

# Syllabus for CSE100-01: Algorithm Design and Analysis

Fall 2020

Instructor: Miguel Carreira-Perpinan

<b>Designation:</b>	CSE 100 Algorithm Design and Analysis
<b>Catalog Description:</b>	Introduction to the design and analysis of computer algorithms. Topics include analysis and implementation of algorithms, concepts of algorithm complexity, and various algorithmic design patterns. Course will also cover major algorithms and data structures for searching and sorting, graphs, and some optimization techniques.
<b>Text Books and Other Required Materials:</b>	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms, MIT Press, 3rd edition, 2009. ISBN 0-262-03384-4
<b>Course Objectives/ Student Learning Outcomes:</b>	<p>The course introduces the basics of computational complexity analysis and various algorithm design paradigms. The goal is to provide students with solid foundations to deal with a wide variety of computational problems, and to provide a thorough knowledge of the most common algorithms and data structures.</p> <p>By the end of the course, students will be able to:</p> <ol style="list-style-type: none"><li>(1) apply knowledge of computing and mathematics to algorithm design;</li><li>(2) analyze a problem and identify the algorithm appropriate for its solution;</li><li>(3) to design, implement, and evaluate an algorithm to meet desired needs</li><li>(4) ability to compare and analyze different algorithms and their usage</li></ol>
<b>Program Learning Outcomes:</b>	<p>An ability to apply knowledge of computing and mathematics appropriate to the discipline;</p> <p>An ability to analyze a problem and identify the computing requirements appropriate for its solution; An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs, and use current techniques, skill, and tools necessary for computing practice.</p> <p>Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.</p> <p>An ability to apply design and development principles in the construction of software systems of varying complexity.</p>
<b>Prerequisites by Topic:</b>	<p>Class Prerequisite: CSE 030, MATH 032</p> <p>Concurrent Prerequisites: CSE 031, MATH 024</p> <p>Proficient level of programming skills in C/C++/Java and elementary data structures. Basic math and probability knowledge required.</p>
<b>Course Policies:</b>	
<b>Academic Dishonesty Statement:</b>	<p>a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.</p> <p>b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.</p>

c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

Note: The CSE department initiated a supplemental Computer Science Academic Honesty Policy fall 2019 delineating escalating penalties for ensuing infractions. This policy is found at the end of this syllabus. Students are presumed to understand this departmental policy by their continuing enrollment in this course.

**Disability Statement:**

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

**Topics:**

Asymptotic notation. Divide-and-conquer. Recurrent equations and the master theorem. Space and time complexity. Loop invariants. Linear and binary search. Sorting algorithms: insertion sort, selection sort, mergesort, quicksort, heapsort. Sorting lower bounds. Heaps. Binary search trees. Hash tables with chaining and open addressing. Dynamic programming and greedy algorithms. Graphs: definition and relevant problems (path search, flow, minimum spanning trees).

**Class/laboratory**

see registrar website

**Schedule:**

**Midterm/Final Exam**

Midterm (during class)

**Schedule:**

Final: see registrar website

**Course Calendar:**

**Professional**

**Component:**

**Assessment/Grading**

Homeworks: 20%

**Policy:**

Lab assignments: 20%

Midterm: 30%

Final: 30%

**Coordinator:**

Miguel Carreira-Perpinan

**Contact Information:**

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**Office Hours:**

TBD (see course web page)

## **Computer Science Department Policy on Academic Honesty**

As stated in the campus wide Academic Honesty Policy (AHP)<sup>1</sup>, "*academic integrity is the foundation of an academic community*". Accordingly, the CSE faculty takes this matter very seriously and has embraced a zero tolerance on this matter. The process described in the following establishes the minimum consequences for violations of the AHP in CSE courses, but repercussions may be more severe for egregious violations.

The Computer Science Department Policy on Academic Honesty ("CSE Policy" from now onwards), does not substitute the AHP, but rather specifies how it will be implemented when students enrolled in classes offered by the Computer Science and Engineering (CSE) department<sup>2</sup> are found in violation of the AHP. In particular, the CSE Policy defines how the CSE faculty implements the "Instructor-Led Process" described in AHP 802.00.A.

This policy and the associated processes have been developed in collaboration with the Office of Student Conduct and the School of Engineering, and is jointly implemented by the CSE Faculty, the School of Engineering, and the Office of Student Conduct.

The CSE Policy becomes effective starting from the Fall 2019 term.

### **Preamble**

Computer science education relies on a variety of methods to assess students' preparation and learning. The term "assignment" shall be interpreted as any method or process resulting in a grade or contributing to the final grade for a class. Accordingly, the term "assignment" used in the following includes, but is not limited to: homeworks, quizzes, in-class exams, take-home exams, programming assignments, software projects, and presentations.

### **Shared Responsibility**

Maintaining an environment where academic integrity is valued and enforced requires commitments by both instructors and students. Instructors will clearly specify what type of collaboration is allowed or disallowed for a given assignment, and students should strictly follow the provided guidelines. When in doubt, students should contact the instructor and ask for clarifications.

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[http://studentconduct.ucmerced.edu/sites/studentconduct.ucmerced.edu/files/page/documents/academic\\_honesty\\_-\\_800.pdf](http://studentconduct.ucmerced.edu/sites/studentconduct.ucmerced.edu/files/page/documents/academic_honesty_-_800.pdf)

<sup>2</sup> These include all CSExxx classes, irrespective of the departmental affiliation of the instructor.

## **First Infraction**

If it is determined that a student has cheated, plagiarized, or otherwise violated the AHP, the student will receive a 0 (or equivalent grade) for the assignment. As per the AHP, violations will be reported to the Dean of the School of Engineering and to the Office of Student Conduct for review of possible violations of the Code of Student Conduct.

## **Additional Infractions**

The School of Engineering keeps a record of all infractions reported by its faculty. If upon receiving a notification it is determined that the student has one or more prior violations of the AHP, the School will inform the instructor who reported the new violation. The additional violation will immediately lead to a failing grade (F) for the course. The student will be informed in writing and will not be allowed to withdraw from the class. According to CSE Policy, students should note that even the first infraction in a class may lead to a failing grade if after reporting it is determined that the student had been previously sanctioned for one or more infractions in other classes. Students will have the right to appeal the instructor's decision as per AHP 802.00.A.

## **Resources**

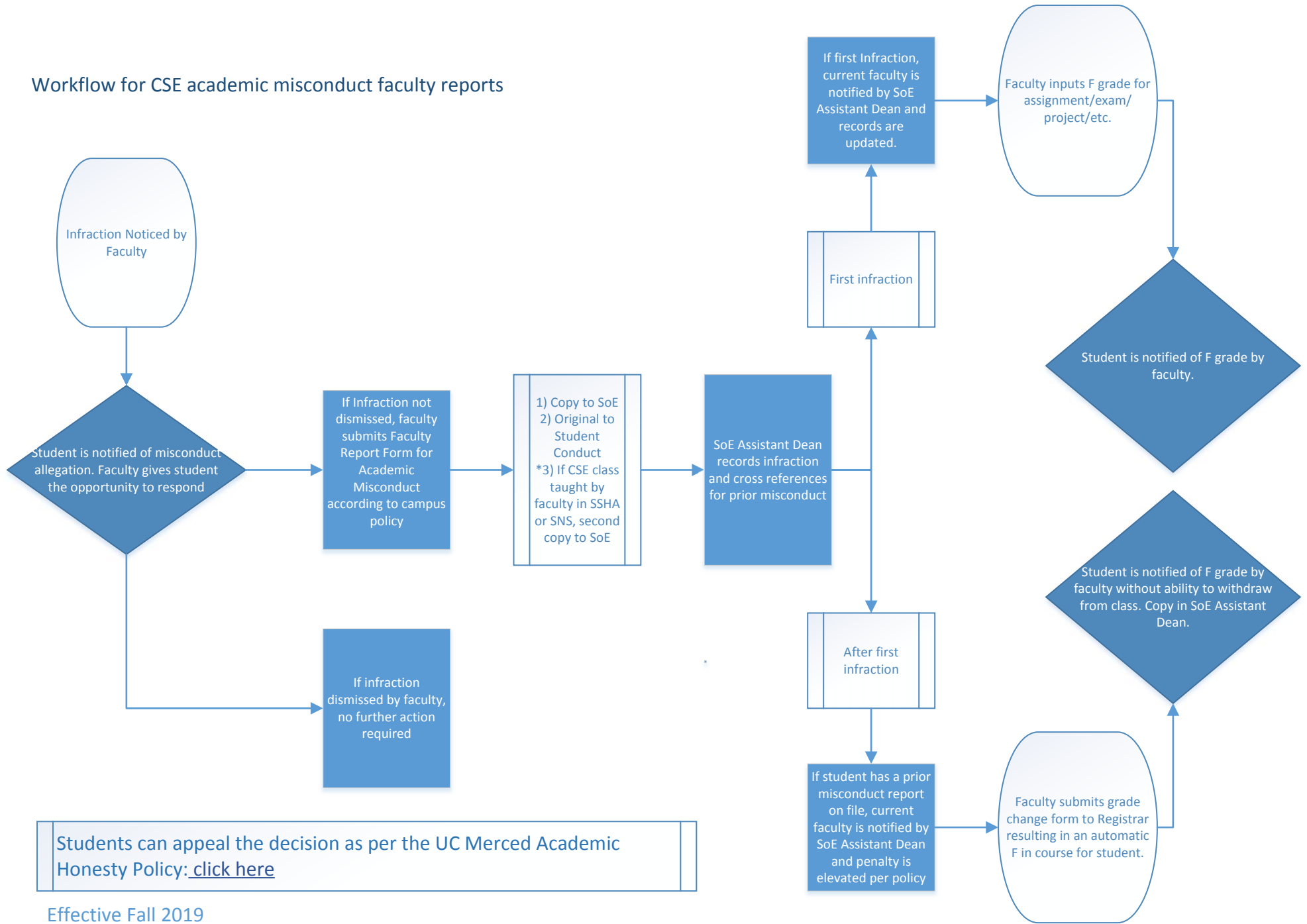
If in doubt, students are encouraged to seek guidance from the faculty, advisors, and the Office of Student Conduct. Additional resources can be found on:

<http://studentconduct.ucmerced.edu/>

<https://ombuds.ucmerced.edu/>

[https://eecs.ucmerced.edu/sites/eecs.ucmerced.edu/files/page/documents/computer\\_science\\_department\\_policy\\_on\\_academic\\_honesty\\_fall\\_2019.pdf](https://eecs.ucmerced.edu/sites/eecs.ucmerced.edu/files/page/documents/computer_science_department_policy_on_academic_honesty_fall_2019.pdf)

## Workflow for CSE academic misconduct faculty reports



Students can appeal the decision as per the UC Merced Academic Honesty Policy: [click here](#)

Effective Fall 2019

See full Policy [HERE](#)