

UCSD CSE M.S. Comprehensive Exam

Fall 2016 Curriculum

Revised: October 17, 2016

Exam List Revised: May 4, 2017

Who?

Students planning to complete their M.S. in CSE degree via the *Comprehensive Exam* option under the Fall 2016 curriculum. In general, this includes only those who matriculated in Fall 2016 or later. Although, technically, students matriculating prior to Fall 2016 may elect to graduate under the Fall 2016 curriculum, doing so is likely to be an option for very few, if any, such students. This is because the comprehensive exam was not integrated into courses prior to Fall 2016, so prior coursework cannot contribute to satisfying the comprehensive exam requirement.

What?

The comprehensive exam is an alternative to the *thesis* option. It is a practical exam designed to evaluate each student's ability to apply what they have learned. In order to ensure that the exam is relevant and presented in context, it is integrated into host courses. In most cases, the associated work serves dual purposes, contributing independently to each of the student's course grade and comprehensive exam score.

Students are required to successfully pass (3) three courses' worth of exam material in (5) five or fewer attempts.

Because of this, potentially associated coursework is not automatically counted toward the exam. Students must register in advance via the published Web form, typically during the 4th week of the quarter. Once a student has registered, the attempt is counted, even if the student drops the class or, for whatever reason, does not complete the exam component.

The exam material typically takes the form of a specific class assignment, or portion thereof, which has been approved in advance by the exam committee. Offerings are designed to facilitate completion of the exam without presenting a significant scheduling burden upon students.

The choice of courses is subject to various constraints prescribed by the exam committee. **In general, students may not choose more than one course in an area, e.g. AI/ML, databases, systems and networking, etc.**

Why?

The University of California requires that Masters degree programs include a comprehensive exam and/or a thesis. This exam is one way to satisfy that requirement. Students who are interested in, or want to explore, a career in research might be better served by undertaking a thesis under the mentorship of a faculty member. But research is a serious undertaking and can be a significant, and sometimes uncertain, time commitment. For those for whom a thesis is not appealing, this exam provides a flexible, integrated capstone experience. If you'd like to talk about which option might be best for you, or obtain help in finding a research mentor, please contact your academic or faculty advisor.

When?

The exam is offered continuously by integration with regular courses. Prior to the start of each quarter, the exam committee will publish a preliminary list of courses expected to contain exam components. Prior to the opening of registration for the exam each quarter, this listing will be finalized. Pass/Attempted scores will be released within 3 weeks of the work being graded by the course staff, after review and acceptance by the exam committee.

Where?

Because the exam is integrated into existing coursework, there is no additional venue. Just participate in class as you would normally, and you'll be given instructions.

How...?

...to prepare for the exam?

Because the exam components are hosted by courses, you don't need to do anything special to prepare for the exam. Prepare as you would for course work, as guided by the course staff, using TAs and other course support, as permitted by the course's policies.

...to sign up for the exam and choose areas?

A link will be provided to you via email, most likely during the 4th week of the quarter.

...to take the exam?

Relax. Do your best. Don't stress. Read problems/assignments and instructions carefully. Show your work. It is just like doing the rest of your coursework. We hope it is interesting, challenging, and thought provoking.

...to receive your results?

The course staff will likely provide you with your grade for the work as part of their normal process. Official confirmation of the exam's contribution to your comprehensive exam will likely take a little longer, because it is a separate process.

...to review your graded exam?

The material is managed by the course staff, as are other assignments within the course.

...to appeal your score?

If you would like to appeal the Pass/Attempted grade associated with any exam component, you may do so. Appeals are made in writing and should be given to Greg Kesden, gkesden@eng.ucsd.edu. Appeals are initially reviewed by the original grader or supervising faculty member. Subsequently, upon request, the appeal may be provided to the exam committee for a second level review. If requested, the third and final level of review within the department is to the department chair. In each case, the same initial request will be reviewed, so it is important that it raise all issues and be complete.

Fine Print

- Students are required to successfully pass (3) three courses worth of exam material in (5) five or fewer attempts.
- The program is free to make changes and exceptions at any time, as it, alone, deems to be in the best interest of the students and the program.
- For students who matriculated under a curriculum earlier than Fall 2015, it is important to note that the "Project Option" is considered by the University to be a comprehensive exam option. No determination has been made as to whether a student who does not pass the AY2016 comprehensive exam may then choose to attempt the pre-Fall 2015 project-option comprehensive exam.
- Within a single quarter, students may not attempt more than one course worth of exam material in the same area or more than three courses worth of exam material, across areas.

Frequently Asked Questions (And, Their Answers!)

Q: Is there a similar document for the new, 2015 curriculum?

A. Yes. It can be found here: <http://cseweb.ucsd.edu/~gkesden/ms/2016/2015MSCompExamInfoSheetv4.pdf>

Q: Is there a similar document for those under 2014 and prior curricula?

A. Prior to the 2015 curriculum the comprehensive exam was integrated into the project option. Information about the project option can be found here (<http://cse.ucsd.edu/node/58>), under "Comprehensive, Standard Plan".

Q: I matriculated in 2014 or 2015. Can I take the new 2016 comprehensive exam?

A. If you otherwise meet the requirements of the 2016 curriculum, this may be possible. But, it is unlikely to make sense. The challenge is that you would need to satisfy the new exam requirement with additional classes, because the classes offered to date were not packaged to include comprehensive exam material.

Q: If I meet the requirements of the 2015 curriculum and pass some, but not all, of the components of the 2015 curriculum's written comprehensive exam, will I be able to complete the rest of the exam by taking classes under the new AY2016 curriculum?

A. No. One may not mix and match curriculum years. You must meet all of the requirements of the curriculum under which you matriculated, or all of the requirements of a newer curriculum.

Q: If I don't pass the comprehensive exam after five (5) attempts, what are my options?

A. If you can find an advisor, you can undertake a thesis. Beyond that, no determination has been made as to whether a student who matriculated prior to AY2016 and attempts, but does not pass, the AY2016 comprehensive exam may choose to subsequently attempt the pre-Fall 2015 project-option comprehensive exam or AY2015 written comprehensive exam. Please do not expect that either will be an available option for you.

Q: Can I take more than one course of exam material in the same area in the same quarter, to make really sure I pass? Can I take more than three (3) courses of exam material in the same quarter to make sure I pass?

A. No. Within a single quarter, students may not attempt more than one course's worth of exam material in one area or more than three courses worth of exam material, across areas. If you want to repeat an area, it needs to be during a subsequent quarter.

Q: If I do not pass one course's exam materials, can I repeat the course and try again?

A. No. You need to pick another course. It can be in the same area, so long as you have not already passed the "course hosted" comprehensive exam for another course in that area, and aren't concurrently attempting another course in that area.

Other Questions?

Feel free to contact Greg Kesden, gkesden@eng.ucsd.edu, or your academic advisor.

Spring 2017 Comprehensive Exam Course Hosted Exam Options

IMPORTANT NOTES:

- The below are informal summaries, not definitive specifications. The details may vary.
- Each host course below is annotated with the "Area" in a (Parenthetical note).

CSE-205A (Theory): An assignment which explores various problems in logic. The assignment takes the form of a take-home, written, exam.

CSE-221 (Systems and Networking):

An assignment which asks students to analyze the benefits, disadvantages, and/or applicability of different techniques, classical and/or derived from recent literature, within particular contexts. The assignment takes the form of a traditional, written, proctored exam.

CSE-222A (Systems and Networking)

An assignment consisting of some combination of multiple choice, true/false, short answer, and perhaps one longer problem design to test each student's comprehension of the assigned research papers. The assignment takes the form of a final exam.

CSE-237B (Embedded Systems):

A programming assignment covering the behavior of a scheduler, for example, a cyclic scheduler. The assignment includes both the development of the source code and the authoring of a descriptive report.

CSE-240A (Architecture)

A written assignment asking the student to analyze the performance of one or more elements of processor design/architecture and/or the execution of a program upon the architecture. The assignment is a traditional, written, proctored exam and is given at 6pm on Friday of the 8th week of the quarter. It is an optional assignment for course-hosted comprehensive exam purposes and does not count toward the course grade.

CSE-250C (Artificial Intelligence/Machine Learning)

A written assignment asking students to provide formal proof and analysis. The assignment is a traditional, written, proctored exam and in many ways similar in character to the midterm exam and homework.

CSE-255 (Artificial Intelligence/Machine Learning):

An assignment in which the students task is to analyze a novel dataset and write their conclusions and justifications. The homework will be peer reviewed: each student will get five (5) pairs of HWs solutions to compare. The homework is currently scheduled to be released as homework #6.

CSE-291/Christensen (Artificial Intelligence/Machine Learning):

Construct a multi-layer neural network to perform deep learning on real data. The assignment will take the form of the last project in the class. *Although for class purposes, the assignment can be done in pairs – it must be done individually to count toward the MS Comprehensive Exam.*

CSE-291/Gupta (Databases):

Individual final project in which each student implements a query engine for a small fragment of the Cypher query language.

CSE-291/Kesden (Systems and Networking):

A written assignment consisting of approximately ten questions which, generally, explore the design and implementation of storage systems and associated techniques and technologies. Given in a proctored environment during week 10.

CSE-291/Malliaros (Artificial Intelligence/Machine Learning):

A project developing quantitative and qualitative skills on network analysis methods and algorithms, and working with software and tools for large-scale graph mining and network analysis. The project is done in teams but grades are individualized by peer review at the end. The project takes the form of the course's final project.

**Winter 2017 Comprehensive Exam
Course Hosted Exam Options**

IMPORTANT NOTES:

- The below are informal summaries, not definitive specifications. The details may vary.
- Each host course below is annotated with the “Area” in a (Parenthetical note).

CSE-202 (Theory):

A set of five shortest path coding problems drawn from assignments #4 and #5 in the course. Assignment is completed individually.

CSE-221 (Systems and Networking):

A written assignment consisting of approximately five (5) questions, each of which asks students to analyze the benefits, disadvantages, and/or applicability of different techniques, classical and/or derived from recent literature, within particular contexts. The assignment is a traditional, written, proctored exam.

CSE-231 (Compilers):

A course-long project, completed individually, which involves the implementation of a compiler.

CSE-237A (Embedded Systems)

An individual project to develop an energy-efficient RM (Rate Monotonic) scheduler, which handles multiple workloads controlling sensors running on Raspberry Pi 3 (RPI3).

CSE-252B (Computer Vision)

An individual assignment consisting of several problems, some involving mathematics and others involving programming problems.

CSE-258A (Artificial Intelligence/Machine Learning)

An individual project to build a recommender system.

CSE-280A (Bioinformatics)

A Python programming assignment to identify personal characteristics from programming data. Must be done individually to count toward the MS Comprehensive Exam Requirement.

CSE-291/Kesden (Systems and Networking):

A written assignment consisting of approximately ten questions which, generally, explore the design and implementation of cloud computing infrastructure. Given in a proctored environment during week 10.

**Fall 2016 Comprehensive Exam
Course Hosted Exam Options**

IMPORTANT NOTES:

- The below are informal summaries, not definitive specifications. The details may vary.
- Each host course below is annotated with the “Area” in a (Parenthetical note).

CSE-200 (Theory):

A written assignment consisting of completing approximate five (5) proofs involving NP-completeness and closure and related material. Assignment is to be completed individually and is a “take home, open book exam”.

CSE-202 (Theory):

A written assignment consisting of the design of approximately five (5) algorithms, as well as perform the attendant analysis. Assignment is to be completed individually and is a “take home, open book exam”.

CSE-221 (Systems and Networking):

A written assignment consisting of approximately five (5) questions, each of which asks students to analyze the benefits, disadvantages, and/or applicability of different techniques, classical and/or derived from recent literature, within particular contexts. The assignment is a traditional, written, proctored exam.

CSE-230 (Programming Languages):

A set of five (5) programming assignments, each of which explores a different task, including: Type Inference, Refined Lists, MapReduce, K-Means Clustering, and Implementing an Interpreter. The programming assignments are individual, out of class, and completed within the specified virtualized environment using Haskell.

CSE-232 (Databases)

A written assignment consisting of completing six (6) tasks, exploring each of six (6) different areas of database theory, for example: B+ Trees, Validation, Concurrency Control, Algebraic equivalences, Incremental View Maintenance, and Query Processing. The assignment is an open book, open notes, written, proctored exam.

CSE-240A (Architecture)

A written assignment consisting of completing eleven (11) tasks, each of which asks students to analyze the performance of one or more elements of processor design/architecture and/or the execution of a program upon the architecture. The assignment is a traditional, written, proctored exam.

CSE-250A (Artificial Intelligence/Machine Learning)

A written assignment consisting of several tasks, each of which asks students to show applicability, parameterize, compute state or otherwise analyze, prove properties, or apply AI models and techniques. The assignment is a traditional, written, proctored exam.

CSE-250B (Artificial Intelligence/Machine Learning)

A written assignment consisting of several tasks, each of which asks students to show applicability, parameterize, compute state or otherwise analyze, prove properties, or apply Machine Learning (ML) models and techniques. The assignment is a traditional, written, proctored exam.

CSE-291/Barngrover (Robotics):

Given provided framework, students should cause robot to navigate room, covering all areas, while avoiding the walls, generating a SLAM map. The robot and room are virtual, existing within the provided framework. This is an individual, out of class, programming project.