



UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF COMPUTER SCIENCE  
COURSE OUTLINE

1. **Course:** CPSC 413: Design and Analysis of Algorithms I

**Lecture Sections:**

L01, TR 12:30-13:45, Wayne Eberly, ICT 613, 220-5073, [eberly@ucalgary.ca](mailto:eberly@ucalgary.ca)

Office Hours: TR 14:00-14:50

**Course Website:** D2L

**Computer Science Department Office, ICT 602, 220-6015, [cpsc@cpsc.ucalgary.ca](mailto:cpsc@cpsc.ucalgary.ca)**

2. **Prerequisites:** CPSC 313 and either CPSC 331 or both CPSC 319 and CPSC 105, and MATH 211 or 213, and one of MATH 249, 251, 265, 275, 281 or AMAT 217  
(<http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620>)
3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments (Best 4 out of 5)	45%
Midterm Test	20%
<i>(Monday February 27<sup>th</sup>, 2017 at 18:00 in ST 141 and ST 143)</i>	
Final Exam	35%

This course **will** have a Registrar's Scheduled Final Exam.

Special Regulations affecting Final grade: Each of the above components will be given a percentage grade. The final grade will be calculated weighted by the percentage given above, rounded up to the nearest integer between 0 and 100, and the reconverted to a final letter grade using the attached cut-offs. In order to obtain a final grade of C- or better, students are required to obtain an averaged percentage of C- (58%) or better on the midterm test and final exam.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.6 of the University calendar.
5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative arrangements can be made.
6. **Course Materials:**  
Algorithm Design, Jon Kleinberg and Eva Tardos, Addison Wesley 2006 (Recommended)  
Introduction to Algorithms Third Edition, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, The MIT Press 2009 (Recommended)

**Online Course Components:**

Lecture slides will be posted on D2L

7. **Examination Policy:** Closed book. Students should also read the Calendar, Section G, on examinations.
8. **Approved Mandatory and Optional Course Supplemental Fees:** None.

9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

- a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.
- b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.
- c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at [http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities\\_0.pdf](http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf). Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science.
- d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>
- f) **Student Union Information:** VP Academic (403) 220-3911 [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca) SU Faculty Rep (403) 220-3913 [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca), Student Ombuds Office: (403) 220-6420 [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca), <http://ucalgary.ca/provost/students/ombuds>
- g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference – please participate in USRI surveys.

Department Approval \_\_\_\_\_ Date \_\_\_\_\_

Faculty Approval for  
out of regular class-time activity: \_\_\_\_\_  
Date: \_\_\_\_\_

Faculty Approval for  
Alternate final examination arrangements: \_\_\_\_\_  
Date: \_\_\_\_\_

\*A signed copy of this document is on file in the Computer Science Main Office\*

**CPSC 413 Percentage to Letter Grade Conversion Table**

A+	96-100
A	91-95
A-	86-90
B+	81-85
B	76-80
B-	71-75
C+	66-70
C	62-65
C-	58-61
D+	55-57
D	50-54
F	0-49

## **CPSC 413 Syllabus**

Tentative Topics Covered:

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- \* Correctness and Efficiency of Simple Algorithms
- \* Algorithm Design: Divide and Conquer
- \* Algorithm Design: Dynamic Programming and Memoization
- \* Algorithm Design: Greedy Algorithms
- \* Introduction to Computational Complexity Theory

### **Learning Outcomes:**

By the end of the course, students will:

- Illustrate using examples, define and generalize problems definitions. Students will be able to understand preconditions and postconditions, and use these to define computational problems in a reasonably precise way.
- \* Give a proof that a (reasonably simple) algorithm solves a computational problem correctly.
- \* Analyze the running time of a (reasonably simple) algorithm using summations and recurrences, and express this running time using asymptotic notation.
- Design algorithms using Greedy, Dynamic Programming and Divide and Conquer design approaches.
- Suggest a promising design approach given a problem, initial algorithm and target run-time.
- Prove a problem to be NP-Complete using polynomial-time reductions and efficient certification.
- Suggest a promising design approach given a problem, initial algorithm and target run-time.
- Classify problems as being in P, NP, NP-hard or NP-complete - or, at least, make an informed guess about this, based on the complexity of other problems that they know about.

**Allowable Sources:**

No Restrictions on source material.

**Cited Sources:**

If you used an article, book, function or algorithm that you did not create for this course you must cite it. (This means you may have to cite yourself!) Use APA for citations in a report, paper or in the header documentation of computer code you submit. If citing a website, make sure you include the date you accessed the website. Don't forget to cite code that you used, even if you modified the code.

**Level of Collaboration between Students:**

You may discuss the assignments with other students in the class, who are not part of your group, but do NOT share any code, or any other written work that will be included in your assignment submission. Do not ask others to provide you with code or solutions to assigned problems, and do not show code or other written work that you have created for assignments to other students.

You are also not allowed to discuss assigned work with tutors: Tutorial exercises generally cover the same material and can be discussed instead.

**Disclosure Policy**

If you discuss the assignments with others, make sure to cite these discussions.