

Student Retention Study in Computer Sciences 303E

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Introduction

The purpose of this study was to determine the reasons for high drop out rates in Computer Sciences 303E, identify ways to retain students (especially female students), and determine reasons that students do not pursue further computer science courses, specifically C S 313E.

Description of the course

C S 303E, Elements of Computers and Programming, is designed to teach the fundamentals of computing and programming, including basic computer architecture and software components. Students learn to program in a high level language (Java) and problem solving techniques for numerical and scientific problems, studying the object-oriented features of Java, developing their own algorithms, and translating them to computer code. No prior programming experience is required, but familiarity with personal computers helps significantly.

Students meet three times a week for lectures and once a week for a discussion section. The instructor follows the text quite closely. Supplemental notes are available on the Web. Unlike in the traditional lecture format, classes are a venue for solving problems, writing programs, and exchanging ideas. Student attendance is mandatory.

Programming assignments are given almost every week. Students may choose to use their own computer to work on these assignments. There are three tests and no final examination.

The sequent course, C S 313E, Elements of Software Design, covers object-oriented design of software in a modern high-level language, using software library packages, and provides an introduction to elementary data structures and the complexity of algorithms.

Methodology

The subjects were students enrolled in C S 303E during fall 2005, and students who dropped the course were asked to participate in the dropout survey.

Pre- & Post-surveys

The commercial product SurveyMonkey was used to conduct surveys online. A pre-course survey (see Appendix A) administered after last drop/add date, included items concerning demographic information, history of computer use, reasons for taking the course, familiarity with and accessibility to a computer, computer skills, experience with programming languages, interest in the course, application of the course material, difficulty of the course, and plans for taking the next sequence course (C S 313E).

A post-course survey (see Appendix B) administered during the last week of class included several repeated items: reasons for taking the course, interest in the course, application of the course material, difficulty of the course, and plans for taking the next sequence course (C S 313E).

Dropout surveys

E-mail surveys (see Appendix C) with 9 open-ended questions were administered to students who dropped out of the course during the fall semester. They were asked why they enrolled in the course, what their expectations were for the course, how difficult the course was, and why they dropped it. They were also asked to provide open-ended comments.

Ongoing Course Assessment (OCA)

Ongoing Course Assessment Surveys (see Appendix D) were administered for frequent feedback three times throughout the semester, at the end of September, October, and November. Two questions were asked each time: “What parts of the course do you think are working well?” and “What parts of the course do you think can be improved?”

Interviews with female students

Female students were contacted through e-mail and asked to participate in one-on-one interviews. Interview questions included why there were so few female students in the course, whether gender had played any role in their course experience, whether they thought males and females learn differently, and whether there was any disadvantage to being female in the course. Interview protocols are shown in Appendix E.

Results

The number of participants varied for the various data collection activities, as shown in Table 1.

Table 1. Number of participants

	Number of participants
Pre-course survey	80
Post-course survey	28
Pre- & Post-surveys	22
OCA 1	33
OCA 2	19
OCA 3	7
Dropout survey	5
Female interview	6

Survey (pre & post)

The findings reported are based on the students who responded to both the pre and post surveys. For the results of the pre-survey only, with 80 participants, see Appendix F.

Demographic information**Major**

The majority of students were from natural sciences and engineering majors as shown in Table 2.

Table 2. Distribution of Participants by Major

Major	N	Percent (%)
Biological science	4	19
Business	0	0
Computer science	2	10
Engineering	2	10
Health professions	0	0
Humanities	0	0
Languages	0	0
Mathematics	5	24
Physical science	4	19
Social science	1	5
Other	3	14
Total	21	100

Gender

An equal number of male and female students responded to both surveys, as shown in Table 3.

Table 3. Distribution of Participants by Gender

Gender	N	Percent (%)
Male	11	50
Female	11	50
Total	22	100

Ethnicity

The majority of respondents were Caucasian, with no African Americans or Native Americans, as shown in Table 4.

Table 4. Distribution of Participants by Ethnicity

Ethnicity	N	Percent (%)
African American	0	0
Asian American	3	14
Caucasian	16	73
Hispanic	1	5
International	2	9
Native American	0	0
Total	22	100

Class Standing

Except for seniors, similar proportions of students in each class responded to both surveys, as shown in Table 5.

Table 5. Distribution of Participants by Class Standing

Class Standing	N	Percent (%)
Freshman	7	32
Sophomore	7	32
Junior	6	27
Senior	2	9
Total	22	100

Characteristics of students

History of Computer Use

Most students first learned to use many computer functions in middle school, though many never learned to use Citrix and WinZIP, as shown in Table 6.

Table 6. Distribution of Participants by History of Computer Use

N Percent (%)	Middle School	High School	At UT	Another College	Never Learned	Total
PC	22 (100)	0 (00)	0 (00)	0 (00)	0 (00)	22 (100)
MAC	12 (55)	4 (18)	2 (09)	0 (00)	4 (18)	
Save a file	22 (100)	0 (00)	0 (00)	0 (00)	0 (00)	
Microsoft Word	21 (96)	1 (05)	0 (00)	0 (00)	0 (00)	
WinZIP	6 (27)	7 (32)	1 (05)	0 (00)	8 (36)	
Citrix	2 (09)	0 (00)	2 (09)	0 (00)	18 (82)	
Search engine	18 (82)	3 (14)	0 (00)	1 (05)	0 (00)	
E-mail	17 (77)	4 (18)	0 (00)	1 (05)	0 (00)	

Familiarity with Computers

Most students were comfortable using computers for everyday tasks, but less comfortable for advanced tasks as shown in Table 7.

Table 7. Distribution of Participants by Familiarity with Computers

N Percent (%)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
Everyday tasks	0 (00)	0 (00)	0 (00)	1 (05)	21 (96)	22 (100)
Advanced tasks	4 (18)	4 (18)	6 (27)	7 (32)	1 (05)	

Computer Skills

Most students considered themselves skillful at using computers for everyday tasks, 36% reporting they were skillful for advanced tasks, and 18% for programming tasks, as shown in Table 8.

Table 8. Distribution of Participants by Computer Skills

N Percent (%)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
Everyday tasks	0 (00)	0 (00)	1 (05)	2 (09)	19 (86)	22 (100)
Advanced tasks	4 (18)	3 (14)	7 (32)	6 (27)	2 (09)	
Programming tasks	4 (18)	9 (41)	5 (23)	2 (09)	2 (09)	

Experience with Programming Languages

The majority of students did not have any experience with programming languages, and a small percent of students had some experience in Java and C++, as shown in Table 9.

Table 9. Distribution of Participants by Experience with Programming Languages

Percent ^N (%)	None	A little	Some	Very much	Extensive	Total
Basic	18 (86)	2 (10)	1 (05)	0 (00)	0 (00)	21 (100)
C	19 (91)	1 (05)	1 (05)	0 (00)	0 (00)	21 (100)
C++	17 (77)	2 (09)	3 (14)	0 (00)	0 (00)	22 (100)
C#	21 (100)	0 (00)	0 (00)	0 (00)	0 (00)	21 (100)
Cobol	21 (100)	0 (00)	0 (00)	0 (00)	0 (00)	21 (100)
Fortran	21 (100)	0 (00)	0 (00)	0 (00)	0 (00)	21 (100)
Java	12 (55)	5 (23)	5 (23)	0 (00)	0 (00)	22 (100)
Pascal	19 (91)	2 (10)	0 (00)	0 (00)	0 (00)	21 (100)

Accessibility to computers

Virtually all students (96%) reported accessibility to computers at home and school. At UT Austin, all respondents had campus access to computers and 77% had access at home, with 73% owning own laptops.

Gender differences

One statistically significant gender difference was found (see Table 10 for descriptive statistics): post-course difficulty, $t(20) = 2.372$, $p < .05$ with mean difference of .818. Females regarded the course as more difficult than did males. There was no statistically significant difference between males and females on history of computer use, reason for taking the course, familiarity with and accessibility to computers, computer skills, experience with programming language, interest in the course, application of the course material, and plans for taking the next sequent course.

Table 10. Descriptive Statistics for Course Difficulty by Gender

		Mean	N	Std. Deviation	Std. Error of the Mean
Pre- Course difficulty	Male	2.91	11	1.14	0.34
	Female	2.27	11	0.79	0.24
Post- Course difficulty	Male	2.73	11	0.79	0.24
	Female	1.91	11	0.83	0.25

Change between Pre- and Post-Surveys

Several topics were addressed in both surveys: plans for taking C S 313E, reasons for taking the course, learning interest, application of the course material, and the course difficulty. For 3 items there were significant differences between the responses to the pre- and post-surveys. Students who were not sure about pursuing C S 313E on the pre-survey had decided by the time they completed the post-survey, as shown in Table 11.

Table 11. Changes in Responses Concerning Plans for Taking C S 313E

	Post-Plan to enroll C S 313E				
	N Percent (%)	Yes	No	Not sure	Total
Pre-Plan to enroll C S 313E	Yes	7 (32)	2 (09)	0 (00)	9 (41)
	No	1 (05)	2 (09)	0 (00)	3 (14)
	Not sure	6 (27)	4 (18)	0 (00)	10 (45)
	Total	14 (64)	8 (36)	0 (00)	22 (100)

For the other 2 items with significant differences, descriptive statistics are shown in Table 12 and t-test results in Table 13. Students' degree of agreement with the statement "I need the course content to succeed in my chosen profession" decreased from the pre- to the post-surveys, and increased for the statement, "I understand how the content for this course can be applied to human services/social problems."

Table 12. Descriptive Statistics for Items with Differences between Pre- & Post-Surveys

	Mean	N	Std. Deviation	Std. Error of the Mean
Pre-Need content for profession	3.95	22	1.09	0.23
Post-Need content for profession	3.41	22	1.37	0.29
Pre-Understanding human services/social problems	3.73	22	1.08	0.23
Post-Understanding human services/social problems	4.14	22	0.71	0.15

Table 13. Paired Samples t-Test Results for Differences between Pre- & Post-surveys

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-Need content for profession - Post-Need content for profession	0.55	1.01	0.22	0.10	0.99	2.53	21	0.02
Pre-Understanding human services - Post-Understanding human services	-0.41	0.91	0.19	-0.81	-0.01	-2.11	21	0.05

Pursuing C S 313E

To examine whether there was any difference between students who responded yes and who responded no about plans to enroll in C S 313E, t-tests were performed on many pre-survey and post-survey items. Descriptive statistics are shown in Table 14.

Table 14. Descriptive Statistics for Pre- & Post-Survey Items on Pursuing C S 313E

	Post-Plan for CS 313E	N	Mean	Std. Deviation	Std. Error Mean
Pre-survey items					
First learn (aggregate)	yes	14	1.86	0.48	0.13
	no	8	1.92	0.50	0.18
Comfort level (aggregate)	yes	14	3.93	0.58	0.16
	no	8	3.88	0.79	0.28
Skill level (aggregate)	yes	14	3.52	0.57	0.15
	no	8	3.25	1.16	0.41
Programming experience (aggregate)	yes	14	1.24	0.22	0.06
	no	8	1.22	0.52	0.18
Difficulty of the course	yes	14	2.57	0.76	0.20
	no	8	2.63	1.41	0.50
Expectation of grade	yes	14	3.93	0.73	0.20
	no	8	3.88	0.83	0.30
Expectation of master content	yes	14	4.07	0.73	0.20
	no	8	3.50	1.07	0.38
Expectation of master programming skills	yes	14	4.00	0.78	0.21
	no	8	3.50	1.07	0.38
Understanding human services/social problems	yes	14	4.07	0.73	0.20
	no	8	3.13	1.36	0.48
Understanding natural sciences/engineering research	yes	14	4.64	0.50	0.13
	no	8	4.38	0.52	0.18
Understanding everyday problems	yes	14	4.07	0.83	0.22
	no	8	3.63	0.92	0.32
Need content for UT work	yes	14	4.00	0.88	0.23
	no	8	2.38	1.19	0.42
Need content for profession	yes	14	4.29	0.73	0.19
	no	8	3.38	1.41	0.50
Need content for future	yes	14	4.57	0.51	0.14
	no	8	3.50	1.20	0.42
Learning interest general	yes	14	4.71	0.47	0.13
	no	8	3.75	1.16	0.41
Learning interest program tasks	yes	14	4.50	0.76	0.20
	no	8	3.75	1.39	0.49
Learning interest career	yes	14	3.14	1.03	0.27
	no	8	2.38	0.92	0.32

	Post-Plan for CS 313E	N	Mean	Std. Deviation	Std. Error Mean
Post-survey items					
Overall course evaluation	yes	14	4.29	0.47	0.13
	no	8	4.00	0.93	0.33
Difficulty of the course	yes	14	2.57	0.85	0.23
	no	8	1.88	0.83	0.30
Expectation of grade	yes	14	4.07	0.62	0.16
	no	8	3.88	0.64	0.23
Expectation of master content	yes	14	4.00	0.55	0.15
	no	8	2.75	1.16	0.41
Expectation of master programming skills	yes	14	4.07	0.73	0.20
	no	8	2.63	1.19	0.42
Understanding human services/social problems	yes	14	4.07	0.47	0.13
	no	8	4.25	1.04	0.37
Understanding natural sciences/engineering research	yes	14	4.36	0.74	0.20
	no	8	4.50	0.76	0.27
Understanding: everyday problems	yes	14	4.21	0.58	0.15
	no	8	4.38	1.06	0.38
Need content for UT work	yes	14	3.71	1.07	0.29
	no	8	2.25	1.04	0.37
Need content for profession	yes	14	4.07	1.07	0.29
	no	8	2.25	1.04	0.37
Need content for future	yes	14	4.14	1.03	0.27
	no	8	3.00	0.76	0.27
Learning interest general	yes	14	4.57	0.51	0.14
	no	8	3.50	0.53	0.19
Learning interest program tasks	yes	14	4.50	0.65	0.17
	no	8	3.13	0.99	0.35
Learning interest career	yes	14	3.29	1.07	0.29
	no	8	1.88	1.36	0.48

For two pre-survey items, statistically significant mean differences were observed between students who wanted to pursue C S 313E and those who did not:

- Need content for UT work: “I need the content of this course to succeed in my work here at UT”
 $t(20) = 3.678, p < .01, \text{Mean Difference} = 1.625$

- Need content for future: “I need the content of this course to understand the uses of technology in the future”
t(8.504) =2.411, p<.05, Mean Difference = 1.071

For eight post-survey items, statistically significant mean differences were observed between students who wanted to pursue C S 313E and those who did not:

- Expectation of mastering content: “I mastered the content taught in this course”
t(8.851) =2.856, p<.05, Mean Difference =1.25
- Expectation of mastering programming skills: “I mastered the programming skills in this course”
t(10.095) =3.124, p<.05, mean difference =1.45
- Need content for UT work: “I needed the content of this course to succeed in my work here at UT”
t(20) =3.125, p<.01, mean difference =1.46
- Need content for profession: “I needed the content of this course to succeed in my chosen profession”
t(20) =3.881, p<.001, mean difference =1.82
- Need content for future: “I needed the content of this course to understand the uses of technology in the future”
t(20) =2.740, p<.05, mean difference =1.14
- Learning interest in general: “I am interested in learning more about computers in general”
t(20) =4.640, p<.001, mean difference =1.07
- Learning interest in programming tasks: “I am interested in learning to program simple tasks for which computers are used in my field of study”
t(10.527) =3.515, p<.01, mean difference =1.38
- Learning interest for career: “I am interested in learning more about computer science as a career choice”
t(20) =2.703, p<.05, mean difference =1.41

Reason for pursuing or not pursuing C S 313E

On the pre-survey, 44% of students who wanted to take C S 313E said it was because it was a required course, and 22% said it was because they were interested in the course. On the post-survey, however, the most frequently mentioned reason was that they were interested, followed by because it was required or part of the course sequence. Note the small sample sizes for both the pre- and post-surveys. Table15 shows the distribution.

Table 15. Distribution of Participants by Reasons for Taking C S 313E

Reason for Taking C S 313E	Pre-survey		Post-survey	
	N	%	N	%
Required	4	44	4	29
Interested	2	22	5	36
Related to major	1	11	1	7
Sequence course	1	11	4	29
Other	1	11	0	0
Total	9	100	14	100

On the pre-survey, the most frequently mentioned reasons for not taking C S 313E were because it was not required or because of other reasons. Other reasons included undecided major, no knowledge about the course, graduating, and no reason. On the post-survey, however, the most frequently mentioned reasons were because they were not interested, followed by it was not required, not related to their major, they were taking other course, they were graduating, and it was too difficult. Table 16 shows the distribution.

Table 16. Distribution of Participants by Reasons for Not Taking C S 313E

Reason for NOT taking C S 313E	Pre-survey		Post-survey	
	N	%	N	%
Not required	5	39	1	13
Not interested	1	8	3	38
Not related to major	0	0	1	13
Take C S 307	1	8	0	0
Take other course	1	8	1	13
Other	5	39	2	25
Total	13	100	8	100

Ongoing Course Assessment (OCA)

First OCA

Out of 150 students enrolled in the course, thirty-three submitted their comments on the first OCA (see Appendix G). Comments are listed in descending order from most to least frequently mentioned, with the number of comments in parentheses.

What parts of the course do you think are working well?

- Activities in class (12)
- General quality of the course (8)
- Instructor (7)

- Material arrangement (7)
- Help outside of class (7)
- Discussion, homework, and programming assignments (6)
- Lecture (6)

What parts of the course do you think can be improved?

- Activities in class (8)
- Nothing (6)
- Pace (5)
- Help outside of class (4)
- Lecture (4)
- Difficulty (3)
- Homework and Assignments (3)
- Computer using in the class (3)
- Grading (2)

Second OCA

Out of total 137 students enrolled in the course, nineteen submitted their comments on OCA (see Appendix H).

What parts of the course do you think are working well?

- Activities in class (10)
- Discussion, homework, and programming assignments (8)
- General quality of the course (3)
- Lecture (3)
- Instructor (3)
- Material arrangement (1)
- Difficulty (1)
- Grading (1)

What parts of the course do you think can be improved?

- Nothing (4)
- Homework and Assignments (4)
- Grading (3)
- Difficulty (3)
- Activities in class (2)
- Lecture (2)
- Help outside of class (1)

3rd OCA

Because the OCA does not produce a report when there are fewer than 5 respondents to protect the anonymity, comments were available for one section (the course has 2 sections) for the 3rd OCA. Out of total 74 students enrolled in one section of the course, seven submitted their comments on OCA (see Appendix I).

What parts of the course do you think are working well?

- Discussion, homework, and programming assignments (3)
- General quality of the course (2)
- Pace (2)
- Lecture (2)
- Help outside of class (2)
- Attendance (1)
- Activities in class (1)
- Instructor (1)

What parts of the course do you think can be improved?

- Nothing (2)
- Activities in class (2)
- Textbook (2)
- Grading/Test (1)
- Difficulty (1)

Dropout survey

Five responses were received from students who dropped the course (see Appendix J).

1. What is your major?
 - Diverse -- Liberal arts, communication, natural sciences, and engineering
2. Why did you enroll in CS 303E?
 - Most students answered that they needed to fulfill a credit requirement, but at the same time they were also interested in the course.
3. How does this course relate to your major or future career?
 - Most answered that it did not.
4. What did you expect to gain from the course?
 - Many expected basic knowledge about programming.
5. What was the difficulty level of course assignments and exams?
 - Most said that the course assignments and exams were difficult for someone without a background in computer sciences.
6. Why did you drop the course?
 - Some said it was too difficult or was not what they expected. There was a comment about the teaching method being ambiguous.
7. What would have helped you to stay in the course?
 - Some said more basic background knowledge would have helped; some said more help from the teacher and tutor (being able to meet TA during office hours).
8. Do you plan to enroll in this course in another semester? Why or why not?

- Some said no, and some said if offered by a different professor or institution.
9. Other comments or suggestions that could improve the class.
- Provide a prerequisite course to teach the basics about a computer.

Female interview (one-on-one)

There were total of 6 respondents among female students in the course. For the entire responses, refer to the Appendix K.

1. Major?
 - Diverse -- Natural sciences, languages, and fine arts.

2. Tell me about your interest in computer science or this course.
 - Academic advisors recommended the course, but students reported they also were interested in the course. Some had basic knowledge about computer programming and some had family members in the field who encouraged them to take the course.

3. What worked well in the class?
 - Most of the comments were about the instructor and the organization of the course. Students liked the instructor's teaching style and passion, and they expressed appreciation for well organized class materials.

4. What needs to be improved?
 - Students suggested the class should be held in a computer lab. The textbook was not great, more class examples needed, and the instructor should allow students be more creative in programming assignments. A mandatory visit to a TA was not necessary.

5. Why do you think there are so few female students in this course?
 - 5.1. How can faculty or department recruit more females into CS courses/major?
 - Cultural stereotype does not encourage women to pursue computer science.
 - Publicize the course as satisfying a science credit requirement (many students don't know about it); include activities oriented toward women's interests such as designing media; advertise with an eye-catching poster; talk to the organization such as Women in Science; have female TAs; and conduct small workshops to show computer programming.

6. Has gender made any difference in the experience of the course? How?
 - Most respondents did not experience gender differences. Some just wish to have more females.

7. Do you think females learn differently than males?
 - Most answered that they didn't know, though some answered that females do learn differently than males.

8. Are there any disadvantages to being female in the course?
- Most said that there was no disadvantage to being female in the course, but they wished there were more female students so that they could have had same-gender friends to work with.
9. Do you think there are any characteristics of the course that make female students less likely to stay in the class? If so, what?
- Some said they didn't know. Some said having more females in the course or not asking questions to individual female students would help.
10. Do you feel like the instructor or teaching assistants display different attitudes toward male and female students?
- Nobody felt that way.

Conclusions

Students who dropped the course indicated that the course was more difficult than they expected. They suggested having a prerequisite course to close the gap between students who already have some experience or knowledge of computer programming and those who do not.

Female students thought the reason fewer female students take the course is because of a stereotype that does not encourage females to pursue computer sciences. They suggested that more active advertisement of the course to the female students might help to recruit more of them.

Compared to students who decided not to take C S 313E, students who decided to do so were more likely to think that they needed the course to succeed at UT and in the future, for both the pre- and post-surveys. For the post-survey, they were more likely to think that they needed the course to succeed in their profession, mastered the content and the programming skills, are interested in learning programming, are interested in learning about computer science as a career choice as well as in general.

There was no difference between students who decided to take C S 313E and students who did not concerning their history of computer use, familiarity with or accessibility to computers, computer skills, experiences with programming language, course difficulty, and application of the course material.

Several students (13 out of 22) have changed their mind about taking the next sequent course C S 313E from the beginning of the semester to the end of semester. At the end of semester, whether students are interested in the course was the main factor in the decision.

Students suggested as possible improvements including more examples in class, TA's office hours and speedier grading, addressing the amount and relevance of homework assignments, and using a different textbook.

Recommendations

It seems that students' expectation of course difficulty was not well addressed before they enrolled. The course description could be modified to include more specific elements of the course so that students could have a better idea about the course and what is expected for it.

To increase female enrollment, there must be a more active approach to reach out to the target population. Incorporating more content that might attract females and reaching out to organizations on campus that are part of the female network could be effective.

If students believe they need the course to succeed at UT and in the future, feel they mastered the course content and skills, and are interested in learning, they are more likely to take the next sequent course. Therefore, making them realize the need, encouraging them to learn more about computer science, and assuring their sense of achievement would be helpful.

Appendix A

CS 303E Survey I Fall 2005

Welcome!

The instructor of this course is interested in making this course a good experience for you and for future classes. To that end he is working with the Division of Instructional Innovation and Assessment (DIIA) to determine what works well for you, the students in the class. We are going to ask you for a little information about yourself and your expectations for this course. We'll come back to you later in the semester for more information.

The survey should take you about 15 minutes.

Participation in this survey is voluntary. If you do not wish to participate, just exit the survey with our thanks. Only staff at DIIA will have access to individual responses. The instructor will not know if you decide to participate and only will receive aggregated responses for the whole class.

If you are willing to participate, just click the "next" button below. Please submit your survey by Friday, September 30.

A little information about you

1. Please provide your UT EID (e.g., abc123) in the space below. It will be used only to match your responses to a survey administered at the end of the semester.

2. What is your major?

1. Biological science (eg. microbiology, integrated biology, etc.)
2. Business
3. Computer science
4. Engineering
5. Health professions (eg. nursing, pharmacy, premed)
6. Humanities (eg. English, fine arts, etc.)
7. Languages (eg. Spanish, Germanic Languages, linguistics, etc)
8. Mathematics
9. Physical science (eg. chemistry, physics, astronomy, etc.)
10. Social science (eg. anthropology, sociology, psychology, history, etc.)

3. Gender

1. Male
2. Female

4. Ethnicity (optional)

1. African American

2. Asian American
3. Caucasian
4. Hispanic
5. International
6. Native American
7. Other (please specify) _____

5. Class standing
 1. Freshman
 2. Sophomore
 3. Junior
 4. Senior
 5. Other (please specify) _____

Previous skills/achievements

We're interested in how you already know about computers. Please respond to the following questions about your previous accomplishments.

6. SAT math score (as best you can remember)

7. When did you first learn to:

	Middle school	High school	At UT	Another college	Never learned
Use a PC (Windows)					
Use a MAC					
Save a computer file					
Use Microsoft Word					
Use compressing software (WinZIP)					
Use remote access software (Citrix)					
Use a search engine					
Use email					

8. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am comfortable using computers for everyday tasks, such as email, instant messaging, websearching, etc.					

I am comfortable using computers for more advanced tasks, such as programming or data analysis.					
---	--	--	--	--	--

9. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am skillful at using computers for everyday tasks.					
I am skillful at using computers for more advanced tasks, like data analysis.					
I am skillful at programming computers for basic tasks.					

10. How much experience do you have programming in each of the following languages?

	None	A little	Some	Very Much	Extensive
Basic					
C					
C++					
C#					
Cobol					
Fortran					
Java					
Pascal					

11. With what other programs not listed above do you have some experience?

Access to computers

12. Which of the following is the best description of accessibility to computers when you were in high school?

1. I had an access to computers ONLY at home.
2. I had an access to computers ONLY at school.
3. I had an access to computers BOTH at home and school.
4. I did NOT have an access to computers at all.

13. Following descriptions are about the accessibility to computers at UT. Please select all that apply to you.

1. I have my own laptop computer.
2. I have an access to computers at home.
3. I have an access to computers at UT computer lab.
4. I do NOT have an access to computers at all.

Expectations for CS 303E

Now we are interested in finding out about your incoming expectations for this course and your performance in it.

14. Is this course required for your major?

1. Yes
2. No

15. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I need the content of this course to succeed in my work here at UT.					
I need the content of this course to succeed in my chosen profession.					
I need the content of this course to understand the uses of technology in the future.					

16. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am interested in learning more about computers in general.					
I am interested in learning to program simple tasks for which computers are used in my field of study.					
I am interested in learning more about computer science as a career choice.					

17. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I will be able to make a good grade in this course.					
I will be able to master the content taught in this course.					
I will be able to master the programming skills in this course.					

18. Please indicate the degree of your agreement for the following.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand how the content for this course can be applied to human services/social problems.					
I understand how the content for this course can be applied to the natural sciences and engineering research.					
I understand how the content for this course can be applied to everyday problems we all face.					

19. How difficult do you think this course would be?

1. Very difficult
2. Somewhat difficult
3. An appropriate level of difficulty
4. Somewhat easy
5. Very easy

Future CS courses

20. Do you plan to enroll in the next Computer Science course, CS 313E (Elements of Software Design)?

1. Yes (Go to #21)
2. No (Go to #22)
3. Not sure (Go to #22)

Future CS courses --- "yes" follow up

21. Why do you plan to enroll in CS 313 E?

1. It is required for my degree
2. I am interested in the content
3. It is related to my major
4. It is a sequence course to CS 303E
5. Other (please specify) _____

Future CS courses --- “no” “not sure” follow up

22. Why do you not plan to enroll in CS 313E?

1. It is not required for my degree
2. I am not interested in
3. It is not related to my major
4. I will take CS 307
5. I will take other CS courses
6. Other (please specify) _____

Thank you!

That concludes this survey

Appendix B

CS 303E Survey II Fall 2005

Welcome Back!

This is a follow-up survey of "CS 303E Survey I Fall 2005." As mentioned before, the instructor of this course is interested in making this course a good experience for you and for future classes. To that end he is working with the Division of Instructional Innovation and Assessment (DIIA) to understand what worked well and what did not for you, the students in the class. We are going to ask you questions about your experience with course.

The survey should take you about 5 minutes.

Participation in this survey is voluntary. If you do not wish to participate, just exit the survey with our thanks. Only staff at DIIA will have access to individual responses. The instructor will not know if you decide to participate and only will receive aggregated responses for the whole class.

If you are willing to participate, just click the "next" button below. Please submit your survey by Friday, December 9.

UT EID

1. Please provide your UT EID (e.g., abc123) in the space below. It will be used only to match your responses to a survey administered at the beginning of the semester.

Evaluation for CS 303E

Now we are interested in finding out about your evaluation for this course and your performance in it.

2. After taking the course, what is the degree of your agreement for the following?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I needed the content of this course to succeed in my work here at UT.					
I needed the content of this course to succeed in my chosen profession.					
I needed the content of this course to understand the uses of technology in the future.					

3. After taking the course, what is the degree of your agreement for the following?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am interested in learning more about computers in general.					
I am interested in learning to program simple tasks for which computers are used in my field of study.					
I am interested in learning more about computer science as a career choice.					

4. After taking the course, what is the degree of your agreement for the following?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I received a good grade in this course.					
I mastered the content taught in this course.					
I mastered the programming skills in this course.					

5. After taking the course, what is the degree of your agreement for the following?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand how the content for this course can be applied to human services/social problems.					
I understand how the content for this course can be applied to the natural sciences and engineering research.					
I understand how the content for this course can be applied to everyday problems we all face.					

6. How difficult do you think this course was?

- Very difficult
- Somewhat difficult
- An appropriate level of difficulty
- Somewhat easy
- Very easy

7. Overall, how would you evaluate this course?

- 1. Very unsatisfactory
- 2. Unsatisfactory
- 3. Neutral
- 4. Satisfactory
- 5. Very satisfactory

Future CS courses

8. Do you plan to enroll in the next Computer Science course, CS 313E (Elements of Software Design)?

- Yes (Go to #9)
- No (Go to #10)
- Not sure (Go to #10)

Future CS courses --- “yes” follow up

9. Why do you plan to enroll in CS 313 E?

- It is required for my degree
- I am interested in the content
- It is related to my major
- It is a sequence course to CS 303E
- Other (please specify) _____

Future CS courses --- “no” “not sure” follow up

10. Why do you not plan to enroll in CS 313E?

- It is not required for my degree
- I am not interested in
- It is not related to my major
- I will take CS 307
- I will take other CS courses
- I may have to retake this course
- Other (please specify) _____

Thank you!

That concludes this survey. Thank you for your cooperation.

Appendix C

Email Survey for Students Who Dropped the Course.

Hi ~,

I am writing to you because you withdrew from or dropped CS 303 E. I am working with your instructor, Dr. Mitra, to evaluate and improve the course. One thing we want to know is why students drop the course. Included at the end of this email are a few questions about your experiences in the course that should take about 10 minutes to answer. All your answers will be confidential and Dr. Mitra will not know whether you answered or what you said. Your input is very important to making this a better class. Please send me your feedback by Nov. 11. If you have any further questions, please don't hesitate to contact me. Thank you for your time!

1. What is your major?
2. Why did you enroll in CS 303E?
3. How does this course relate to your major or future career?
4. What did you expect to gain from the course?
5. What was the difficulty level of course assignments and exams?
6. Why did you drop the course?
7. What would have helped you to stay in the course?
8. Do you plan to enroll in this course in another semester? Why or why not?
9. Other comments or suggestions that could improve the class.

Appendix D

Ongoing Course Assessment

Dr. Mitra is interested in your feedback about what is working well so far and what could be improved. We will send out a two question anonymous survey at the end of each month to get your input about the class. Dr. Mitra will use this information to consider changes as the course progresses. Your input is greatly appreciated!

What parts of the course do you think are working well?

What parts of the course do you think can be improved?

Appendix E

Interview Protocol for Female Students in the Course

1. Major?
2. Tell me about your interest in computer science or this course.
3. What worked well in the class?
4. What needs to be improved?

Instructor of this course is interested in recruiting and retaining female students. Your response to the following questions will help him to do so.

5. Why do you think there are so few female students in this course?
 - 5.1. How can faculty or department recruit more females into CS courses/major?
6. Has gender made any difference in the experience of the course? How?
7. Do you think females learn differently than males?
8. Are there any disadvantages to being female in the course?
9. Do you think there are any characteristics of the course that make female students less likely to stay in the class? If so, what?
10. Do you feel like the instructor or teaching assistants display different attitudes toward male and female students?

Appendix F

Pre-survey Analyses

Demographic information

Major

	N	Percent (%)
Biological science	10	13
Business	0	0
Computer science	4	5
Engineering	4	5
Health professions	2	3
Humanities	1	1
Languages	3	4
Mathematics	16	20
Physical science	13	17
Social science	5	6
Other	21	27
Total	79	100

Gender

	N	Percent (%)
Male	51	64
Female	29	36
Total	80	100

Ethnicity

	N	Percent (%)
African American	2	3
Asian American	13	17
Caucasian	47	62
Hispanic	7	9
International	5	7
Native American	2	3
Total	76	100

Class standing

	N	Percent (%)
Freshman	25	31
Sophomore	23	29
Junior	21	26
Senior	11	14
Total	80	

Characteristics of students

History of computer using

N Percent (%)	Middle school	High school	At UT	Another college	Never learned	Total
PC	74 (93)	6 (08)	0 (00)	0 (00)	0 (00)	80 (100)
MAC	38 (48)	24 (30)	8 (10)	0 (00)	10 (13)	80 (100)
Save a file	73 (91)	7 (09)	0 (00)	0 (00)	0 (00)	80 (100)
Microsoft Word	69 (89)	9 (12)	0 (00)	0 (00)	0 (00)	78 (100)
WinZIP	31 (39)	30 (38)	2 (03)	0 (00)	17 (21)	80 (100)
Citrix	4 (05)	16 (20)	7 (09)	0 (00)	53 (66)	80 (100)
Search engine	58 (73)	21 (26)	0 (00)	1 (01)	0 (00)	80 (100)
Email	56 (70)	23 (29)	0 (00)	1 (01)	0 (00)	80 (100)

Familiarity to computers

N Percent (%)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
Everyday tasks	1 (01)	1 (01)	0 (00)	3 (04)	75 (94)	80 (100)
Advanced tasks	7 (09)	18 (23)	23 (29)	21 (26)	11 (14)	

Computer using skills

N Percent (%)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
Everyday tasks	1 (01)	1 (01)	1 (01)	11 (14)	66 (83)	80 (100)
Advanced tasks	7 (09)	16 (20)	26 (33)	19 (24)	12 (15)	
Programming tasks	11 (14)	28 (35)	17 (21)	16 (20)	8 (10)	

Experience of programming languages

N Percent (%)	None	A little	Some	Very much	Extensive	Total
Basic	61 (77)	10 (13)	6 (08)	2 (03)	0 (00)	79 (100)
C	62 (81)	12 (16)	3 (04)	0 (00)	0 (00)	77 (100)
C++	45 (56)	13 (16)	18 (23)	4 (05)	0 (00)	80 (100)
C#	75 (97)	2 (03)	0 (00)	0 (00)	0 (00)	77 (100)
Cobol	77 (100)	0 (00)	0 (00)	0 (00)	0 (00)	77 (100)
Fortran	76 (100)	0 (00)	0 (00)	0 (00)	0 (00)	76 (100)
Java	40 (51)	26 (29)	15 (19)	1 (01)	0 (00)	79 (100)
Pascal	68 (88)	5 (07)	3 (04)	0 (00)	1 (01)	77 (100)

Accessibility to computers

There was not much variability for the accessibility to computers. When students were in high school, 91% had access both at home and school. At UT, all the respondents had an access to computers. In addition, 71% had an access at home and 76% owned own laptops.

Appendix G. Ongoing Course Assessment Results

(Comments are listed in descending order from most to least frequently mentioned)

1st OCA

What parts of the course do you think are working well?

Activities in class (12)

- Working on programs together in class is extremely helpful in training us how to think and program in a more organized and efficient manner.
- The fact that we do examples in class.
- I also like the mini "projects" we do during class.
- I enjoy the in class problems and feel that they are good practice, I also feel that his encouraging us to make predictions about the outcome of the programs before we run them is very beneficial to forming logical thought.
- The in-class programming examples that we started this week are especially helpful.
- The examples Dr. Mitra does on the screen are very good because they show us how to write a program from beginning to end (including the sometimes tricky syntax).
- Participation somewhat works, as the interaction provides students a less formal approach to the subject.
- I think the watching the teacher use the BlueJ program in class, is a very big help especially when it comes time for the students to do their homework
- I like writing programs together and seeing how they work. It helps to see when our logic is wrong instead of being told how to do it correctly at first.
- I like how Mitra explains and goes over the material in the book and gives a few examples to make sure we understand.
- I think the class participation works well.
- Class, participation

In general (8)

- I think all aspects of the course are working well.
- I love the class and the way that it is currently taught.
- Everything seems pretty good.
- It's difficult enough to be interesting, not so difficult that it's just plain frustrating.
- I think everything is going quite well, actually.
- So far I have no complaints about the course. Everything is working very well.
- It is a reasonable course as long as one does not get behind on the material
- Everything's working well so far. I enjoy the class more than I thought I would!

Instructor (7)

- I think it is good that Dr.Mitra goes through and shows us how to make the programs. I learn much better that way. He explains the concepts very well.
- Willingness to explain each question that a student asks and good effort to get to know individuals in the class.
- Most of the explanation about the math problem and solve the problem.

- The professor is a wonderful teacher, it is easy to see that he has a genuine interest in the progress of his students and because of this I look forward to his lectures.
- Good teaching.
- Dr. Mitra is good at answering question and that he is always asking in class if there are any questions.
- I also like that you go through the roster and ask questions of everyone. Even when I don't have much time, I always do the reading so I know what's going on in class the next day. It has really kept me from falling behind in the reading (which I often do in my other classes). I also like how enthusiastic Dr. Mitra is about the information being taught and how important he thinks it is for non-cs majors to understand how to use computers at an advanced level

Material arrangements (7)

- The homework is always posted well in advance of the due date.
- Having the lecture notes online makes it easier to pay attention in class without having to write everything down.
- The homework system.
- Posting the topics and sections to be covered in class on the web site is great. If I am exposed to it before class I can better understand it when it is brought up in class.
- Having lecture notes on the internet.
- I think that the notes are very comprehensive and discussions cover them well.
- I like that we have notes pre-typed. It helps to follow along a bit better.

Help outside of class (7)

- I like the relative abundance of office hours.
- Dr. Mitra is very enthusiastic about helping outside of class.
- Tutors are very good in teaching and being aware of what kinds of difficulties students might have in an activity.
- I also like the flexibility the students get in going to a particular TA.
- The T.A.s are also very helpful in their office hours.
- TA's help a lot too in the labs.
- Available T.A.'s every day if questions.

Discussion, Homework & Programming assignments (6)

- The discussions and programming assignments are challenging and interesting.
- Programming assignments.
- I like that there are frequent assignments to practice.
- Programs.
- Homeworks are very helpful too.
- Workload is good, right where seems necessary.

Lecture (content & method) (6)

- The Lectures are working pretty well.
- The lectures are very helpful.
- I like the lecture periods.
- Dr. Mitra, I am impressed with the flow of the lecture, meaning that all new material is covered in a clear and concise manner. The consistent method in

which the lecture is presented everyday helps to establish a stable learning environment and helps students learn Java at a comfortable, if not brisk, pace

- I think the pace is solid as well as the lecture process.
- Riddles are fun and good.

What parts of the course do you think can be improved?

Activities (examples) in class (8)

- I don't think he spends as much time with things as he can. I think he should give us more example problems very similar to the homework before a homework is due so we can go over it in class together and better understand everything. The teacher does give examples but none that reflect what the homework is going to be like. For example, Program 2, i have no idea where to start on it because it doesn't look like any of the things the teacher goes over in class.
- I would like to see more examples or case studies of formatting certain variables such as loops, conditional statements (if else), switches, etc.
- I personally dislike the way the book explains things. It should include more examples, even though this is something that you cannot easily change.
- I really like the in-class programming examples and problems. I hope to see more of them as we get further into the actual Java programming.
- I think a few more examples would be helpful, such as examples of shifts etc. On the test I was less comfortable with those problems than I expected to be. A few more examples in class would have been helpful in making me feel more comfortable with and confident about those sort of questions on the test.
- Put more examples on the internet regarding the lectures in more detail. Have examples like putting a certain application that we would cover in class as a program form on the internet.
- Also, it would be helpful if more time is spent on examples and if there were more examples.

He focuses more on getting the information across and not actually working out examples. I am having trouble because not a lot of examples are preformed in class.

Nothing (6)

- There's nothing to improve right now.
- I think he doesn't need to improve his teaching methods, he does things very well.
- Hmm...not exactly sure. Dr. Mitra seems to cover all of the material well, and if you pay attention, you should not have problems.
- Perhaps it is too early in the semester for me to pick anything out yet.
- At the present, i don't see any part of the course that i would like changed/improved.
- Can't think of any right now...really!

Pace (5)

- Lectures can be hard follow...maybe more examples....and not as quick.

- I think Mitra moves on quite quickly and because I'm not very good with Java, I tend to fall behind.
- It is absolutely essential that the pace of the class move with those who are completely unfamiliar with java and should not be dictated by those experienced students who are only taking the class for credit. To those who already know Java, it may seem very straightforward and logical, however, just as any other foreign language, special consideration must be given at each point in which a new piece of information appears in order to ensure that the beginners in the class, who may be timid about expressing their understanding of the material, comprehend the relevance that particular piece of information, both to what they already know and in the methods in which they will apply it in the future.
- The programs are discussed too rapidly for some to comprehend fully. Perhaps if that lecture portion is slowed down a bit, there would not be as much confusion.
- The only thing I'm concerned about is that if we went too slowly at the beginning of class, maybe we'll have to go too fast to catch up or maybe we'll even miss something.

Help outside of class(4)

- It will be wonderful if the TA schedule have many different hours, so It will be easy for us to meet the TA during the TA office hours.
- I don't think it is fair to have mandatory TA sessions when it isn't stated so in the course schedule whenever you register for the class. You should only have to go if you feel you need help.
- The TA's in the lab need to label themselves as help AND be in the room at the time they stay they will be (not in the adjacent room).
- I don't like the I have to go to office hours because I already have a busy schedule as it is. I prefer to solve my problems independently.

Lecture (content & method) (4)

- Further explanation of newer ideas, at least a little bit. Also, perhaps a slightly deeper explanation of how a new idea's written code is constructed.
- Perhaps have fewer questions for the students, just because they seem to take up a lot of time
- I think the teacher could give a better explanation of the terms and some concepts of Java (i.e. loops, ++var etc...) because I hear alot of whispering in front or behind me, of students asking others what does he mean, or how do I do this?
- There were a few test questions that used symbols I somehow missed learning in class or in the textbook and they weren't in any of the homework problems. I guess that's my own fault, but with so many symbols and reserve words, I think it might be helpful to address the ones we need to memorize and mention which ones we should just know exist (like the ASCII table) for logic help when writing programs.

Difficulty (3)

- Introduce new concepts in a way that people without prior cs experience can understand.
- This is my first computer science class and I don't feel like it is in fact an introductory course.
- Programming explanations are too simplified, I keep falling asleep.

Homework & Assignments (3)

- The homework could perhaps be picked more according to what will be on the test. If the homework covered the same material as the test, we would learn the material better and be better prepared for the test.
- More programming assignments and more practice with each function.
- For homework problems, some way to check your answers at home to know if a response is wrong, or at least before the test over the same material.

Computer using in the class (3)

- It's hard to keep up if you don't have a computer to follow the programs in class, so that when we get home I barely even know how to set up the program. Maybe more samples in the notes
- I would like to have more hands-on experience with this course. This would be best achieved in a computer lab in which everyone has access to a computer and the students are able to write code along with the professor. This isn't a problem by any means, given that students are allowed to bring their own laptops.
- I can't bring my computer to class, so trying to write all that stuff down is hard.

Grading (2)

- I think the homework and tests could be graded more promptly so that we are better able to gauge our performance and make changes on future work.
- The homeworks are worth too much comparatively. Mess up on a few and its like failing in writing a program. I think the program should be worth at least double what the homeworks are worth, because it takes so much more time, effort and sweat.

Appendix H. Ongoing Course Assessment Results

(Comments are listed in descending order from most to least frequently mentioned)

2nd OCA

What parts of the course do you think are working well?

Activities in class (10)

- I like that the class is interactive and that we have to actually attempt to write programs in class
- In-class interaction
- Class participation
- I like the way that he demonstrates the correct programming syntax in class.
- Writing programs in class together helps a lot
- I also continue to like the programming examples that we go over in class
- Having interaction is good.
- I like the amount of examples that you used for each thing that we are learning because I feel that practice is the only way that we can truly learn to be good programmers.
- I like writing programs together in class to see how they work and to see how the logic works
- I find the examples and sample "thinking" problems very helpful too. I don't remember having a lot of examples the first few lectures and frankly, I didn't need that much to understand. However, as the materials become harder, those examples really help!

Discussion, Homework & Programming assignments (8)

- Programming assignments
- The updating of notes and homework/assignments are going well.
- The programming assignments go very well with the course material.
- The assignments to keep us making sure we are keeping up with the course.
- The homework and programming assignments, because there are ways to correct what I do wrong and understand the course material better.
- The assignments are good. I think they're very relevant to what we cover in class.
- Course needs more examples of programming assignments
- I like the program writing, it can become unnerving at times, but I do believe it to be worthy of our patience.

In general (3)

- I think the course is going very well.
- I think that the class is run rather well
- Course is going well

Lecture (content & method) (3)

- The class sessions themselves, the teaching is direct and understandable.
- Information is taught in a clear manner.
- Your teaching style is great.

Instructor (3)

- First, I was very impressed that Dr. Mitra knew most (if not all) of the student's names! I know the classes are not-so-small and it takes time and effort to learn everyone's names. :) Also, these surveys show concern and determination to hear feedback.
- I like that he asks how our programming assignments are going and wants to help us figure out why they may not be working.
- Dr. Mitra is a rather good lecturer who invokes class participation well and doesn't make students feel like idiots when they don't know the answer to a question. Much appreciated.

Material arrangements (1)

- The lecture notes are up before classes, so that's a huge help. It's also nice to see the homework/assignments up so I don't have to figure out in a day.

Difficulty (1)

- The programs are getting to be much more challenging, but not so much that they seem too difficult to complete.

Grading (1)

- Furthermore, the grading scheme for the assignments is very fair, and if you genuinely cannot find the correct answer for a problem, you can expect to receive at least some credit for what you DO know about the problem.

What parts of the course do you think can be improved?

Nothing (4)

- Overall, I think the class is going well
- Nothing at this time
- I like the course the way it is
- This is probably my best class this semester. I can't really think of anything

Grading (3)

- I can't find anything special to talk about that needs improvement, but I did notice that the homework distribution took some time. I do realize there isn't really a better solution. The only alternative I've seen is putting them in a few separate piles (alphabetically) and students can pick them up when they come in or when they are leaving.
- The grading seems to be very, even somewhat overly, difficult. Also the first test was very difficult

- Quicker feedback on test grades, having to wait multiple weeks for a test to be returned seemed rather ridiculous to me

Difficulty (3)

- The class is such that it is difficult for people with no programming experience to grasp the concepts. Of course, this is just the nature of programming from what I understand. It's not the fault of the professor.
- I would personally like to work on more comprehensive programs, in which we would need to use most of the Java syntax. That way, every program would be like a review, and would reinforce the structure and syntax of typical Java programming.
- I would prefer to have more difficult programming assignments with more time to complete them. currently i feel the assignments are just regurgitations of what we go over in class, often working out the actual assignment on days prior to its due date. i would like to be challenged more to come up with my own solution

Homework & Assignments (4)

- Instead of book assignments, 2 programming assignments per week should be assigned
- More homework from the book, and pages assigned to read between classes
- Sometimes the homework assignments are ahead of the material covered in class
- Maybe different assignments on the website to try as a challenge and then see that answer would be great.

Activities in class (2)

- I think more examples of implementation of new ideas, which has already happened more than in the first part of the semester
- Going over more questions in class like the ones that will show up on tests

Lecture (content & method) (2)

- I think that you should be really specific about what an array is and other examples like that because I feel that we are basically doing problems for each situation in class but i don't have the knowledge to apply it to each unique programming exercise because I still don't understand the purpose of what we are doing.
- I have troubles in the immediate brainstorming of code when under a very short time constraint, and without the aid of the compiler, I reflect this during the program writing during exams.

Help outside of class (1)

- Meeting w/ the ta's - I think it is a little silly that we have to go sign our name on a piece of paper even if we have no questions, or problems we need to talk about.

Appendix I. Ongoing Course Assessment Results

(Comments are listed in descending order from most to least frequently mentioned)

3rd OCA

What parts of the course do you think are working well?

Homework & Assignments (3)

- The weekly programming assignments and the lectures are very helpful and useful. I get a lot out of them
- His programming assignments apply newly learned concepts with an aspect of further cognitive development.
- The program assignments to provide hands-on experience with the material.

In general (2)

- Pretty much everything.
- The class atmosphere is very positive. I don't feel intimidated to ask a question or make a comment.

Pace (2)

- Material is being covered at good pace.
- Dr. Mitra's pace is even enough to allow for questions and insurance of entire class understanding.

Lecture (2)

- His lectures are thorough and consistent with his online notes.
- I am learning so the lectures are helping

Help outside of class (2)

- Programs and all of the extra time we have to talk to TA's.
- There were a lot of TA office hours, and that was greatly appreciated. I especially liked the one from 3-5 on Fridays before the program would be due.

Attendance (1)

- I also like the fact that attendance was taken every time because I didn't miss a class, and its nice to have it count for something.

Examples (1)

- I really like it when you do examples of the area of programming that you are talking about. However, please type slower!

Instructor (1)

- I like the fact that Dr. Mitra knows all of our names and wants to see us succeed.

What parts of the course do you think can be improved?

Nothing (2)

- I like the course the way it is
- None so far

Examples (2)

- More OOP examples in class, using arrays, compliance between static and non-static values
- Not sure, maybe more examples in lectures to improve grasp on material

Textbook (2)

- We bought the book. Give us more reasons to use this expensive thing.
- A New Text book that has answers in the back from some of the practice questions at the end of each chapter.

Grading/Test (1)

- It would also be cool to write the programs for tests on computers, so that we could test the code(out of Dr. Mitra's hands)

Difficulty (1)

- The level of program experience varies greatly when going into the class. I had no experience at all, and I found it quite difficult to keep up. I found that my test grades weren't so great, but my programming assignments and homework assignments were almost all A's, so that is what kept my grade at a B

Appendix J. Drop out Survey

There were total of 5 respondents among students who dropped the course.

1. What is your major?
 - Geography
 - Communication
 - Biomedical Engineering
 - Sociology
2. Why did you enroll in CS 303E?
 - Needed the science credit, and was somewhat interested
 - I wanted to switch my major to CS
 - I go to Tulane, I am only here for the semester and at Tulane it is required that all engineering majors take computer science their freshman year
 - To fulfill a science credit, and I thought it sounded interesting
3. How does this course relate to your major or future career?
 - It does not. Although computer programming is a pretty rapidly expanding field, if I were interested enough I would maybe pursue a career.
 - I wanted a career in CS
 - It is required for my major
 - It does not
4. What did you expect to gain from the course?
 - Basic programming skills, simple stuff
 - I expected to gain knowledge on developing and troubleshooting programs
 - Basic knowledge of computer science and programming, and to pass
 - To learn to make Java programs
5. What was the difficulty level of course assignments and exams?
 - Not that hard, but hard for me because I have/had no foundation in any kind of computer language.
 - The exams were challenging but passable
 - Extremely difficult. Apparently this is an intro level course, but it was way over my head. I have never had a computer science course of any kind before, and it seemed everyone else in the class had. It did not start out very basic
 - Very difficult for someone who has no background at all in CS
6. Why did you drop the course?
 - It was not what I was looking for, too much book stuff
 - I found teacher and his methods to be ambiguous
 - Too hard, need a more basic course that teaches you things that some computer science majors may consider common sense, but the everyday person has no clue. Plus, this course teaches Java and is only 3 hours credit. For Tulane, I needed a 4 hour credit course that taught C++

- I felt very lost in the course, and did not really need it

7. What would have helped you to stay in the course?

- First, if I had become familiar with the language of computer programming, for example knowing what certain terms and lingos meant
- Just the professor clearly stating what we should be doing
- Better tutoring, I showed up for some TA sessions, but nobody showed

8. Do you plan to enroll in this course in another semester? Why or why not?

- No, because it is not what I am looking for
- Only if it is offered by a different professor
- Yes, a similar course at Tulane that I will actually get credit for
- No, too complicated I will just take some other science course to fulfill the credit

9. Other comments or suggestions that could improve the class.

- Sorta think that there should be more prep for the students before going into functions and how to do certain things, what not. Maybe there should be a prerequisite students must take prior to enrolling in this course
- The very first few things that were taught were already above my head, as well as a few others that I talked to. UT needs to have a course where they teach you the basics about a computer and how it works before trying to make you write programs
- Make prereqs for the course

*This is one respondent who did not follow the list to answer each question. Instead this person wrote the following paragraph.

- I have a biology degree, but am interested in teaching math. I was taking the course because it is a prerequisite for some upper division math courses. I decided that I would like to teach math at a high school level, and did not need to take the courses for which CS was a prerequisite. The course was not particularly difficult, although I felt at a disadvantage as so many people had significant previous programming experience. My only real complaint about the course is that the three times I tried to meet with a TA during "office hours" I was unable to find the TA in the lab

Appendix K. Female interview (one-on-one)

1. Major?

- Music
- Spanish Language Teaching
- Geophysics
- Math
- Linguistics/Physics & Computer Science
- Biochemistry

2. Tell me about your interest in computer science or this course.

- Took high school course on C++, parents are computer programmers, to fulfill science credit requirement
- Interested in Computer Science and adviser recommended.
- I thought it would be cool. I like web programming.
- It is required. But, I found it very interesting. So, I will take the second part.
- Physics advisor recommended me to take the course. I want to work with speech and computer and later go in the field of speech technology, speech recognition and synthesis.
- My father and brother are in the computer science field, and encourage me to do it.

3. What worked well in the class?

- Notes online, weekly programming assignments, good pace, format of the course, good organization, test was fair, assignments
- Instructor showed how it is important to have logic and programming skill for any other field.
- Dr. Mitra connects with students really well. He knows students by name.
- He was good in explaining, slowed down when it needed.
- Lectures were great. Going over the programs, and all the assignments were helpful.
- Professor had passion for teaching.

4. What needs to be improved?

- Mandatory visit to TA
- Programming assignments were just repeating or practicing what had learned in the class. It would be better if students are asked to come up with their own coding or logic for the assignments.
- If the class is held in computer lab, it would be great. Bringing laptop to class is hard. UT has money, and I don't understand why it cannot happen. If we can use computer, we can follow what professor is showing on the screen right there on the spot.
- Textbook. Lecture was great, but the book was confusing. Homework assignment ---he asks to do it in certain way when alternate ways are possible.
- I can't think of anything.
- More examples in the class.

Instructor of this course is interested in recruiting and retaining female students. Your response to the following questions will help him to do so.

5. Why do you think there are so few female students in this course?

5.1. How can faculty or department recruit more females into CS courses/major?

- It has been that way all along. Don't know why.---Publicize that this course can be counted as science credit requirement.
- Females are not interested in math or science starting early ages, so at this point they may already feel that they are behind and not well-equipped to take courses like this.---let female students know that they don't need any strong math or science background to take this course.
- There are so few females in the first place. It is boring and technical, and girls don't like it. There are this stereotype that guys like engineering, math, and logic so forth. Having a female TA helps. Make CS more attractive. Website description. Focus on stuff girls usually more interested in, such as designing media stuff, rather than standard calculation of alpha stuff. Advertising poster --- colorful, catch the eyes.
- In society, girls are encouraged to do things like liberal arts, not math or science. General culture does not encourage girls to do math or science. Interesting posters in several buildings --- attractive ad. Women in Science--- organization like that, and talk to them to have a presentation about the course...
- I don't know. The stereo typical guys..... not many women in science in general. Go to science department or classes, and advertise the course. More active advertisement.
- Computer science regarded as guy field. Girls are not familiar with computer much. Workshop here and there to show what basic programming would look like....

6. Has gender made any difference in the experience of the course? How?

- No.
- Maybe because there are so few females.....forming conversation or study group with females are difficult.
- I am not sure.
- Not really. I am used to all-guy environment anyways. But, having more girls would be nicer.
- No.
- No.

7. Do you think females learn differently than males?

- Don't know. It could be due to the stereo type.
- Don't know. Usually more girls are in liberal art courses and more boys are in math and science courses. But, personally I never had any problem, so I guess it is rather personal learning style.
- I think so, but don't know how.
- I don't think so.

- In general, I think so. Men are single brained and women are using both sides of the brains.
- No

8. Are there any disadvantages to being female in the course?

- No.
- Not that I noticed. Just having fewer girls.
- There are no female person that I can go to ask questions, no female friend to discuss about homework stuff...
- I don't think so.
- Not really.
- No

9. Do you think there are any characteristics of the course that make female students less likely to stay in the class? If so, what?

- Teacher put students on the spot to answer questions. That can make some female students uncomfortable.
- It depends on personal self-perception about the course or subject.
- Working as a group is hard when you only have a few females.
- I am not sure. Guys are dropping out a lot.
- I don't know.
- Having more female students in the class

10. Do you feel like the instructor or teaching assistants display different attitudes toward male and female students?

- No, not at all.
- No.
- No. But, having a female TA was a big help.
- Not at all.
- No. Not at all.
- No.