University of North Dakota

Department of Computer Science

CSci242 - Algorithms and Data Structures – Spring 2019

Lecturer: Emanuel S. Grant emanuel.grant@engr.und.edu 701.777.4133

Office: Upson II, room 366D

Office Hour: Tuesday and Thursday, 10:00am – 12:00 noon (or by appointment)

TA: Kencoy Jones kencoy.jones@und.edu

TA Office Hours: TBD

Lecture Room: Education, room 5

Lecture: Monday Wednesday, Friday 1:00pm – 1:50pam

Credit: 3 credits

Prerequisite: CSci161 and Math208.

Course Text: Algorithm Design and Applications by Michael T. Goodrich, Roberto Tamassia.

Description: Object-oriented implementations of complex data structures including lists, sets, trees, and graphs. Time and space analysis and classification of algorithms using upper bounds (big Oh), lower bounds (big Omega), and exact bounds (big Theta). Techniques for analysis of recursive algorithms including use of the "Master Theorem" for divide-and-conquer recurrences.

ABET Outcomes:

- (a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Grading:

Quiz (4)	20%
Mid-term exam	25%
Assignment	30%
Final exam	25%

Date: Quiz: 01/25/19, 02/22/19, 03/29/19, 04/26/19 (during lecture session)
Mid-term exam: Friday March 8, 2019 (during lecture session)
Assignment: Assigned weekly on a Friday; due a week later on a Friday
Final exam: Wednesday May 8, 2019, 1:00pm – 3:00pm

***** Dates are subject to change *****

ALL COURSE MATERIAL WILL BE POSTED ON BLACKBOARD

Late Assignment: Assignments may be submitted up to three school days late. Such late assignments will incur a penalty of 10% deduction for each late day. No assignments will be accepted that is more than three (3) school days late but may be considered for points if a valid written excuse is provided. If a test or assignment submission will be missed then the student should notify the instructor before the due date of the test or assignment to obtain alternative arrangement.

Email Protocol: All email communications from the instructor and TA will be sent to your official UND email address. All email from students to the instructor or TA must be sent from the students official UND email address and must include the prefix "**CSci242**" in the Subject field.

Topics:

1. Role of algorithms in computing
2. Techniques for designing algorithms
3. Techniques for analyzing algorithms
4. Growth of functions (asymptotic notation)
5. Recurrence relationships
6. Sorting algorithms
7. Analysis of sorting algorithms
8. Data structures
   - stacks and queues
   - linked lists and pointers
   - hash tables
   - binary search trees
   - red-black trees
9. Dynamic programming
10. Greedy algorithms
11. Heaps
12. Graph algorithms
13. Minimum spanning trees
14. Shortest paths
15. Linear programming
16. String matching
17. NP-Completeness

(All programming assignments are to be done using C, or C++ programming languages, and must be executable on the Departments lab computers)

Assignment: On completing the topics of each chapter of the class text book an assignment will be given. This assignment will test your comprehension of the topics covered in the respective chapters, and will be due one week after being assigned. All electronically submitted assignments must be in MS Word format and named in the following manner: **CSci242Assign*XX*LastNameFirstName.docx** where ***XX*** is the assignment number.

Quiz: Quizzes will usually consist of five (5) to ten (10) questions, which are to be completed within the specified time period. Each quiz will be based on material covered since the previous quiz.

Mid-term exam: The mid-term exam will be based on all material covered up to and including the lecture before the mid-term exam, and must be completed within the specified period. Half of the session immediately before the mid-term exam will be used as a review session, and students are expected to pose questions on topics with which they have difficulty.

Final exam: The final exam will be based on all material covered since the mid-term exam.

Notice of Nondiscrimination

It is the policy of the University of North Dakota that no person shall be discriminated against because of race, religion, age, color, gender, disability, national origin, creed, sexual orientation, gender identity, genetic information, marital status, veteran's status, or political belief or affiliation and the equal opportunity and access to facilities shall be available to all. Concerns regarding Title IX, Title VI, Title VII, ADA, and Section 504 may be addressed to Donna Smith, Director of Equal Employment Opportunity/Affirmative Action and Title IX Coordinator, 401 Twamley Hall, 701.777.4171, und.affirmativeactionoffice@UND.edu or the Office for Civil Rights, U.S. Dept. of Education, 500 West Madison, Suite 1475, Chicago, IL 60611 or any other federal agency.

Disability Statement

If you need accommodation in this course because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible. If you plan to request disability accommodations, you are expected to register with the Disability Services for Students (DSS) office (190 McCannel Hall, 777.3425 v/tty).

Academic Honesty

All students are subject to the UND Code of Student Life, including but not limited to, issues of Scholastic Dishonesty. Any and all cases of Scholastic Dishonesty will be reported to the Registrar's Office and the Division of Student Affairs and Diversity.

Please make use of the office hours – There is no dumb question if you don't understand…