CSC 226: Software Design and Implementation

Spring 2016 Syllabus

Instructor Information

Instructor: Dr. Jan Pearce
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Office Hours: TR 1:00-2:30 pm, 102C Danforth Technology
Email is typically a good way to reach me, so please feel free to email me if you have any questions or would like to schedule a time to meet outside of office hours. Please also feel welcome to drop by my office.

Primary TAs: Ashley Aiken, Sloane Hertel, Michael Oxendine, and Eric Rhodes
Evening Lab hours: Sunday-Thursday: 7:00- 9:00 pm, 104 Danforth Technology

Course Description:

In this course, students learn to design and implement software with an emphasis on object-oriented design. The course will include pseudocode, stepwise refinement, and testing for algorithm development. Other programming topics include data types, arrays, structures, functions, and files.
Prerequisite: Any CSC 1xx at Berea or the permission of one of the instructor.

Learning Goals:

By the end of this course, students should have developed proficiency in the following:

- *Big Ideas in Computer Science:* Reflect on the power and creativity of computation as well as the how and why computing enables innovation in other fields.
- *Problem-Solving:* Learn to analyze problems of increasing complexity, to break these problems down into smaller more manageable components, and to incrementally develop algorithmic solutions.
- *Data Constructs:* Develop familiarity and comfort with commonly used data and programming concepts, operations and structures, such as flow of control, data types, branching, I/O, functions, methods, objects, classes, loops, and arrays.
- *Programming:* Read, understand, and be able to modify pre-existing code, and design, and implement readable well-documented code using appropriate algorithms.
- *Documentation:* Appreciate the importance of creating well-commented and well-documented code so that it can be easily read, understood, and modified.
- *Teamwork:* Develop skill in working effectively on a team in pursuit of common goals.

This course is a prerequisite for all other 300 and 400 level CSC courses at Berea College. If you are interested in pursuing the Computer and Information Science major or Computer Science minor, I recommend that you enroll in CSC236: Data Structures in the fall.

The Final Project: Instead of a final exam, the video component of a final software project will be due Wednesday, April 27 2016 by NOON, and the class members will enjoy video screenings in class. Note that all of the other elements of the final project will have earlier deadlines. Details will be forthcoming.

Resources and Texts:

- Course Website: Pearce, J. (2016) CSC 226 Software Design and Implementation Assignments and Labs. http://cs.berea.edu/courses/csc226/ (Required)
- Primary Text: Wentworth, P., Elkner J., Downey, A., and Meyers, C. (2012) How to Think Like a Computer Scientist, http://openbookproject.net/thinkcs/python/english3e/ (Required)
- Interactive Text: Miller, B., Ranum, D. (2013) How to Think Like a Computer Scientist, Interactive Edition 2.0, Create Login using Course Name: CSC226 (Supplemental)
- http://interactivepython.org/runestone/static/CSC226/index.html.
- Software: MIniconda: http://conda.pydata.org/miniconda.html (Required) including both of the following:
    - Programming Language: Python 2.7 (Required)
    - Integrated Development Environment (IDE): Spyder (Required)

Technology Policies:

The following policies are designed to guide to help students be effective in a technology-rich environment.

- *Laptop and Software:* Each student is required to bring his or her appropriately equipped laptop to class every day, except when otherwise announced.
- *Unapproved Technology:* The in-class use of unapproved technology will not be tolerated, and in certain cases will constitute a violation of academic honesty. For example, no games are ever acceptable, and communication programs, such as e-mail or instant messaging programs, are only acceptable for class work during class, so must otherwise be disabled before class. Likewise, cellular phones must be disabled before class. To help students to appreciate the gravity of this policy, each and every in-class use of unapproved technology will result in a 1% reduction of the student's homework assignment grade.
- *Appropriate Collaboration:* Team participation is a proven and useful means by which students can learn material. Much information is easily accessible by searching the web. Students are encouraged to appropriately use information from other students, the web, and other resources. However, any information used from other students or any other resource MUST BE CITED. (See below for more information on this serious topic.)
- *Communication:* On the other hand, electronic communication programs are useful when used appropriately, so each student is required to use the course web page and Moodle course management system to access assignments, and to use a Berea College e-mail account to facilitate electronic communication outside of class.
- *Backups:* All students are expected to regularly back-up their work, which includes assignments, quizzes and exams. I think the best way to do this is to store a copy of all work in a cloud service such as Dropbox, SkyDrive, or Google Drive, or on a DVD, flash drive, or some other media. The normally understanding instructor will not be at all sympathetic to loss of electronic work, so it is the student's responsibility to protect his/her work from such heartbreaking loss.
- *Plagiarism and Academic Honesty*: Plagiarism is the use of anyone else's work or ideas without adequate citation. It is a crime which is both easy to commit, and easy to avoid. Ideas taken from other people include those from published or unpublished books, articles, websites, TAs, or friends' homework. The best way to avoid plagiarism is to cite ALL your sources, including those from which you paraphrase or borrow ideas, and to be sure use quotation marks when quoting verbatim. If you are not sure whether or not to cite a source, you should cite it! Simply put, plagiarism is stealing because it constitutes theft of someone else's ideas. It is a serious offense, and Berea College takes it very seriously. Plagiarism will not be tolerated! At the first offense, the student will receive an F for that assignment. At the second offense, the student will fail the course. In addition, ALL offenses of plagiarism will be reported to the Associate Provost for Academic Services, as detailed in the *Berea College Student Handbook.*

Grading Policies:

For the benefit of the students in the class, all course grade computations are continually updated in Moodle by the instructor and/or teaching assistants, so students may check frequently on their in-progress course grade during the term. Please address all questions/concerns regarding grading of any component of the course to one of the instructor only, never to a teaching assistant.

System of Evaluation:

Participation:	5%
Exam 1:	20%
Exam 2:	20%
Quiz total:	20%
Assignments:	15%
Labs & Teamwork:	20%

Scale:

A's:	$90\% \leq A- < 93 \leq A \leq 100\%$
B's:	$80\% \leq B- < 83 \leq B < 87 \leq B+ < 90\%$
C's:	$70\% \leq C- < 73 \leq C < 77 \leq C+ < 80\%$
D's:	$60\% \leq D- < 63\% \leq D < 77 \leq D+ < 70\%$
F:	$0\% \leq F < 60\%$

Note that the of the exam and quiz grade items may be dropped as explained below.*

Please refer to the Grading Scale http://www.berea.edu/cataloghandbook/academics/aps/grades/gradingscale.asp as described in the current Berea College Catalog for the College-wide interpretations of these letter grades.

* "Good Student" Drop Bonus:

After having completed all work in the course, students who satisfy all of the following conditions will have their lowest exam score or quiz total dropped before their final grade is computed:

a. They have completed ALL of the assignments and labs, even if some have been submitted late.
b. reliability: They have not been excessively tardy to or absent from class as defined by the class attendance policy.
c. class citizenry: They have been consistently constructive participants in the course and have not had any noted incidents of disruptive behavior.

The instructor reserves the right to raise the grades of students who have demonstrated significant improvement in their performance. This is at the sole discretion of the instructor, but a student is welcome to bring such possibility to her attention.

Assignment Bonus:

Assignments will be assigned for homework on a near-daily basis, since this is the method for learning about the broader applications. Because the instructor desire to strongly encourage a diligent effort on homework assignments, students who turn in each of their assignments and labs, with no more than two assignments or labs submitted late, will be awarded an additional 5% on the assignment grade!

The Class Atmosphere:

The members of this class constitute a learning community. Learning in such a community best takes place in an atmosphere in which both instructor and students treat everyone with mutual respect. Students need not always raise their hands in order to ask questions or to make comments, but they should not interrupt the instructor or fellow students in doing so. Students typically find the atmosphere set by the instructor to be a sometimes playful and nearly always relaxed one, but students will still need to work hard and consistently both in and out of class in order to do well. If at any time you have thoughts, comments, or suggestions about how the class atmosphere could be improved or made into one which is more supportive of your learning, please come by my office or drop me a note about it. I welcome such suggestions.

Exams and Quizzes:

Two exams and frequent short quizzes will be given in this course. Quiz questions will include questions relating to the reading assignment for that lesson. Students will take these quizzes individually at the start of the class period. After everyone has completed taking the quiz individually, students will take the quiz again in groups, coming to consensus on the answers to each of the questions. Thus, evidence that you have engaged and retained the information you have read will be reflected in your quiz scores. By keeping track of group and individual scores separately, you will have measures of your ability to listen and to learn from others as well.

The most likely time of the two exams will be:

- Exam 1: Friday, February 19
- Exam 2: Friday, April 15

Problems that appear on the tests will be more varied in nature, ranging from homework or lab-like problems to problems that require a deeper synthesis of ideas. Questions such as true or false questions and short-answer questions may also be included.

On Assignment and Lab Collection:

Homework assignments and labs are a form of written communication that are intended to help students address course leaning objectives. Thus, assignments and labs are expected to be well-reasoned and well-organized, in order both to demonstrate reflection, as well as to communicate ideas clearly.

Homework assignments and labs are due at the beginning of class on the announced date due and are to be submitted electronically via Moodle. If Moodle is ever down, they may be emailed to the instructor. They should NEVER be printed or sent to a TA instead of the instructor. If a student must miss class due to either a sickness or a planned absence, homework is still expected to be submitted on time. Homework is always posted on the web and may be requested in advance. Late homework will be accepted for reduced credit up until at least the time when the homework assignment is returned to the class.

What do employers want?

Regardless of whether you plan to go to graduate school first, most of you will want to find employment sooner or later. Employers responding to the 2014 National Association of Colleges and Employers (NACE) Association's Job Outlook survey rated the ability to work in a team structure, make decisions and solve problems, and plan, organize and prioritize work as the top three most important candidate skills/qualities (See Figure 1).[1]

Figure 1: Employers rate the importance of candidate skills/qualities

Skill/Quality	Weighted average rating*
Ability to work in a team structure	4.55
Ability to make decisions and solve problems	4.50
Ability to plan, organize, and prioritize work	4.48
Ability to verbally communicate with persons inside and outside the organization	4.48
Ability to obtain and process information	4.37
Ability to analyze quantitative data	4.25
Technical knowledge related to the job	4.01
Proficiency with computer software programs	3.94
Ability to create and/or edit written reports	3.62
Ability to sell or influence others	3.54

*5-point scale, where 1=Not at all important; 2=Not very important; 3=Somewhat important; 4=Very important; and 5=Extremely important

Source: *Job Outlook 2014*, National Association of Colleges and Employers

[1] The National Association of Colleges and Employers (NACE), *The Candidate Skills/Qualities Employers Want,* http://www.naceweb.org/about-us/press/skills-qualities-employers-want.aspx downloaded July 18, 2014

On Teamwork, Labs, and Assignments:

Learning to work in teams effectively is strongly encouraged. Though most homework assignments are designed for individual work, teamwork assignments are designed to be co-authored, so each assignment must clearly include all of the authors' names on all submissions. All assignments and labs should be handed in with the author(s) acknowledging all of the help received for each problem. This includes significant help received from the instructor, an online forum, webpage, or from the Computing and Digital Crafts Lab Consultants. Note that the instructor or a Computing and Digital Crafts Lab Consultant may help with homework or labs, and while this help should not be acknowledged as co-authorship, it should still be mentioned. This is meant to be a sharing process; do not "give credit," to other students who have not attempted to contribute to the work or to the team's work, because it is ultimately not a help for the student who did not contribute to the work. Thoughtful practice, not (even mindful) copying, is ultimately the best way to learn. Note that on all team-completed homework, students must describe the roles played by each author on the co-authored homework submission. *Warning: Please be careful to conform to these standards for teamwork, since they are designed to encourage good learning practices. (Furthermore, copying another person's work or otherwise failing to adhere to these standards may even result in a charge of academic dishonesty.)*

Success in Design and Coding:

There are two main points I will try to drive home in this course. First, it is very important for you to not be a “Code Monkey”, who is someone who starts writing code without having a design plan first. You will be much more successful if you start early with a solid design and then incrementally develop your programs. It is common for people to spend 10% of their time writing the code and 90% of the time debugging it without a design plan. It is a very cold and terrible feeling when you are faced with code that is so snarled that you cannot begin to understand how to fix it, and it is due the following day.

Code Monkey from Wikimedia Commons

Second, you MUST document your code with comments so that someone who is not familiar with your code should be able to understand the design and what you intended to implement. The immediate consequence would be that if you bring your program with lots of comments to the Computing and Digital Crafts Lab, the TAs are must more likely to be able to help you and will also be able to grade your submissions and give you more useful feedback much more quickly.

The Attendance Policy:

Class-time is considered to be a vital key to success in this course. Attendance is expected at each class session unless a specific exception is made. If you are sick with flu-like symptoms, the Center for Disease Control (CDC) recommends that you stay home for at least 24 hours after your fever is gone, except to get medical care, or for other necessities. Please do not come to class if you exhibit flu-like symptoms. Instead, e-mail me and seek medical attention immediately. When you return to class, bring paperwork showing that you sought medical attention that day and your absence will be excused. Students who come late, leave early, or fail to fully participate during the class will be considered absent for that portion of the period, and such partial absences will accumulate. The final grade may be lowered by one third of a letter grade for each unexcused absence beyond the third. It is the responsibility of the student to contact me about each absence from class. This should be done via email, as soon as possible, and if at all possible, before the absence occurs. Students who miss class are held responsible for all of the material covered, assigned, and collected during their absence. Quizzes will be announced and/or occasionally "popped.” I will drop the lowest quiz grades before computing your overall quiz score, so under nearly any circumstances, make-up quizzes will not be given.

Additional Support and Disability Accommodation:

The Computing and Digital Crafts Lab is located in room 104 of the Danforth Technology Building and is open Sunday through Thursday from 7:00 to 9:00 PM (except on evenings of convocations). Most of the CS TA's, will be able to answer questions about the computational content in the course during consultations in their Computing and Digital Crafts Lab hours. Students are strongly encouraged to make use of the help available in the Computing and Digital Crafts Lab, as well as in the instructor' office hours. Best results are obtained trying to solve problems before asking for help, and students should be prepared to show what they have already tried. Topics in this course build throughout the course, so students should be sure to do their best to keep up with the class, so as to not get behind and forever lost. No question to which you do not know the answer is "dumb," unless it goes unanswered because it remained unasked.

Berea College values diversity and inclusion and seeks to create a climate of mutual respect and full participation. My goal is to create learning environments that are accessible, equitable, and inclusive. If you encounter barriers based on the impact of a disability or health condition, please let me and Disability & Accessibility Services, Lisa Ladanyi (DAS, 111 Lincoln Hall, 859-985-3237, lisa.ladanyi@berea.edu) know immediately so that we can determine if there is a design adjustment that can be made to the course or if accommodations might be needed to overcome the barriers. Together we can explore all of your options and establish how to best coordinate accommodations for this course. In particular, under Title IX of the Education Amendments of 1972, pregnant and parenting students may be afforded certain accommodations regarding their educational experience. If you believe that pregnancy or pregnancy-related conditions are likely to impact your participation in this course, please contact Berea's Title IX Coordinator, Katie Basham (Katherine_basham@berea.edu or 859-985-3606), to discuss appropriate accommodations.