Ira A. Fulton Schools of Engineering
Arizona State University

Course Syllabus and Schedule/Map – Fall 2021 (Session A)

CSE 551: Foundations of Algorithms

Instructor	Sohini Roy
Teaching Assistant(s)	Sucharith Reddy Desireddy Michael Kintscher Nithin Jayakar Padala
Virtual Office Hours	Details provided in Live Events section below and on course's Live Events page
Content Questions	Weekly discussion forums and live events
Course Issues	Course page "Feedback" and Issue "Flagging" tools
Technical Support	Coursera Learner Help Center NOTE: Please make sure you are logged in with your ASU email address so that support personnel recognize you as an ASU degree student.
Private Support	mcsonline@asu.edu NOTE: When sending an email about this class, please include the prefix "CSE 551" in the subject line of your message.
Slack Channel	https://asu-2217-cse551-88016.slack.com NOTE: You will be automatically added to this workspace, but you must access it using your ASURITE credentials.

~ Shortcut to Course Schedule ~

Course Description

Algorithms, or a step-by-step process to efficiently reach the desired goal, have been part of human history since the 1200s. Algorithms are a fundamental component to any computerized system. In this foundational course, you will learn

several different algorithms and be able to explain *how they work* and *why they are considered good.* This knowledge will help you:

1. Evaluate appropriate algorithmic techniques that can lead to more efficient solutions for a problem, instead of just coding the first idea that comes to mind.
2. Develop sound background knowledge on algorithms that will allow you to navigate the field's literature, beyond the context of this class.

In order to gain these skills, you will have to work through and understand several algorithmic techniques, including the mathematics necessary for analyzing the properties of these techniques and the algorithms based on them.

Specific topics covered include:

- Greedy Algorithms
- Stable Matching
- Divide-and-Conquer
- Dynamic Programming
- Amortized Analysis
- Network Flows
- NP-completeness
- Introduction to Randomized and Approximation Algorithms

Learning Outcomes

By completing this course, you will be able to:

- Identify and apply algorithmic techniques to solve a problem
- Apply knowledge of algorithms in multiple contexts using multiple programming languages
- Evaluate correctness and efficiencies of algorithms

Estimated Workload/Time Commitment

Average of 18 - 20 hours per week

Required Prior Knowledge and Skills

- Basic understanding of Asymptotic Notation (Big-Oh), recurrence relations, proof techniques, recursion, worst-case analysis, and basic discrete math (e.g., set theory, functions, logic, basic graph theory, etc.).
- Understanding of basic data structures and algorithms such as Sorting Algorithms, Hash Tables, Binary Search Trees, Heaps, and Red-Black Trees.
- Basic understanding of Greedy Algorithms, Divide-and-conquer, Dynamic Programming
- Basic understanding of Graph Algorithms such as Depth-First Search, Breadth-First Search, Minimum Spanning Trees (Kruskal's and Prim's algorithms), and Shortest-paths (Dijkstra's algorithm)

Technology

Hardware

- No special requirements except a machine with sufficient memory and processing power

Software

- Reliable Internet connection
- Up-to-date web browser

Textbook

There is no required textbook for this course. However, the following textbook is recommended:

J. Kleinberg and E. Tardos, ***Algorithm Design***. United States: Pearson Education, 2006.

Important Course Dates

The following dates will be key to your success in this course.

Event	Date	Please Note
Class begins	Thursday, August 19, 2021	
Holiday(s)	Monday, September 6, Labor Day	University closed
Midterm exam	**Opens:** Friday, September 10, 12:15 AM (AZ) **Closes/must be completed by:** Sunday, September 12, 11:45 PM (AZ)	**Last appointment** will be Sunday, September 12, **9:15 PM (AZ)**
Course evaluations	Approximately 9/26/21	Please watch for emails from ASU's University Office of Evaluation and Educational Effectiveness, which sets the dates for university evaluations.
Final exam	**Opens:** Thursday, October 7, 12:15 AM (AZ) **Closes/must be completed by:** Saturday, October 9, 11:45PM (AZ)	**Last appointment** will be Saturday, October 9, **9:15 PM (AZ)**
Class ends	Saturday, October 9, 2021	
Grades due	Monday, October 11, 2021	

Course Deadlines and Late Penalties

Unless otherwise noted, **all graded work is due** at **11:59 PM** the **Sunday** ending the **week** for which it is assigned. Solutions will be made available at 12:01 AM the Monday immediately following.

Late work: Late work will not be accepted and will result in a one-time 100% penalty.

Week	Main Topic	Begin Date	End Date/ Graded Work Due	Solutions Available
1	Stable Matching	Aug 19	Aug 22	Aug 23
2	Greedy Algorithms	Aug 23	Aug 29	Aug 30
3	Amortized Analysis and Splay trees	Aug 30	Sep 5	Sep 6
4	Divide and conquer	Sept 6	Sep 12	Sep 13
4	Midterm Exam	Sep 10	Sep 12	N/A
5	Dynamic Programming	Sep 13	Sep 19	Sep 20
6	Network Flows	Sep 20	Sep 26	Sep 27
7	Polynomial Time Reductions and NP-Completeness	Sep 27	Oct 3	Oct 4
8	Approximation and Randomized Algorithms	Oct 4	Oct 9	Oct 10
8	Final Exam	Oct 7	Oct 9	N/A

Live Events/Virtual Office Hours

This course will offer several live event/virtual office hour sessions each week, all of which will be hosted on Zoom. These sessions have an open, “drop-in” format to

provide everyone an opportunity to meet with the course instructor and/or teaching assistants as well as classmates to ask questions and learn more about course topics and assignments. Further details regarding the purpose of these events and the expectations surrounding them are provided below.

Live events/virtual office hours may be joined using a computer or a mobile device. iOS devices, however, are not fully supported at this time. To join from an iOS device, use the Zoom app and paste in the session URL. Using other mobile operating systems or a computer, simply open the Coursera app, navigate to "Live Events," and click the active link to join.

Event Dates and Times

All live events will run for **one hour**. Times shown are Phoenix, AZ.

Day	Start Time	Hosted By
Mon	3:00 P.M.	Sucharith Reddy
Tue	3:00 P.M.	Sohini Roy (instructor)
Wed	11:00 A.M.	Nithin Jayakar Padala
Thu	6:30 PM.	Michael Kintscher

Watch for announcements and check the Live Events page in the course for possible revisions to this schedule.

NOTE: *These events will be recorded and the instructor's live events will be uploaded to the course by the end of the day following each event. Look for the "Live Event Recording" section at the end of each week. TA virtual office hours will not be uploaded to the course but will be made available to individuals who attended them upon request.*

Live Events - Weekly

Live events are a valuable part of the learning experience because students can meet with the course instructor and fellow classmates to learn more about course topics, special topics within the field, and coursework. If you are able to attend these live events, you are strongly encouraged to do so. Even if you are ***not*** able to attend synchronously, if you have specific questions or topics of interest to be discussed during the live events, please ask your question

in the corresponding week's discussion forum prior to the live event, and request that your question be answered and/or topic covered. Although it may not be possible to address all requests live, the instructor is interested in tailoring the live events to your questions and interests. The instructor will typically follow a set agenda, so please be mindful of that when engaging in the live session.

Live Event Expectations

The environment should remain professional at all times. Inappropriate content/visuals, language, tone, feedback, etc. will not be tolerated, reported and subject to disciplinary action. Review the Policy Regarding Expected Classroom Behavior section of the syllabus and the Student Code of Conduct for more detailed information.

Virtual Office Hours - Weekly

Virtual Office Hours offer a chance for students to get their questions answered from the wider course team.

Virtual Office Hour Expectations

Although the course team is responsive to trends in the discussion forums and emails sent to mcsonline@asu.edu, these sessions focus on addressing students' specific questions related to content: clarifications, reteaching, assessment review, etc. These sessions are not intended to address program or course design questions or feedback. Teaching assistants do not have the authority to weigh in or make decisions regarding those items, so please do not include those at this time. These sessions are specific to helping students learn materials and understand various course assessments. Feedback of that nature is best addressed in the communication channel: mcsonline@asu.edu and please include it in your course survey.

The environment should remain professional at all times. Inappropriate content/visuals, language, tone, feedback, etc. will not be tolerated, reported and subject to disciplinary action. Review the Policy Regarding Expected Classroom Behavior section of the syllabus and the Student Code of Conduct for more detailed information.

Slack Channel

This course will have a unique Slack workspace where you can communicate with your classmates about topics other than the course itself.

Slack is intended to provide a space to create community with your classmates. Please remember to follow the communication protocol pinned in your Slack channel to ensure that any questions or concerns you have are addressed in a timely manner either in a weekly discussion forum, during a live event, or via an email sent to mcsonline@asu.edu. Also,

please remember ASU's Academic Integrity policy (see also **Policies** section below), and please refrain from sharing assessment questions, answers or solutions.

NOTE: You must access this workspace using your ASURITE credentials.

Course Content

The course comprises the following elements:

Instruction	Assessments
Video Lectures Readings Live Events/Virtual Office Hours **NOTE:** Transcripts are provided with the videos. PDFs of all lecture slides are provided in Week 1 in the "Welcome—Start Here" module."	Practice quizzes (auto-graded, feedback provided) Graded assignments (instructor- and auto-graded) Midterm and Final exam (proctored, auto-graded, instructor reviewed) **NOTE:** Solutions will be provided for graded quizzes and assignments.

Assessment Settings

The table below summarizes the course's assessment settings:

Assessment Type	Description	Time Limit	# of Attempts	Feedback
Practice quizzes/ Module Knowledge Checks	Each module includes Knowledge Check practice quizzes, which cover only each module's topic. The system may present a different selection of questions to you after your first attempt. These	None	Unlimited	Full (score, correct/ incorrect choices, explanations)

	quizzes do not contribute toward your final score in the class.			
Graded assignments	All weeks include one or more graded "homework" assignment. The nature and complexity of these assignments varies, but each comprises a reading that presents the problems and a **graded companion quiz** where you submit the results of your work. **NOTE:** These assignments are complex and time-consuming, and you will not pass the course without completing them and giving them your full attention.	None **NOTE:** There is no time limit for completing the work required to prepare for the graded assignment quizzes.	1	Full (score, correct/ incorrect choices)
Unit Practice Quizzes	Each unit includes a Unit/Weekly practice quiz, which covers the entire unit. These practice quizzes immediately	2 hours	Unlimited	Full (score, correct/ incorrect choices, explanations)

	precede the graded Unit/Weekly quizzes. The system may present a different selection of questions to you after your first attempt. These quizzes do not contribute toward your final score in the class.			
Unit Graded Quizzes	Each week includes a graded unit quiz, which covers the entire unit (all modules). These graded quizzes immediately follow the practice unit quizzes.	2 hours	1	Full immediately, and solutions will be released (day after quiz due date)
Exams	You will have two (2) proctored exams, a midterm and a final, taken in the course with ProctorU, each available for three (3) days. Additional ProctorU information is provided in Week 1. See Course Schedule below and Exam Instructions in	**Midterm:** 135 minutes, including 15-minute start-up **Final:** 135 minutes, including 15-minute start-up	1	Limited (score only)

	the course for full exam details, including allowed materials.			

Grade Breakdown

Course Work	**Quantity**	**Format**	**%**
Graded assignments	8	Individual	25
Graded weekly quizzes	8	Individual	15
Midterm exam (will cover Units 1-4)	1	Individual	30
Final Exam (will cover Units 5-8)	1	Individual	30

Grade Scale

Consistent with CIDSE policy, you must have a cumulative grade of at least 83% to earn a “B” in this course, and 73% (“C”) to earn credit for this course. The full list of cutoffs that will be used to generate your letter grade follows:

A+	≥97%
A	≥93%
A-	≥90%
B+	≥87%
B	≥83%

B-	≥80%
C+	≥77%
C	≥73%
C-	≥70%
D	≥60%
E	< 60%

NOTE: Grades may be curved based on overall class performance. For more information about grading, visit ASU's Grades & Records webpage.

Policies

All ASU and Coursera policies will be enforced during this course. For policy details, please consult the MCS Graduate Handbook and the MCS Onboarding Course.

Absence Policies

There are no required or mandatory attendance events in this online course. Live Events, both Live Sessions hosted by the faculty and Virtual Office Hours hosted by the course team do not take attendance. [Opportunity to insert expectations for teamwork/group work and what "attendance" or "absences" look like. A line can be added about grade adjustments based on individual contributions to teamwork/group work...*The instructor reserves the right to adjust individual grades based on, but not limited to: workload imbalance, inappropriate behavior, lack of productivity, etc.]

Students are to complete all graded coursework (e.g., projects and exams). If exceptions for graded coursework deadlines need to be made for excused absences, please contact the course team by prior to the work's due date using the mcsonline@asu.edu email address. Review the exam availability windows and schedule accordingly. The exam availability windows allow for your own flexibility and

you are expected to plan ahead. Personal travel does not qualify as an excused absence and does not guarantee an exception.

Review the resources for what qualifies as an excused absence and review the late penalties in the Assignment Deadlines section of the syllabus and the course:

a. Excused absences related to religious observances/practices that are in accord with ACD 304–04, "Accommodation for Religious Practices"
b. Excused absences related to university sanctioned events/activities that are in accord with ACD 304–02, "Missed Classes Due to University-Sanctioned Activities"
c. Excused absences related to missed class due to military line-of-duty activities that are in accord with ACD 304–11, "Missed Class Due to Military Line-of-Duty Activities," and SSM 201–18, "Accommodating Active Duty Military"

Policy Regarding Expected Behavior

The aim of education is the intellectual, personal, social, and ethical development of the individual. The educational process is ideally conducted in an environment that encourages reasoned discourse, intellectual honesty, openness to constructive change, and respect for the rights of all individuals. Self-discipline and a respect for the rights of others in the university community are necessary for the fulfillment of such goals. An instructor may withdraw a student from a course with a mark of "W" or "E" or employ other interventions when the student's behavior disrupts the educational process. For more information, review SSM 201–10.

If you identify something as unacceptable classroom/course/learning community behavior on the course site (e.g., Coursera discussion forum) or communication channels (e.g., Zoom, virtual live session, virtual office hours, Slack, etc.), please notify the course team using the mcsonline@asu.edu email. In the discussion forums, you can also flag the post for our attention. For more specifics on appropriate participation, please review our Netiquette infographic.

Our classroom community rules are to:

- Be professional
- Be positive
- Be polite
- Be proactive

Bottom line: You are expected to observe Coursera's policies as well as ASU's academic integrity and netiquette standards.

Academic Integrity

Students in this class must adhere to ASU's academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the ASU Academic Integrity Honor Code and the Fulton Schools of Engineering Honor Code. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains records of all violations and has access to academic integrity violations committed in all other ASU colleges/schools.

Copyright

Course content, including lectures, are copyrighted materials and students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course (see ACD 304– 06, "Commercial Note Taking Services" and ABOR Policy 5-308 F.14 for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Policy Against Threatening Behavior (SSM 104-02)

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services. Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU Disabilities Resource Center and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged. See ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

Mandated sexual harassment reporter: As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately.

Course Faculty

The following faculty member created this course.

Andrea Richa

Professor Andrea W. Richa joined Arizona State University (ASU) in 1998. She is currently affiliated with the Biomimicry Center at ASU, and the Biosocial Complexity Initiative in general. Prof. Richa's main areas of expertise are in distributed/network algorithms and computing in general. More recently she has focused on developing the algorithmic foundations on what has been coined as programmable matter, through her work on self-organizing particle systems (SOPS) (see sops.engineering.asu.edu). Her work has been widely cited, and includes, besides SOPS, work on bio-inspired distributed algorithms, distributed load balancing, packet routing, wireless network modeling and topology control, wireless jamming, data mule networks, underwater optical networking, and distributed hash tables (DHTs). Dr. Richa received the 2017 Best Senior Researcher award from the School of Computing, Informatics, and Decision Systems Engineering (CIDSE). She was the recipient of an NSF CAREER Award in 1999, an Associate Editor of IEEE Transactions on Mobile Computing, and the keynote speaker and program\general chair of several prestigious conferences. In particular, Prof. Richa was the Program Committee Chair of the 31st International Symposium on Distributed Computing (DISC), 2017, one of the top two conferences in distributed computing. Prof. Richa has also delivered several invited talks both nationally and internationally. For a selected list of her publications and other accomplishments, CV, and current research projects, please visit www.public.asu.edu/~aricha or sops.engineering.asu.edu .

Course Schedule

WEEK 1

Unit 1: Stable Matching

Learning Objectives

- Explain the importance of algorithms
- Identify and apply algorithmic techniques to solve the stable matching problem
- Evaluate the correctness and efficiency of the proposed stable matching algorithm

Modules

Module 1: Welcome, Start Here!
Module 2: Stable Matching

WEEK 1 – To Do

- ❏ Introduce yourself and start getting to know your classmates
- ❏ Attend and/or access Live Event/Virtual Office Hour(s)
- ❏ If you are registered with SAILS (formerly DRC) and require accommodations, inform the instructor.
- ❏ Create your ProctorU account (if you do not already have one)
- ❏ Schedule your midterm exam and complete the system test with ProctorU

WEEK 1 – Graded Work - Due by August 22, 2021

- ❏ Getting Started Quiz
- ❏ Graded Assignment 1 and Quiz
- ❏ Unit 1 Graded Quiz

WEEK 2

Unit 2: Greedy Algorithms

Learning Objectives

- Explain interval scheduling and interval partitioning
- Explain the problem of scheduling to minimize lateness
- Explain how to solve the optimal caching problem

- Present cut and cycle properties of minimum spanning trees
- Explain how to solve the shortest path problem using Dijkstra's algorithm

Modules

Module 1: Interval Scheduling and Interval Partitioning
Module 2: Scheduling to Minimize Lateness
Module 3: Optimal Offline Caching
Module 4: Revisiting Minimum Spanning Trees and Shortest Paths (Dijktra's)

WEEK 2 – To Do

❏ Attend and/or access Live Event/Virtual Office Hour(s)

❏ If you haven't already, schedule your midterm exam and complete the system test with ProctorU

WEEK 2 – Graded Work - Due by August 29, 2021

❏ Graded Assignment 2 and Quiz
❏ Unit 2 Graded Quiz

WEEK 3

Unit 3: Amortized Analysis and Splay Trees

Learning Objectives

- Explain Amortized Analysis
- Explain different methods of Amortized Analysis
- Review Dynamic Binary Search Trees and Balanced Search Trees
- Explain Splay Trees
- Prove amortized analysis of Splay Trees

Modules

Module 1: Amortized Analysis
Module 2: Splay Trees

WEEK 3 – To Do

❏ Attend and/or access Live Event/Virtual Office Hour(s)

❏ If you haven't already, schedule your midterm exam and complete the system test with ProctorU
❏ Study for midterm exam – covers Units 1 - 4

WEEK 3 – Graded Work - Due by September 5, 2021

❏ Graded Assignment 3 and Quiz
❏ Unit 3 Graded Quiz

WEEK 4 (Unit 4 and Midterm Exam)

Unit 4: Divide and Conquer

Learning Objectives

- Review the basics of divide-and-conquer technique
- Demonstrate general techniques of divide-and-conquer via examples
- Explain the closest pair of points algorithm
- Demonstrate the algorithm with an example
- Explain Karatsuba's integer multiplication algorithm
- Explain Strassen's fast matrix multiplication algorithm

Modules

Module 1: General Technique
Module 2: Closest Pair of Points
Module 3: Integer Multiplication and Matrix Multiplication

WEEK 4 – To Do

❏ Attend and/or access Live Event/Virtual Office Hour(s)
❏ If you haven't already, schedule your midterm exam and complete the system test with ProctorU

WEEK 4 – Graded Work - Due by September 12, 2021

❏ Graded Assignment 4 and Quiz
❏ Unit 4 Graded Quiz
❏ Midterm Exam (see below)

Midterm Exam

❏ Midterm exam (duration: 120 minutes + 15 minutes for startup with proctor)

Opens: Friday, September 10, 12:15 AM (AZ)
Closes: Sunday, September 12, 11:45 PM (AZ)
Last appointment: Sunday, September 12, 9:15 PM (AZ)

Conduct a system test prior to your appointment!

The following materials are allowed during the exam:

NOTES: Four sides of two sheets of 8.5x11 or international equivalent paper of handwritten notes ***OR*** two sides of one sheet of 8.5x11 or international equivalent of typed notes

SCRATCH (BLANK) PAPER: Four sides of two sheets of 8.5x11 or international equivalent paper to use as scratch paper with pen or pencil OR a physical dry erase white board, marker, and eraser

ATTENTION: Use of supplemental electronic devices (e.g., calculators) or software will not be permitted during the exam. No cell phones. No digital whiteboards. No bathroom breaks allowed. **You must destroy your scratch paper or erase your whiteboard at the end of the exam.**

PROCTORU NOTICES:

- ☐ You must schedule your exam at least 72 hours prior to your desired appointment to avoid having to pay a late-scheduling fee.
- ☐ Conduct a ProctorU system test PRIOR to your exam.

WEEK 5

Unit 5: Dynamic Programming

Learning Objectives

- Describe Dynamic Programming and its applications
- Explain solution of Weighted Interval Scheduling problem using Dynamic Programming

- Explain the solution of the Knapsack problem using Dynamic Programming
- Explain the solution of the Shortest Path problem using Dynamic Programming and Bellman-Ford Algorithm

Modules

Module 1: General Technique
Module 2: Weighted Interval Scheduling
Module 3: Knapsack
Module 4: Shortest Path: Bellman-Ford

WEEK 5 – To Do

❏ Attend and/or access Live Event/Virtual Office Hour(s)
❏ If you haven't already, schedule your final exam and complete a ProctorU system test.

WEEK 5 – Graded Work - Due by September 19, 2021

❏ Graded Assignment 5 and Quiz
❏ Unit 5 Graded Quiz

WEEK 6

Unit 6: Network Flows

Learning Objectives

- Explain the Maximum Flow problem
- Explain the Minimum Cut problem
- Explain the Ford-Fulkerson Algorithm
- Explain Max Flow-Min Cut Theorem
- Explain Capacity Scaling Algorithm
- Explain Bipartite Matching
- Explain Edge Disjoint Path problem
- Explain Network Connectivity problem

Modules

Module 1: Ford-Fulkerson Algorithm

Module 2: Max Flow-Min Cut Theorem
Module 3: Capacity Scaling Algorithm/Edmonds-Karp Algorithm
Module 4: Applications: Max Cardinality Bipartite Matching, Edge Disjoint Paths, and Network Connectivity

WEEK 6 – To Do

- ❏ Attend and/or access Live Event/Virtual Office Hour(s)
- ❏ If you haven't already, schedule your final exam and complete the system test with ProctorU

WEEK 6 – Graded Work - Due by September 26, 2021

- ❏ Graded Assignment 6 and Quiz
- ❏ Unit 6 Graded Quiz

WEEK 7 (Unit 7)

Unit 7: Polynomial Time Reductions and NP-Completeness

Learning Objectives

- Explain polynomial-time reductions/transformations
- Explain classes P and NP
- Define NP-complete problems
- Explain proofs of NP-completeness
- Describe examples of NP-completeness proofs

Modules

Module 1: Classes P and NP
Module 2: Polynomial-Time Reductions Module 3: NP-Completeness

WEEK 7 – To Do

- ❏ Attend and/or access Live Event/Virtual Office Hour(s)
- ❏ If you haven't already, schedule your final exam and complete the system test with ProctorU
- ❏ Study for final exam – covers Units 5, 6, 7, and 8

WEEK 7 – Graded Work - Due by October 3, 2021

- ❏ Graded Assignment 7 and Quiz
- ❏ Unit 7 Graded Quiz

WEEK 8

Unit 8: Introduction to Approximation and Randomized Algorithms

Learning Objectives

- Describe Approximation Algorithms
- Explain List Scheduling Algorithm via Load Balancing problem.
- Explain solution of Knapsack Problem via Approximation Algorithms
- Explain Skip Lists via examples

Modules

Module 1: Introduction to Approximation Algorithms
Module 2: Knapsack
Module 3: Skiplists

WEEK 8 – To Do

- ❏ Attend and/or access Live Event/Virtual Office Hour(s)
- ❏ Study for final exam – covers Units 4 - 8
- ❏ Complete course evaluation survey

WEEK 8 – Graded Work - Due by October 9, 2021

- ❏ Graded Assignment 8 and Quiz
- ❏ Unit 8 Graded Quiz
- ❏ Final exam (see below)

Final Exam

❏ Final exam (duration: 120 minutes + 15 minutes for startup with proctor)

Opens: Thursday, October 7, 12:15 AM

Closes: Saturday, October 9, 11:45 PM
Last appointment: Saturday, October 9, 9:15 PM (AZ)

Conduct a system test prior to your appointment!

The following materials are allowed during the exam:

NOTES: Four sides of two sheets of 8.5x11 or international equivalent paper of handwritten notes ***OR*** two sides of one sheet of 8.5x11 or international equivalent of typed notes

SCRATCH (BLANK) PAPER: Four sides of two sheets of 8.5x11 or international equivalent paper to use as scratch paper with pen or pencil OR a physical dry erase white board, marker, and eraser

ATTENTION: Use of supplemental electronic devices (e.g., calculators) or software will not be permitted during the exam. No cell phones. No digital whiteboards. No bathroom breaks allowed. **You must destroy your scratch paper or erase your whiteboard at the end of the exam.**

PROCTORU NOTICES:

- ☐ You must schedule your exam at least 72 hours prior to your desired appointment to avoid having to pay a late-scheduling fee.
- ☐ Conduct a ProctorU system test PRIOR to your exam.