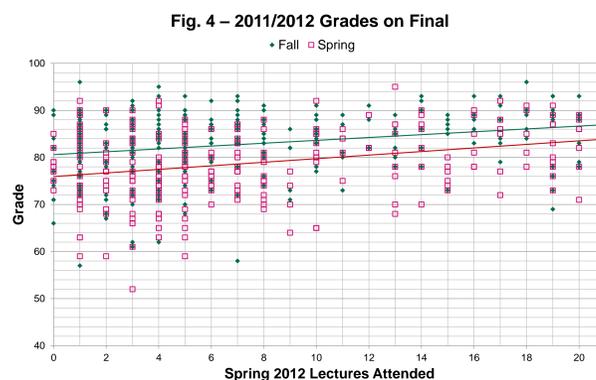
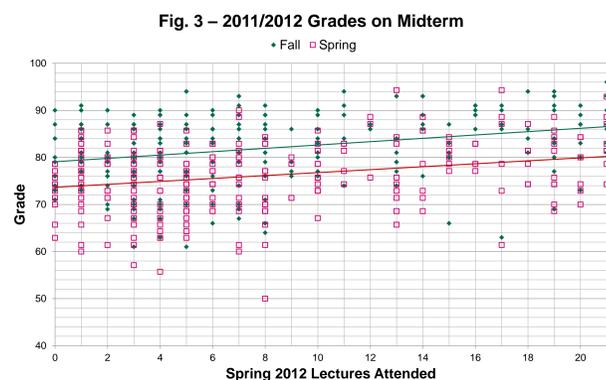
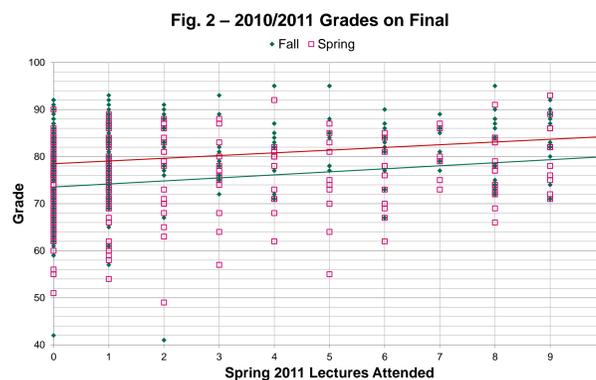
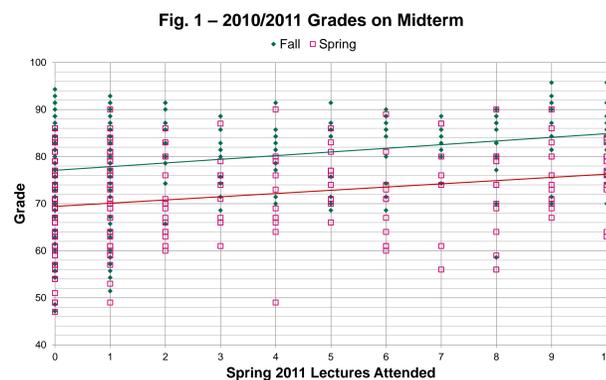
This paper consists of several parts. First a description of the freshman engineering program, as well as the methods used to track student progress are provided. Then, a comparison of student performance on exams, administered during each semester is presented. Finally, this paper includes a discussion of the effect that lecture attendance has on student learning. It is concluded that providing students with the option of either attending lecture or viewing a video recording of the lecture does not negatively affect student performance.

## Process

In the Watson School of Engineering and Applied Science at Binghamton University the first-year engineering program is comprised of two linked courses each semester: Exploring Engineering and Engineering Communications. Exploring Engineering I & II, each have two components: (1) a one-hour lecture section that meets twice a week, and (2) a one and one-half hour laboratory section that meets once a week. The lecture section is one for which all the students are registered while the laboratory component is split into classes of twenty-four students or fewer. In Exploring Engineering I, the fall semester iteration of this course, lecture attendance is mandatory. However, in Exploring Engineering II students have been given the option of viewing the recorded lecture, rather than being physically present when the lecture is given. Attendance is taken in the lecture with an *iClicker*<sup>TM</sup>. Students, who choose not to attend the lecture, access the recording on *Blackboard*<sup>TM</sup>. Student access to the recording is tracked and serves as 'attendance' at the lecture. Lecture notes are available to both student groups on *Blackboard*<sup>TM</sup>.

This study compares the performance of students who attend the lectures with students who choose not to attend, but view the recorded lectures instead. Performance on midterm and final exams are compared over a two year period. Of interest here, is whether student performance varies, when accommodations of this type are made for differences in student learning styles.

## Results



## Discussion

Student grades on midterm and final exams are shown in Fig. 1 – 4. In each of the four figures the horizontal axis represents the number of lectures students physically attended in the spring. It is important to understand that the same students who attended a given number of lectures in the spring are compared to the same students in the fall. The figures show a comparison between the fall and spring semesters midterm and final exam grades. Each exam consisted of multiple choice and true/false questions.

The spring results in isolation appear to suggest that students who did not choose to attend lecture, did more poorly on the exams, even though they had the option of viewing the recording. However, when the fall grades for the same student groups are compared to the spring grades the same trend emerges. In other words the same students, who chose not to attend lecture in the spring, tended to receive lower scores in the fall too, even though they were present when the lecture was given. The same students, who chose to attend all lectures in the spring, tended to receive higher scores in the fall as well. The spring midterm grades overall are generally lower than the fall midterm grades, presumably because the spring exam was more difficult.

In Fig. 5 and Fig. 6 the spring 2012 grades have been normalized to the fall 2011 grades. The mean grades of students who chose to attend fewer lectures in the spring actually increase relative to the students who chose to attend more lectures. This is seen for both the midterm and final exams.

Finally, it is worth noting that students, who choose to attend the lectures, report that they like the smaller class, whereas students whose choose to only view the recording like the flexibility it affords them with their schedules. Students generally, but not always, chose the same option each week.

## Conclusions

It is the conclusion of this study that attendance at the time the spring 2011 and spring 2012 Exploring Engineering II lectures were given did not significantly affect student performance as measured on both midterm or final exams. A comparison of grades on the fall 2010 and fall 2011 Exploring Engineering I lectures with respective grades on the spring 2011 and spring 2012 midterm and final exams suggests factors other than physical attendance affected student performance. It is suggested that student learning was more likely affected by study habits, unrelated to physical lecture attendance. In fact, the data suggest that student learning for students who choose to attend fewer lectures was slightly improved. It is hypothesized by the authors that the option of viewing the lecture video recordings might have enabled some students to learn more effectively.

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