CS 715 ±Advanced Analysis of Algorithms

UNIVERSITY OF NEVADA LAS VEGAS
Department of Computer Science
Semester/Term

Time: Asynchronous
Class Location: Virtual.
Office Location: WebEx
Office Hours: Thursday 3:00 pm±5:30 pm; Friday 11:00 am±12:30 noon(Subject to change).
Phone: 702 895 14776 Tm 0 g 0 G [(Time:)] TJ ET Q q 0.00000912 0 612 792 re W* n

This course gives advanced methods for the development and analysis of algorithms. After taking this course the student will have a thorough grasp of algorithmic foundations in computer science.

Program Competencies

In-depth familiarity with areas of theoretical computer science

Course Competencies

- x Advanced Analysis of Algorithms
- x Network Flow
- x Linear Programming
- x Sorting, Medians and Order Statistics
- x NP completeness I
- x NP completeness II Quantum Computing
- x Approximation Algorithms and Heuristics
- x Algorithms from Computational Geometry
- x String Matching
- x Modular Arithmetic and RSA
- x Fast Fourier Transform
- x Online Competitive Algorithms
- x Advanced Methods for Dynamic Programming
- x Matching and Assignment Problems
- x Scheduling Algorithms

Learning Outcomes Course Objectives

1. Display knowledge of specialized areas and advanced topics in computer science.
2. Exhibit a depth of knowledge in a number of specialized areas of computer science.

Required Text

Introduction to Algorithms, 3rd Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, ISBN 10: 9780262033848, The MIT Press, 2009.

Evaluation Methods

1. Assignments
    - x Submitted and graded through Canvas.
    - x Written homework assignments. (35%).
    - x Assignments are due on Saturdays.
    - x Assignments are submitted as a PDF file. The maximum permissible size per assignment is 4 pages and 5MB.

- x Assignments should be typeset (ideally using Latex). However, scanned handwritten solutions are permitted. In the case of a handwritten scanned document it has to be crisp quality, no gray washed documents are accepted.

2. Presentation
   - x Every student will prepare one 25 minute presentation. Topics are available will be provided in Canvas (counts for 30% of the grade).

3. Examinations
   - x Midterm (not cumulative, counts for 15% of the grade) Length 75 minutes.
   - x Final Exam (cumulative, covers all material, counts for 20% of the grade) Length 120 minutes.

Academic Dishonesty

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Grading Scale

A   > 89

Copyright

The University requires all members of the University Community to familiarize themselves with, and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect nor defend you, nor assume any responsibility for student or employee violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional copyright policy information is available at https://www.unlv.edu/provost/copyright.

Disability Resource Center (DRC)

The UNLV Disability Resource Center (Student Services Complex, SSC Room 143, https://www.unlv.edu/drc, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

Final Examinations

The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The Final Exam schedule is typically available at the start of the semester, and the classroom location available approximately one month before the end of the semester. See the Final Exam Schedule, https://www.unlv.edu/registrar/calendars.

Identity Verification in Online Courses

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas.

To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus Canvas or another UNLV-managed platform that requires ACE login credentials for access.

Incomplete Grades

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This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith by both the effort instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

Rebelmail

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staff should only send emails to students' Rebelmail accou V H Q G   H P D L O V   W R   V W X G H Q W V ¶   5 H E H O P D L O   D F F R X ... ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail acco unt after they have been admitted to the University. Sending emails within WebCampus Canvas is also acceptable.

Tutoring and Coaching

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see University Statements and Compliance, https://www.unlv.edu/about/statements-compliance.

A successful learning experience requires mutual respect and trust between the students and the L Q V W U X F W R U $ F F R U G L Q J O \   W K H   L Q V W U X F W R U   D V N V   W K D W points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, civil language when expressing their perspectives.

UNLV Land Acknowledgement

UNLV is situated on the traditional homelands of Indigenous groups, including the Nuwu or Nuwuvi, Southern Paiute People, descendants of the Tudinu, or Desert People. We honor and offer gratitude for those who have stewarded the land; for the land itself; and for the opportunity to cultivate a thriving, diverse, inclusive, and just scholarly community here today that works for a better tomorrow for all.

Course Agenda/Schedule

Module	Topic
Get started	Introduction
Module 1	Advanced Analysis of Algorithms
Module 2	Network Flow
Module 3	Linear Programming
Module 4	Sorting, Medians and Order Statistics
Module 5	NP completeness I
Module 6	NP completeness II, Quantum Computing
Module 7	Approximation Algorithms and Heuristics
Module 8	Algorithms from Computational Geometry
Module 9	String Matching
Module 10	Modular Arithmetic and RSA
Module 11	Fast Fourier Transform
Module 12	Online Competitive Algorithms
Module 13	Advanced Methods for Dynamic Programming
Module 14	Matching and Assignment Problems
Module 15	Scheduling Algorithms