

## Systems CQI Report

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### Summary

The following required courses were reviewed in the context of the departmental curriculum and current curricular recommendations of the ACM.

- Architecture I (CS3432)
- Theory of Operating Systems (CS4375)

These courses exceed ACM recommendations for core (Tier1 & Tier2) systems KUs except those related to computer networking. Those topics are presently included in Computer Networks (CS4316), which is presently offered as an elective course.

### Student mastery of course learning outcomes

Both courses were taught by Eric Freudenthal. Student mastery of skills was assessed and tabulated throughout the term. Data was extracted in the processes of grading of in-class instruments (quizzes and tests) and lab assignments.

#### Architecture 1 (CS3432, Spring 2017)

Computer Architecture I is an introductory course on computer organization. Student mastery of more than fifty KUs was examined. More than 80% of the students earning a passing (C) grade demonstrated mastery of all but one of those KUs (Add w/ carry, at 30%). To determine the reason for this weakness, the instructor for F17 will speak to students individually after class to determine common misconceptions related to this skill.

#### Theory of Operating Systems (CS4375, Fall 2016)

Course outcomes were last updated in 2000 and are severely out of date. For example, they explicitly reference an operating system discontinued a decade ago. The course, as implemented, references current systems and has evolved to include KUs now recommended by the ACM such as various forms and applications of (generalized) virtualization.

Of 48 required competencies measured by assessments and lab exercises, only the following were mastered by less than two thirds of students who earned passing grades:

- semantics of unix file permissions (18%)
- context switch mechanisms (54% in the context of processes and 59% in the context of virtualization)

More than 80% of students demonstrated mastery of 30 of the remaining competencies.

### Planned curriculum change

The analysis of student mastery of course learning outcomes learning was presented at the Fall 2017 CS faculty retreat. At that meeting, the following recommendation was developed and accepted.

Beginning in Fall 2018, CS4375 (required) and CS4316 (elective) will be replaced by two new systems courses:

- A required broad “systems infrastructure” course that will examine the structure and pragmatic implications of abstractions provided by modern operating systems. A student who completes this course should be able to comprehend and utilize pvirtualization, concurrency, communication, and storage in conventional contexts.
- An elective “advanced systems” course that will examine the mechanisms, algorithms, and theory that enable the abstractions studied in the “systems infrastructure” course.