# Evaluating the Impact of 8 AM Class Schedules on Student and Faculty Performance and Perspectives in Engineering Technology Department

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# Evaluating the Impact of 8 AM Class Schedules on Student Performance and Perspectives in Engineering Technology.

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## Abstract

This study examines the connection between academic achievement and student attendance in early morning engineering classes, offering insights into the benefits and difficulties of early course scheduling. The study compares attendance rates and grades between early morning (beginning at 8:00 AM) and later-day classes using rigorous statistical analysis and data visualization techniques, drawing on data collected over six semesters from engineering technology students at a top-tier research university. The results highlight how the schedule of classes affects student participation and performance. This study emphasizes the significance of matching instructional strategies to the varied needs and realities of engineering students and adds to the continuing conversation about effective tactics for raising student engagement and performance, especially in the context of early morning classes.

## Introduction:

Students enrolled in engineering programs must demonstrate a strong commitment to the subject matter, mastering both theoretical and practical applications. But in this setting, class scheduling

has could have abig influence on academic achievement and student involvement. Students face a special struggle when they attend early morning classes, which are commonly scheduled at 8:00 AM. They have to deal with the responsibilities of getting up early, traveling, and focusing during these early hours. This introduction lays the groundwork for a comparison analysis that examines the impact of early morning engineering class attendance on student academic achievement. Early morning sessions are a significant part of the academic calendar since they provide students with the chance to start their day with learning activities. A more thorough investigation is necessary, nevertheless, given the real-world effects of these classes on student attendance and ensuing grades. Even though early starts are seen to provide advantages, like the possibility of higher productivity and better time management, students could encounter difficulties keeping up regular attendance and doing their best work during these early hours.

This research uses a comparative analysis approach to investigate the complex relationship between academic achievement and student attendance in early morning engineering classes. Through the analysis of data gathered over 6 semesters, the study seeks to identify insights pertaining to grades and attendance rates at various class times. In particular, the goal is to identify any notable disparities in student involvement and accomplishment between classes conducted later in the day and those held early in the morning, beginning at 8:00 AM.

A previous study performed by Besluk et al. [1] examines the connection between students' academic achievement and sleep habits. According to the study, students' morningness-eveningness preferences—that is, whether they lean more toward being morning people or evening people—predict students' academic results to some extent. According to the report, students' academic performance varied according to the teaching period, suggesting that the timing of lessons can have an influence. The Besluk study explores the possibility of a

relationship between students' academic success and their circadian preferences. Moreover, the Besluk study investigates if changing class timings has an impact on students' academic performance and looks for chronotype-based variations in students' final test performance, which is given at 09:30 AM. An aggregate of 1471 college students, aged 18 to 25, completed the Morningness-Eveningness Questionnaire (MEQ). Additionally, information regarding their cumulative grade point averages (CGPA) was obtained from their official transcripts. A portion of the sample's students attended courses during the first teaching period, which ran from 8:00 to 14:50, while the remainder attended classes during the second schedule, which ran from 15:00 to 21:50.. MEQ scores showed that academic achievement varied depending on the time of the teaching period and that they were a partial predictor of academic success. Additionally, students' scores on the final exam, which was given at 9:30 AM.m., varied according to their preferred time of day; those who preferred the morning scored higher than those who preferred the evening or intermediate. Academic performance is thus impacted by the start times of both classes and exams. Many school districts are reevaluating their early start schedules. Early start hours have historically been impacted by things like athletics and the effectiveness of the transit system, but new research indicates that they may cause students to become sleep deprived and impair their academic performance. The Minnesota Medical Association [2] responded by arguing in favor of later start hours and cited research that indicates teenagers require more than nine and a half hours of sleep. The start hours of certain schools, including the Edina Public Schools in Minnesota, have changed, and this has benefited student performance. Superintendent Kenneth Dragseth's emphasis on the value of establishing the best possible learning environment led other districts around the country, from Alaska to Washington, D.C., making comparable adjustments.

A three-year research study reported by Wahlstrom, et. al., [3] found that high school students with start times of 08:35 or earlier averaged 7.8 hours of sleep per school night, while high school students with start times after 08:35 averaged greater than 8 hours of sleep. The data presented show that a strong relationship between school start time and the percentage of students reporting more than 8 hours of sleep per school night. For example, the percentages of students reporting 8 or more hours of sleep from two schools with 08:00 start times were 44.5% and 49.7%. The percentage of students reporting 8 or more hours of sleep at the school with the latest start time, 08:55 was 66.2%. College students do not have parental monitoring and enforcement of a bedtime, and they have more opportunities to be involved late night activities than high school students. For example, the University of Dayton RecPlex is open until midnight on Mondays through Thursdays.

Research reported in 2019 by Okano, et. al.,[4] showed that sleep measures account for almost 25% of the variance in academic performance in a study involving sleep patterns monitored by Fitbit devices provided by the researchers.

As far as the author is aware, not much, if any, study has been done on the relationship between classes starting at 8:00 AM and engineering technology courses. As a result, the new analysis presented in this paper aims to shed light on the best times to schedule different engineering technology courses.

**Methodology:**

This study uses statistical analysis to examine the relationship between the time of course offering and student performance. The study was completed at a top-tier research university

using data from a 100 level undergraduate engineering mechanical design course. The course was chosen because it was taught by the same instructor with the same material for 6 consecutive semesters with alternating start times; it was offered at 8:00AM in the Fall semester and 12:30PM in the Spring semester. This study's main goal was to determine whether or not students' performance improved when they attended the 8:00 AM session, where performance was defined by course grade and class attendance. A total of 69 students took the class at 8:00AM and 83 took the class at 12:30PM between 2021 and 2023 (Figure 1).

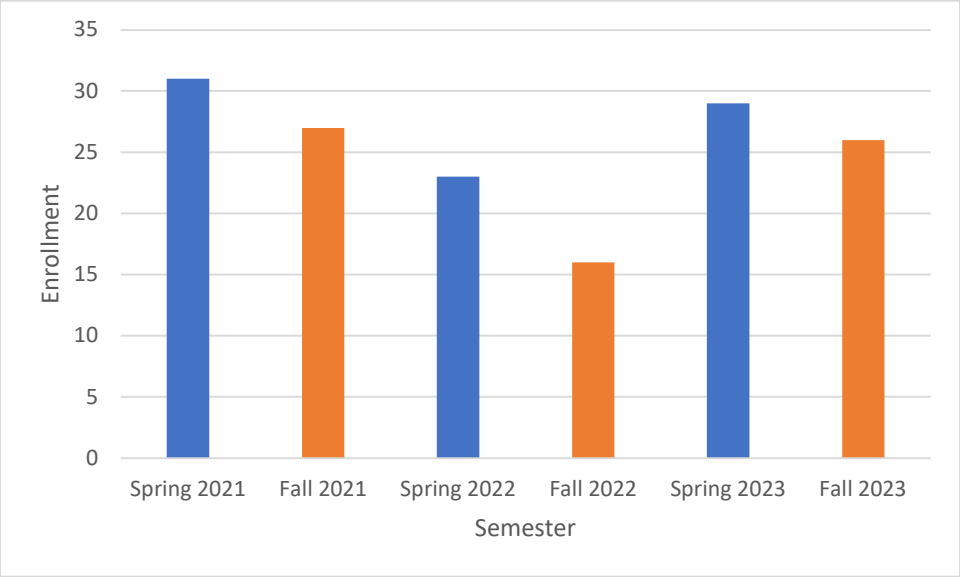



Figure 1: Enrollment of students by semester from 2021 to 2023

The distribution of course grades is shown in Figure 2. Students who took the class at 8:00AM earned a mean grade of 85.22 with a standard deviation of 14.70. Those who took the class at 12:30PM earned a mean grade of 83.51 with a standard deviation of 12.86. Attendance was recorded as the proportion of classes attended by each student with respect to the total number of classes offered that semester. The distribution of attendance is shown in Figure 3. Of the students who took the class at 8:00AM, 41 out of the total 69 students (59.4%) attended all classes

(proportion = 1), while 67 out of the total 83 students (80.7%) who took the class at 12:30PM attended all classes.

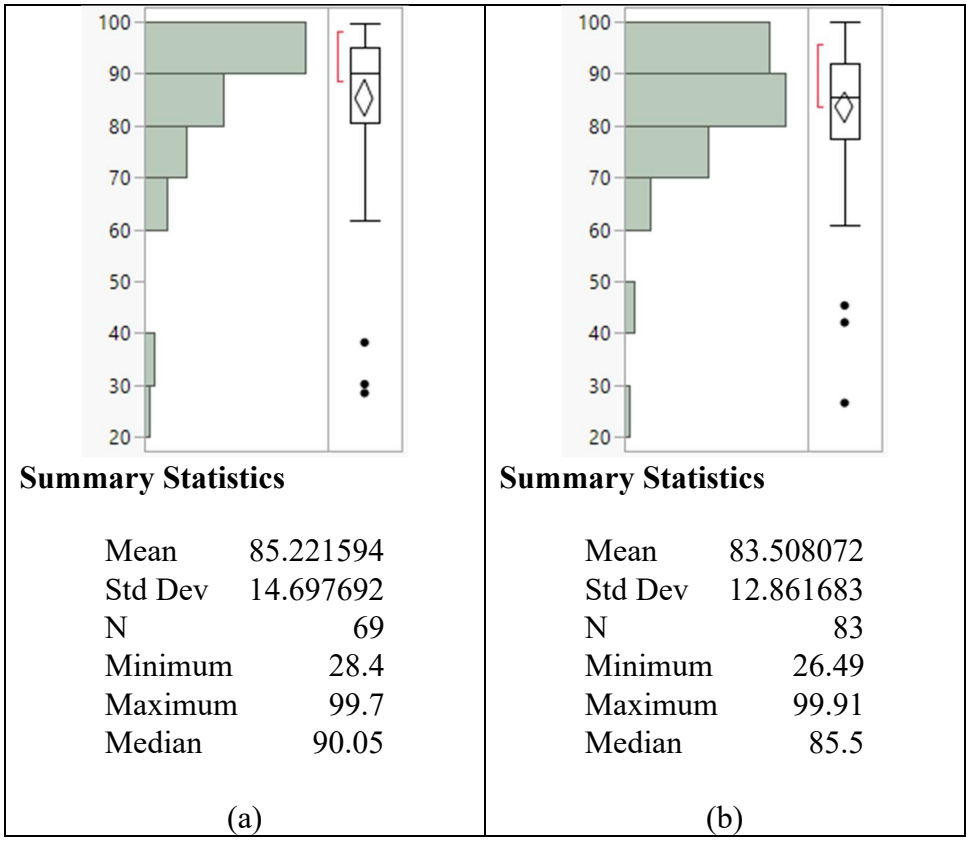
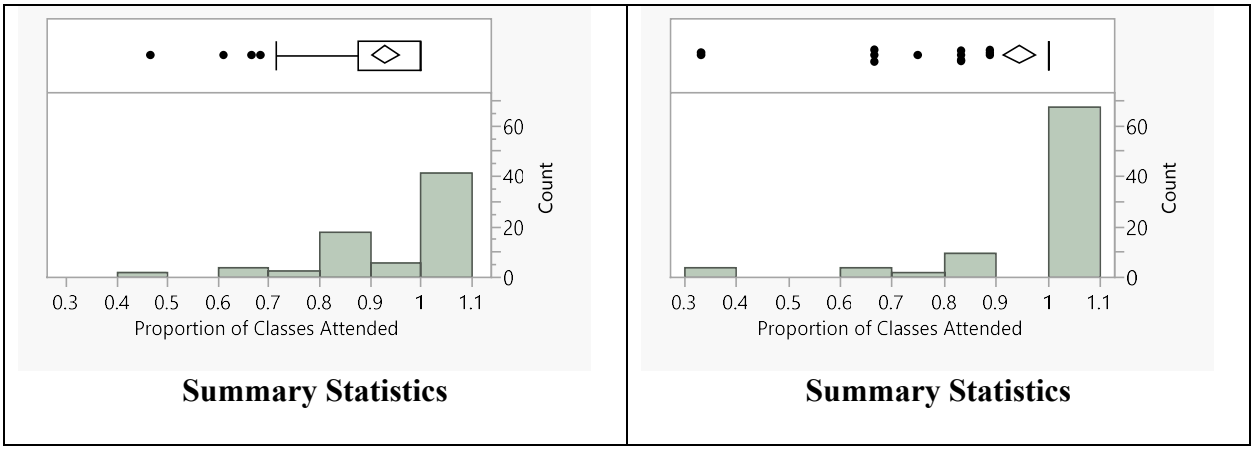



Figure 2: Distribution of course grades when the class was offered at (a) 8AM and (b) 12:30PM from Spring 2021 to Fall 2023



| | |
|---|---|
| Mean | 0.9315018 |
| Std Dev | 0.1098942 |
| N | 69 |
| Minimum | 0.4666667 |
| Maximum | 1 |
| Median | 1 |

(a)

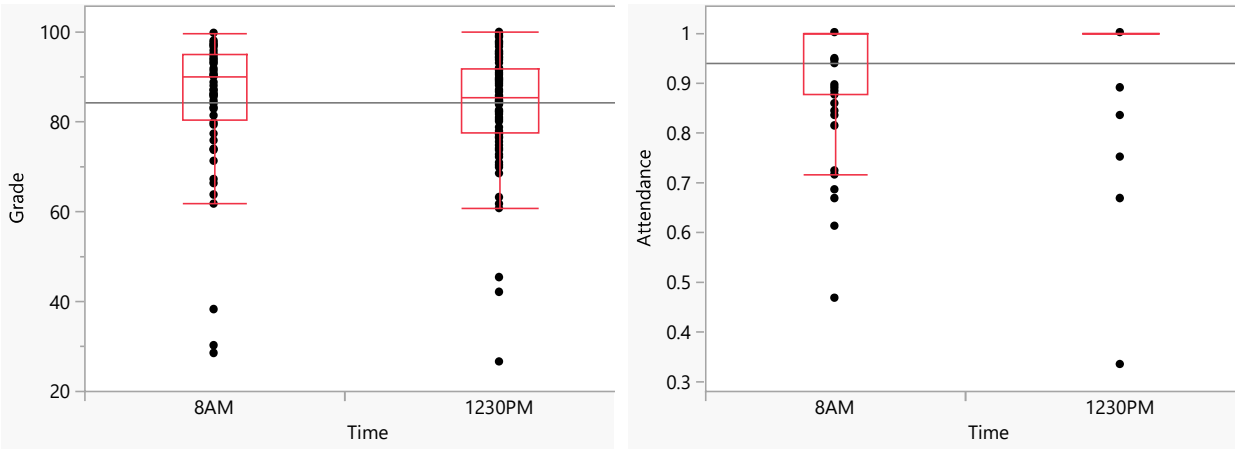
| | |
|---|---|
| Mean | 0.9447791 |
| Std Dev | 0.143126 |
| N | 83 |
| Minimum | 0.3333333 |
| Maximum | 1 |
| Median | 1 |

(b)

Figure 3: Distribution of attendance when the class was offered at (a) 8AM and (b) 12:30PM from Spring 2021 to Fall 2023

**Results and Discussion:**

Figures 2 and 3 clearly show that both course grade and attendance have skewed distributions and cannot be assumed to be Normal. For this reason, we used the Kruskal-Wallis test to compare grades and attendance between the 8:00AM and 12:30PM timings. Results indicate that the 8:00AM class grades are not statistically different from the 12:30PM class grades ($p$-value = 0.0951), but the 8AM attendance is significantly different from the 12:30PM class attendance ($p$-value = 0.0194). Figure 4 shows comparative box-and-whisker plots for grades and attendance and highlights the similarity of distributions for grades and the disparity of attendance between the 8:00AM and 12:30PM course timings.



(a) (b)

Figure 4: Comparative box plots of (a) grades and (b) proportion of class attended based on time of day offering from Spring 2021 to Fall 2023

- Conclusion: for MCT 112L, teaching the course at 8AM does not appear to affect the students' grades but does affect the rate of class lecture attendance.

A deeper discussion of the delivery methods, attendance policies, and grading policy for the MCT 112L sections can provide some insight into why the students' grades were not significantly affected by the early start time and lower average attendance. While the primary mode of this course is in-classroom live delivery, most class sessions are also hosted in an online meeting application, Zoom, with recordings available to the students. The emphasis of the class is Mechanical Design, including demonstrations of design using SOLIDWORKS commercial computer aided design (CAD) software. Students follow along with the demonstrations to create the same designs and drawings. Students often complete the assignments during the class period as an in-class, graded exercise. While most students hand in their assignment at the conclusion of class, the due date is typically the start of the following class period.

The instructor of this course began employing Zoom with recordings during "stay home" periods early in the COVID-19 pandemic and continued ever since due to favorable feedback from his students. Even students who attended class reported occasionally watching the recordings to go through demonstrations with the ability to pause the recording to help them complete their assignment. Students who missed class can also watch the Zoom recording to help them complete their "in class" assignment and hand it in on time.

The course grade is a combination of scores from in-class design exercises, homework design projects, 4 in-class quizzes, and a team design project.

The course syllabus does not have a specific attendance policy, but students are verbally encouraged to attend. The instructor does not have any specific grade penalties for not attending, except that students who miss multiple class sessions during a team project phase can be taken off the team and then must complete their own project without the help of teammates.

With MCT 112L, the class type and course objectives are well suited for a format that includes live in-class demonstrations that are also available on Zoom with recordings. These recordings may help students who do not make it to class due to sleep or any other issues.

**Conclusion:**

This study examined the relationship between class time and student performance in an engineering technology course. Students' attendance rates varied based on the time of the session, with 12:30 PM classes showing the highest attendance rates. Results from the statistical analysis lead us to conclude that teaching course at 8:00AM does not affect students' grades, but does affect the proportion of classes they attend. These results highlight how crucial it is to take class timing into account when choosing a course schedule in order to maximize student success and participation in engineering technology education. Strategies to address attendance issues in early morning classes without sacrificing academic quality and efficacy may be the subject of future research.

**References**

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