

# The Relationship between Lab Attendance and Academic Performance in a Computer Information Systems Course

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## Abstract

There is considerable debate among students as to the usefulness of attending the lab portion of information systems courses. The purpose of this paper is to present evidence of the relationship between lab attendance and the academic performance of students in one computer information systems course over a three-semester period. This relationship was tested using data collected from 118 undergraduate students in the required lab portion of a lower-level computer information systems course. The study analyzed attendance records and course grades from three consecutive semesters of the same course using Spearman's correlation coefficient. After conducting statistical analyses, results indicate that higher attendance rates in the lab do lead to higher academic performance by students.

**Keywords:** lab attendance, academic performance, grades, computer information systems

## 1. INTRODUCTION & LITERATURE REVIEW

In most colleges and universities, regular classroom attendance is generally considered to have a positive impact on a student's academic performance (Chiara, 1996; Snell & Mekies, 1995). Student attendance has been largely associated with classes that are purely lecture-based where the instructor clarifies material in the textbook as well as provides personal anecdotes and real-world stories that are related to the course. But in classes that have an accompanying lab, where students are given the opportunity to put into practice

what they have learned from the lectures, students sometimes question whether attending the lab part of a class has a significant effect on their grades.

Educators and students alike are interested in knowing if these required labs prove beneficial to the overall learning experience. Educators put a great deal of time and energy into preparing these lab assignments. They would like to know that their efforts facilitate the learning of the course material. Students, on the other hand, question whether even attending the lab is necessary to their academic career. It seems to be a common feeling among many undergraduate students that attending these

labs is a waste of time, and any certainty that being present in lab affected one's grade may not be clearly conveyed to the students.

The objective of the current research project is to give clarity to the relationship between attendance and academic performance in the lab. In addition, it aims to provide both educators and students with an explanation of how academic performance is or is not affected by attending required lab sessions.

Specifically, this study will examine the effect that attending the lab portion of a Computer Information Systems (CIS) class has on the student's lab average and on the student's overall semester average. For the purposes of this study, regular attendance will be defined as those students who attend the lab at least 80% of the time. Also, the terms 'academic performance' and 'grades' will be used interchangeably in this study.

The issue of whether or not attendance has an impact on a student's grades has been debated for decades (Clump, Bauer, & Whiteleather, 2003). Like the work of other academic researchers (Jones, 1984; Van Blerkom, 1992), the current project attempts to provide additional knowledge about this subject by examining the data available for a specific course.

### **Literature Review**

Throughout the years, academic researchers have attempted to shed new light on the correlation between attendance and academic performance. They have done so by organizing research studies and conducting experiments in order to get a better understanding of the relationship. One of the cornerstone studies on this topic was conducted by Jones (1984), who discovered that "absences were negatively correlated with grades" (p. 133). His research documented the downward spiral effect that absences have on academic performance for some students. When the student missed a class meeting it caused lower grades or lower academic performance. Then the student got discouraged, which resulted in more absences and even lower grades (Jones, 1984; Van Blerkom, 1992). This corresponds with a research study

conducted at Pennsylvania State University that determined that "a student who regularly missed class dropped at least one full letter grade" (Donathan, 2003, p. 45).

Shimoff and Catania (2001) conducted an experiment using the students in an introductory psychology class at the University of Maryland. The goal of their research was to see the effects of attendance on grades. Their study divided the lecture class into two groups. The first group of students was provided with a sign-up sheet to record attendance. The second group was counted to get the number of students in attendance each day. During the semester, the students were given several quizzes to measure their academic performance. At the end of their study, they concluded that "increased attendance does indeed improve academic performance" (Shimoff & Catania, 2001, p. 194). They also discovered that "simply recording attendance (without awarding course credit for attendance) increased both attendance and overall academic performance" (Shimoff & Catania, 2001, p. 192).

A similar study examined the attendance of pre-service teachers in a methods class where lesson planning and instructional strategies were taught. In this type of class, attendance would be very important for teachers in training who need to acquire certain skills for their future professions. Over a three-semester period, records of absences and final grades were documented for the education methods class. At the conclusion of the project, Silvestri (2003) concluded that "there [was] a relation between absences and final grades" (p. 484) and that higher grades were earned by students who kept absences down.

The research study by Clump et al. (2003) also tested the theory that "class attendance leads to better performance" (p. 220). They used two lecture sections of a general psychology course to gather their data. To measure academic performance, six chapter tests and three unannounced quizzes were administered during the semester. On quiz days, students wrote their name on a sign-up sheet for a record of their attendance. Their study "found that attending class significantly increased the number of correct answers on [the] unit test[s] over the

material and on overall test scores" (Clump et al., 2003, p. 222). They also noted that their findings support the conclusions of other research studies (Jones, 1984; Shimoff & Catania, 2001; Van Blerkom, 1992) on the relationship between attendance and academic performance.

These past research studies all conclude that attendance and academic performance do in fact appear to be correlated, i.e., higher grades are earned by those students who attend more class meetings. However, their findings are all centered on lecture-based courses and not on classes that have an added lab to attend. The current study is concerned with the relationship between those students who attend the lab portion of a class and the grades they earn.

## 2. HYPOTHESIS DEVELOPMENT & METHODOLOGY

The hypotheses for this study are as follows:

- H<sub>1</sub>:** The lab averages for those students who attend the CIS lab regularly are not significantly different from those of students who do not attend.
- H<sub>2</sub>:** The overall semester averages for those students who attend the CIS lab regularly are not significantly different from those of students who do not attend.

### Participants

The participants for this study were 125 undergraduate students enrolled in an introductory computer information systems course that teaches programming logic and design at a four-year university. The data was taken from three consecutive semesters the class was taught: Fall 2003, Spring 2004, and Fall 2004. During the three semesters, seven students who enrolled in the class subsequently dropped it. After removing those students from the dataset, the sample size for this study consisted of 118 students. Table 1 outlines the total number of students enrolled in each semester as well as the gender composition for each semester.

### Materials

The materials used for this study were provided by the instructor who taught the class for those three semesters. They included lab attendance records, final lab grades, and final course averages for each student. Upon request by the researchers, the instructor supplied additional gender-related data necessary for testing purposes.

It should be noted that all materials used in this study were from the same instructor, and he used the same approach and course materials for each semester. In addition, during each semester there was a lab assistant present in the lab to help clarify concepts and answer questions from the students. However, for each of the three semesters there was a different lab assistant teaching the lab. Any significant differences that the different lab assistants made on attendance or academic performance are not within the scope of this project.

During the weekly 50-minute CIS lab, individual student attendance was recorded by the lab assistant. For two of the three semesters, the students had 9 lab assignments to complete. But in the Fall 2004, the students had 10 lab assignments to complete. The final lab grade was calculated by taking the average of those individual lab assignments.

The final course average for the three semesters was calculated on a weighted scale using all of the class assignment and exam grades. The Fall 2003 and Spring 2004 semesters took a weighted average of the following: the final lab grade, a lab project grade, three exam grades, and a final exam grade. While the final course average for the third semester took a weighted average of the final lab grade, two exam grades, a mid-term exam grade and a final exam grade. After analyzing the data, it was noted that any differences due to course structure did not seem to have a remarkable effect on course grades.

### Procedure

The instructor provided the researchers with the grade books for each of the three semesters. Included in those grade books were the following data for each student:

the lab grades for each lab assignment, a final lab average, a lab project grade (for two of the semesters), the exam grades for each exam, a mid-term exam grade (for the Fall 2004 semester), a final exam grade, the final course average, and the lab attendance records. This study will focus its data analysis on the final lab averages, final course averages, and lab attendance records.

The materials supplied to the researchers were consolidated and reorganized for use in this study. The original data were transferred to a data collection form in Excel and later copied into SPSS. Once the data were in SPSS, statistical analysis was conducted to test the significance of the relationship between attendance and academic performance. In order to determine this, Spearman's correlation coefficient was used because the data was not normally distributed (see Figures 1, 2, and 3).

### 3. RESULTS

Data analysis was conducted to see the actual changes in weekly lab attendance during each semester. The fluctuations in weekly attendance by all the students for each semester are shown in Figures 4 – 6. The general trend for all three semesters is higher attendance for the first 2 or 3 weeks, followed by decreases in attendance as the semester progresses. On average, the weekly attendance for all students during the Fall 2003 and Spring 2004 semesters was 8-11% higher than weekly attendance in the Fall 2004 semester (see Table 2). An examination of the differences in weekly attendance between genders was also performed. These results are shown in Figures 7 – 9. On average, male weekly attendance rates were higher in the Spring 2004 and Fall 2004 semesters compared to the rates of female attendance in those same semesters. But for all three semesters, the male weekly attendance rates were closer to weekly attendance averages of all the students (see Table 2).

**Relationship between lab average and lab attendance:** The sample had a mean lab average of 80.4 ( $s = 24.61$ ), and the mean lab attendance was 56.7% ( $s$

$= 28.62$ ). The Spearman's correlation coefficient for the lab averages and lab attendance was .641 ( $p < .01$ ), which indicates a relationship between these variables. This means that higher lab averages were earned by those students who attended lab more often. As a result of the statistical analysis, we rejected the hypothesis that there is no significant difference in the lab averages for those students who attend CIS lab regularly and those students who do not attend. The evidence indicates that lab attendance does positively affect the lab average.

**Relationship between semester average and lab attendance:** The sample had a mean semester average of 79.6 ( $s = 21.23$ ), and the mean lab attendance was 56.7% ( $s = 28.62$ ). The Spearman's correlation coefficient between the semester average and lab attendance was .496 ( $p < .01$ ) which shows the direct relationship between these variables. The relationship between the semester average and lab attendance is not as strong as the relationship between the lab averages and lab attendance but the correlation is still significant. In other words, higher semester averages were earned by those students who attended more lab sessions. These results lead us to reject the null hypothesis that there is no significant difference in the semester averages for those students who attend the CIS lab regularly and those students who do not attend.

### 4. DISCUSSION

The results of this study conclude that regular attendance in the CIS lab does have a significant effect on a student's lab average and final semester average. In other words, higher lab averages and higher semester averages were earned by those students who attended the CIS lab regularly. These results coincide with the conclusions of other studies on this subject (Clump et al., 2003; Donathan, 2003; Jones, 1984; Shimoff & Catania, 2001; Silvestri, 2003; Van Blerkom, 1992). These past research studies were based on strictly lecture-based classes, but their findings and the findings of this study remain consistent, i.e. attending class more often will increase a student's academic performance.

This study should be beneficial to students because they will know that they have a better chance of earning higher grades if they attend lab more often. It will also supply educators with supportive evidence that higher attendance rates in the lab lead to higher grades. The current research will also provide groundwork for future studies about this subject.

The main limitation to this study is that the researchers are only providing information about one particular computer information systems course at one university. Future researchers could examine other lab-based courses to see if the current findings hold true. In addition, this research could be extended to examine whether students who maintain higher collegiate grade point averages attend lab more regularly and consequently earn higher grades than do students with lower grade point averages.

## 5. REFERENCES

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## 6. TABLES

Table 1. Number of students enrolled in each semester.

	Number of Students		
	Fall 2003	Spring 2004	Fall 2004
Total	50	30	38
Male	36	25	31
Female	14	5	7

Table 2. Descriptive statistics for weekly attendance by semester.

Weekly Attendance						
	Fall 2003		Spring 2004		Fall 2004	
	Mean	SD	Mean	SD	Mean	SD
All Students	58.8%	20.14	61.3%	21.58	50.2%	19.39
Male	58.6%	21.24	62.8%	21.50	50.4%	18.49
Female	59.5%	20.28	53.8%	26.31	49.4%	25.04

### 7. FIGURES

Figure 1. Distribution of lab attendance for all three semesters.

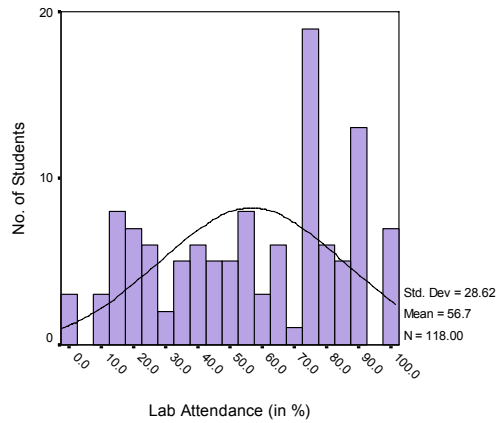


Figure 2. Distribution of lab averages for all three semesters.

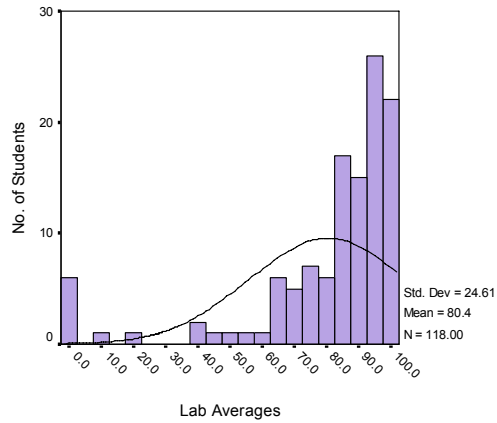


Figure 3. Distribution of semester averages for all three semesters.

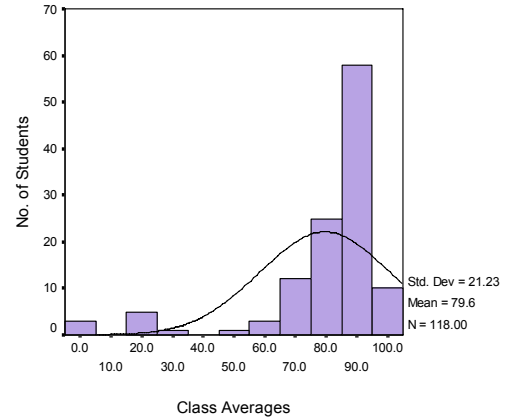


Figure 4. Weekly attendance for Fall 2003 by percentage of attendance.

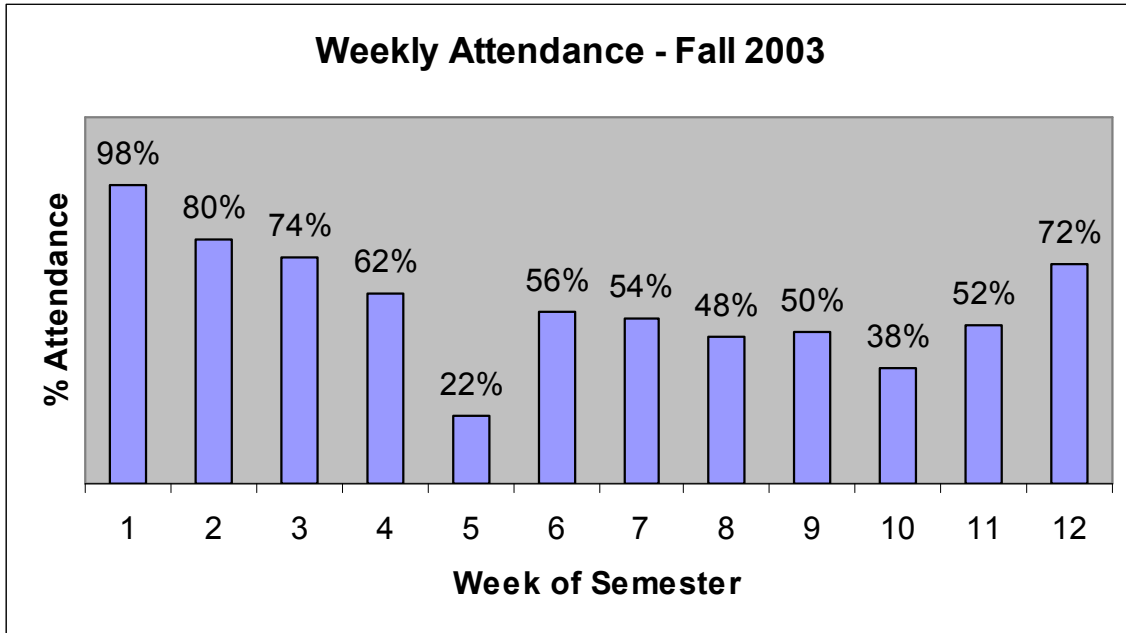


Figure 5. Weekly attendance for Spring 2004 by percentage of attendance.

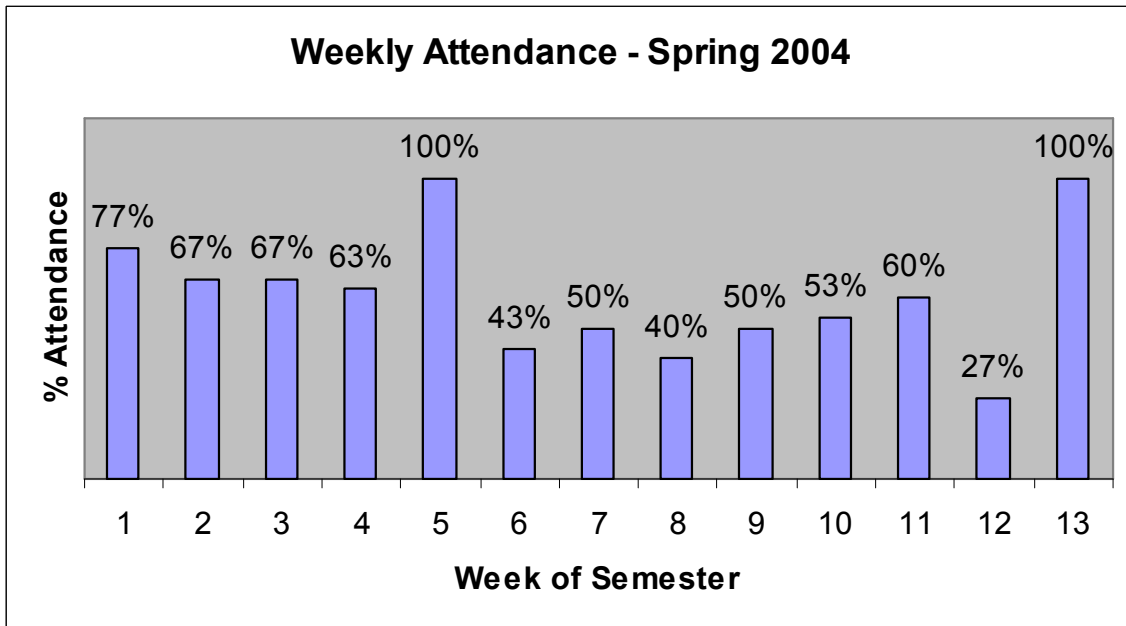


Figure 6. Weekly attendance for Fall 2004 by percentage of attendance.

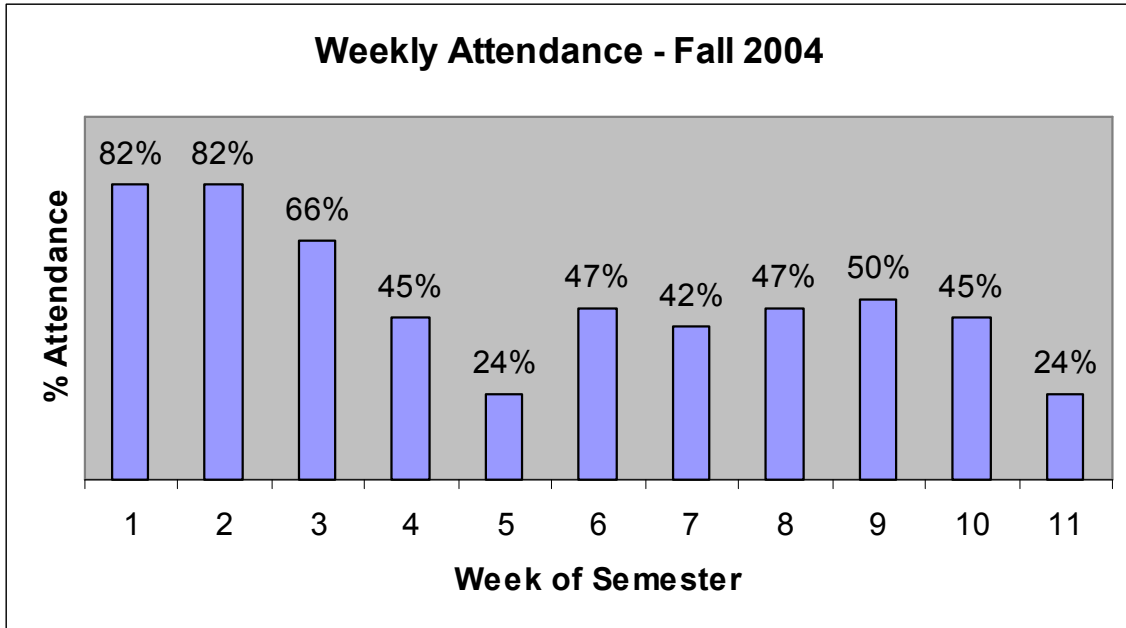


Figure 7. Weekly attendance by gender for Fall 2003 based on percentage of attendance.

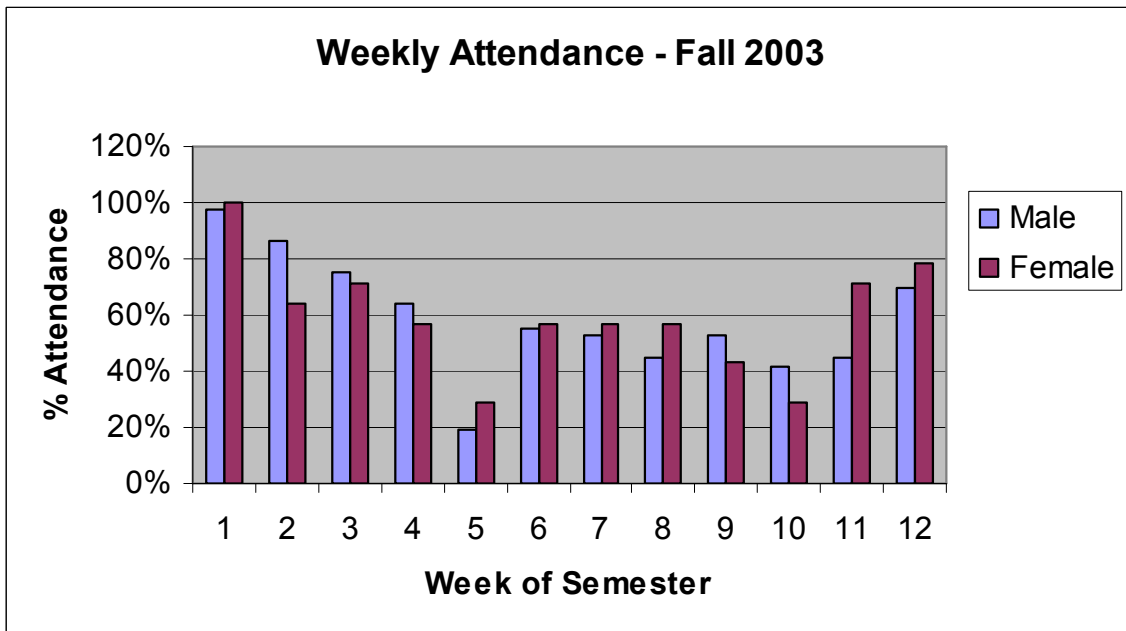




Figure 8. Weekly attendance by gender for Spring 2004 based on percentage of attendance.

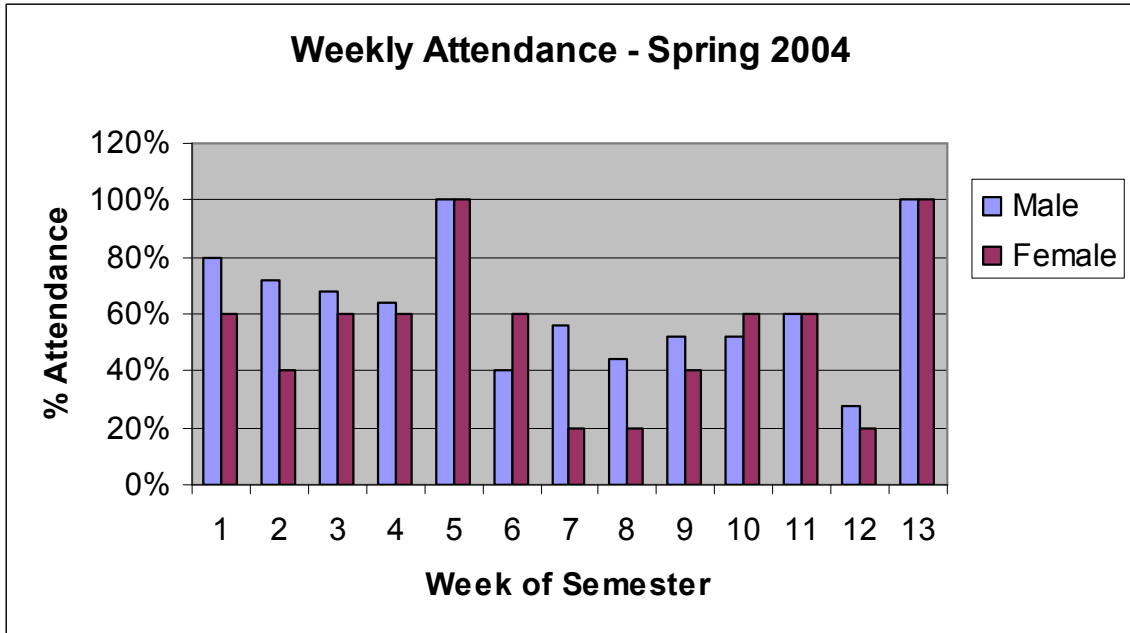


Figure 9. Weekly attendance by gender for Fall 2004 based percentage of attendance.

