CS333: Storage Systems

Syllabus for Spring 2020

General Info

Instructor:	Bill Jannen
Office:	TCL 306
Phone:	597–4509
Email:	jannen@cs.williams.edu

Meetings:	MoTh from 2:35-3:50pm
Course Web Page:	`http://www.cs.williams.edu/~jannen/teaching/s20/cs333`

Texts

We will be using the following textbook in this course:

- *Operating Systems: Three Easy Pieces* by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau (version 1.0).

Additionally, a good C reference is highly recommended. Many copies of the following textbook are on reserve at the Schow Science Library:

- *The C Programming Language, 2nd edition by Brian Kernighan and Dennis Ritchie.* by Brian Kernighan and Dennis Ritchie.

Additional readings will be assigned from various sources, including conference proceedings, research journals, magazines, and textbook excerpts. You may also be required to search out and select resources on your own. Additional readings will be digitally accessible from the course website; they will be accessible while connected to the Williams network (or while off-campus using the library's proxy server).

Course Description

This course will examine topics in the design, implementation, and evaluation of storage systems. Topics include the memory hierarchy; ways that data is organized (both logically and physically); hardware characteristics and the ways that storage hardware influences storage software design; data structures and performance models; and system measurement/evaluation. The course emphasis will be on identifying and evaluating design trade-offs.

Course Objectives

Upon the completion of this course, students:

- should have the ability to speak fluently about current and emerging storage technologies;
- should, when presented with a new storage technology, be able to describe how that technology will fit into or modify the "storage landscape";
- should be able to critically read texts in the storage literature and understand the texts' content and arguments;
- should be able to describe and/or use common storage interfaces at the application, OS, and device layers;
- should be comfortable writing system code in C; and
- should be able to analyze the performance of external memory algorithms and data structures.

Course Structure

Course meetings. This course will meet twice each week for lecture and discussion. *Attendance at course meetings is mandatory*. There are valid reasons to miss a course meeting, but unexcused absences will significantly reduce the participation component of your final course grade; additionally, missed in-class assignments will not be accepted.

Reading Assignments. There will be readings associated with each class, and you should complete all readings before the associated meeting. However, unexpected things happen during the semester. If you are unable to complete the readings, you should still attend the meeting and participate in discussions when able.

Labs. Although there is no scheduled laboratory meeting, lab assignments will be an important part of this course. Lab work will be evaluated based on completeness, correctness, and creativity.

Labs are to be completed in accordance with the college and Computer Science department honor codes. Individual assignments will contain additional details/clarification as needed.

If you ever have a question about the honor code, *please ask*. Violating the honor code has serious repercussions; a common outcome of honor code violations, as determined by the honor committee, is course failure.

Exams. There will be one midterm and one final exam. Both exams will be 24-hour, open-book, take-home exams. The midterm exam will be available to take during the week prior to spring break and must be submitted before the start of spring break.

Final Project. For the final assignment of the course, you will either design your own project or select/customize a project proposal from a sample set that I will provide. In the first phase of your project, you will be required to submit a formal proposal that includes success criteria, methods for evaluation, and project deliverables. We will agree upon this proposal together. You will then complete your project, author a short conference-style writeup of your experience, and present your findings to the class during the final week of the course.

Preparation and participation. There are many ways to participate in the course, starting with attendance. Many class meetings will begin with a short "hand-in" question that pertains to the readings for that day; late or make-up "hand-in" questions will not be accepted.

Most meetings will also include small group discussions, and we will utilize *Piazza* as a forum for asking and answering questions semi-anonymously (only the instructor will know the identities of posters).

Your base "preparation and participation" will be determined by performance on written "hand-in" questions, but particularly helpful/insightful Piazza questions and answers will be taken into account as a way to boost your score in this category.

Grading. Grades for this course will be determined as follows:

Preparation and participation:	15%
Lab assignments:	35%
Final Project:	25%
Exams:	25%

Note: assignments within a given category may have different weights.

Honor Code

Uncredited collaborations will be considered a violation of the honor code and will be forwarded to the honor committee. If in doubt of what is appropriate, do not hesitate to ask your instructor. For a full description of the Computer Science Honor Code, please see
`https://csci.williams.edu/the-cs-honor-code-and-computer-usage-policy/`.

Workload.

At Williams, we operate under the course unit system (rather than the credit hour system). You should expect to spend (on average) at least 13 hours per week on the academic and creative work related to class. This includes time spent meeting as a class and working on assignments. The Office of the Registrar explains the relationship of course units to credit hours in greater detail.

Course Calendar and Schedule.

The course calendar and schedule can be found on the course webpage, including links to the readings that should be completed prior to each course meeting (all required textbook materials are available as free PDF documents). The course webpage will be regularly updated after each course meeting to make all lecture materials and examples available for review.

The content and schedule may change in response to course demands, so please check back regularly for updates.