

**VIRGINIA COMMONWEALTH UNIVERSITY  
SCHOOL OF ENGINEERING**

**CMSC 501: ADVANCED ALGORITHMS  
Fall 2022**

**Credits:** 3 lecture hours. 3 credits

**Instructor:** Thang Dinh

**Class hours:** Online [Recommended to watch videos MW 9:30-10:45AM]

Recorded lectures are posted on Canvas

**Office hours/Discussion:** MW 11:00am-noon, Zoom

**Course Web Site:** Canvas

**Prerequisites:** CMSC 401 with a grade of “C” or better and graduate student standing or acceptance into the five-year accelerated B.S. and M.S. program in computer science

**Course Description:** Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 or equivalent; graduate standing or acceptance into accelerated B.S. to M.S. program in computer science. Advanced data structures, and advanced graph algorithms, combinatorial optimization methods, NP-completeness, approximation algorithms, online and streaming algorithms.

**Textbooks (required):**

- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, 3<sup>rd</sup> Edition.

**List of Topics:**

Complexity and Master Theorem, Average & Amortized Complexity, Binary Search Tree, Dynamic Programming Algorithms, Greedy Algorithms & Matroid, Graph Algorithms: Shortest paths, Network flow, Min-cost flow, Linear programming, Duality Theory, Polynomials and the FFT, NP-completeness, Approximation Algorithms, Randomized Algorithms, Online and Streaming Algorithms.

## **Grading:**

**Homework:** 30%

**Midterm exam:** 25%

**Final exam:** 30%

**Programming Assignments:** 15%

**Final grade:** A (90% - 100%), B (80% - 89%), C(70% - 79%), D(60%-69%), F(0% - 59%)

## **Statements for Syllabi and Blackboard Pages**

The topics are:

1. VCU Email Policy
2. VCU Honor System: Upholding Academic Integrity
3. Student Conduct in the Classroom
4. Students with Disabilities
5. Statement on Military Short-Term Training or Deployment
6. Excused Absences for Students Representing the University
7. Campus Emergency Information
8. Important Dates
9. VCU Mobile
10. Class registration required for attendance

### **Email Policy**

Electronic mail or "email" is considered an official method for communication at VCU because it delivers information in a convenient, timely, cost effective and environmentally aware manner. Students are expected to check their official VCU e-mail on a frequent and consistent basis in order to remain informed of university-related communications. The University recommends checking e-mail daily. Students are responsible for the consequences of not reading, in a timely fashion, university-related communications sent to their official VCU student e-mail account. This policy ensures that all students have access to this important form of communication. It ensures students can be reached through a standardized channel by faculty and other staff of the university as needed. Mail sent to the VCU email address may include notification of university-related actions, including disciplinary action. Please read the policy in its entirety: <http://www.ts.vcu.edu/kb/3407.html>

### **VCU Honor System: Upholding Academic Integrity**

The VCU honor system policy describes the responsibilities of students, faculty and administration in upholding academic integrity, while at the same time respecting the rights of individuals to the due process offered by administrative hearings and appeals. According to this policy, "members of the academic community are required to conduct themselves in accordance with the highest standards of academic honesty and integrity." In addition, "All members of the VCU community are presumed to have an understanding of the VCU Honor System and are required to:

- Agree to be bound by the Honor System policy and its procedures;
- Report suspicion or knowledge of possible violations of the Honor System;
- Support an environment that reflects a commitment to academic integrity;
- Answer truthfully when called upon to do so regarding Honor System cases, and,

- Maintain confidentiality regarding specific information in Honor System cases.”

The Honor System in its entirety can be reviewed on the Web at [http://www.provost.vcu.edu/pdfs/Honor\\_system\\_policy.pdf](http://www.provost.vcu.edu/pdfs/Honor_system_policy.pdf) or it can be found in the current issue of the VCU Insider at <http://www.students.vcu.edu/insider.html>

### **Student Conduct in the Classroom**

According to the *Faculty Guide to Student Conduct in Instructional Settings*

(<http://www.assurance.vcu.edu/Policy%20Library/Faculty%20Guide%20to%20Student%20Conduct%20in%20Instructional%20Settings.pdf>), "The university is a community of learners. Students, as well as faculty, have a responsibility for creating and maintaining an environment that supports effective instruction. In order for faculty members (including graduate teaching assistants) to provide and students to receive effective instruction in classrooms, laboratories, studios, online courses, and other learning areas, the university expects students to conduct themselves in an orderly and cooperative manner." Among other things, cell phones and beepers should be turned off while in the classroom. Also, the university Rules and Procedures prohibit anyone from having "in his possession any firearm, other weapon, or explosive, regardless of whether a license to possess the same has been issued, without the written authorization of the President of the university..." For more information, visit the VCU Insider online at <http://www.students.vcu.edu/insider.html>

### **Students with Disabilities**

SECTION 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 as amended, require that VCU provides "academic adjustments " or "reasonable accommodations" to any student who has a physical or mental impairment that substantially limits a major life activity. To receive accommodations, students must request them by contacting the Disability Support Services Office on the Monroe Park Campus (828-2253) or the Division for Academic Success on the MCV campus (828-9782). More information is available at the Disability Support Services webpage: <http://www.students.vcu.edu/dss/> ; or the Division for Academic Success webpage at [www.specialservices.vcu.edu/disabilityss](http://www.specialservices.vcu.edu/disabilityss).

If you have a disability that requires an academic accommodation, please schedule a meeting with me at your earliest convenience. Additionally, if your coursework requires you to work in a lab environment, you should advise your instructor or a department chairperson of any concerns you may have regarding safety issues related to your disability. This statement applies not only to this course but also to every other course in this university.

### **Statement on Military Short-Term Training or Deployment**

If military students receive orders for short-term training or deployment, they should inform and present their orders to Military Student Services and to their professor(s). For further information on policies and procedures contact Military Services at 828-5993 or access the corresponding policies at <http://www.pubapps.vcu.edu/bulletins/about/?Default.aspx?uid=10096&iid=30704> and <http://www.pubapps.vcu.edu/BULLETINS/undergraduate/?uid=10096&iid=30773>.

### **Excused Absences for Students Representing the University**

Students who represent the university (athletes and others) do not choose their schedules. Student athletes are required to attend games and/or meets. All student athletes should provide their schedule to the instructor at the beginning of the semester. The Intercollegiate Athletic Council (IAC) strongly encourages faculty to treat missed classes or exams (because of a scheduling conflict) as excused absences and urges faculty to work with the students to make up the work or exam.

### **Campus Emergency information**

#### What to Know and Do To Be Prepared for Emergencies at VCU:

- Sign up to receive VCU text messaging alerts (<http://www.vcu.edu/alert/notify>). Keep your information up-to-date. Within the classroom, the professor will keep his or her phone on to receive any emergency transmissions.
- Know the safe evacuation route from each of your classrooms. Emergency evacuation routes are posted in on-campus classrooms.
- Listen for and follow instructions from VCU or other designated authorities. Within the classroom, follow your professor's instructions.
- Know where to go for additional emergency information (<http://www.vcu.edu/alert>).
- Know the emergency phone number for the VCU Police (828-1234). Report suspicious activities and objects.

#### **Important Dates**

Important dates for the Spring 2013 semester are available at:

[http://academiccalendars.vcu.edu/ac\\_fullViewAll.asp?term=Spring+2013](http://academiccalendars.vcu.edu/ac_fullViewAll.asp?term=Spring+2013)

#### **VCU Mobile**

The VCU Mobile application is a valuable tool to get the latest VCU information on the go. The application contains helpful information including the VCU directory, events, course schedules, campus maps, athletics and general VCU news, emergency information, library resources, Blackboard and more. To download the application on your smart phone or for more information, please visit <http://m.vcu.edu>.

#### **Class Registration Required for Attendance**

Please remember that students may only attend those classes for which they have registered. Faculty may not add students to class rosters. Therefore, if students are attending a class for which they have not registered, they must stop attending.