

# CS 2214B: Discrete Structures for Computing

## Winter 2021 Course Outline

### Objectives and contents of the course

This course presents an introduction to the mathematical foundations of computer science, with an emphasis on mathematical reasoning, combinatorial analysis, discrete structures, applications and modeling, and algorithmic thinking. Topics may include sets, functions, relations, algorithms, number theory, matrices, mathematical reasoning, counting, graphs and trees. Tentative list of specific topics includes:

- Foundations: logic and proofs
- Basic Structures: sets, functions, sequences, sums and matrices
- Number Theory and Cryptography (divisibility and modular arithmetic, integer representations, primes and greatest common divisors)
- Induction and Recursion
- Counting (basics of counting, pigeonhole principle, permutations and combinations)
- Discrete Probability (introduction to discrete probability, Bayes' Theorem)
- Relations (equivalence relations, partial orders)
- Graphs (graphs and graph models, connectivity, Euler and Hamiltonian paths)

The recommended textbook is Discrete Mathematics and Its Applications, 7th Edition, 2012, Kenneth Rosen, McGraw-Hill.

### Prerequisites

Either

1. Computer Science 1027A/B, Computer Science 1037A/B, or Computer Science 2101A/B, in each case with at least 65%, and 1.0 course with at least 60% in each from: Applied Mathematics 1201A/B, Applied Mathematics 1413, Calculus 1000A/B, Calculus 1301A/B, Calculus 1500A/B, Calculus 1501A/B, Mathematics 1600A/B.

**or**

2. Integrated Science 1001X with at least 60%.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

### Anti-requisites

Mathematics 2151A/B, Mathematics 2155F/G.

## Instructor

### Peter Valovcik

Email: pvalovc@uwo.ca

Office hours time: Monday, 13:30 - 15:30

Office hours format: Zoom meetings

Office hours location: see the [OWL web site](#) of the course

## Polices regarding email and contact

For all questions related to the course materials (lectures, assignments, tutorials and exams) students **must use the forum** of the [OWL web site](#) instead of contacting the instructor or the TAs by email. Indeed a question about the lectures or an assignment problem is likely to be of interest to many students in the class. Writing to the instructor or the TAs should only be done for handling a personal matter, like illness the day of the Final Exam.

When writing to the instructor or TAs, **emails must be sent from your uwo email account**. Emails from other accounts will not receive a response since this would raise potential privacy concerns (anyone can make a non-Western email with any name).

## Delivery mode

The format of the course lectures will be recorded videos accompanied by lecture slides. At the beginning of each week (by 14:00 Tuesday), the videos and slides corresponding to the lectures of that week will be posted on the [OWL web site](#) of the course.

The format of tutorials will also be recorded videos accompanied by a PDF of some problems corresponding to the lecture content of the same week they are posted. Around the middle of each week (by 14:00 Thursday), the tutorial video and problems will be posted on the [OWL web site](#) of the course.

Office hours will be synchronous and they will not be recorded.

## Course Website

Students should use the [OWL web site](#) as the primary website for the course where all content, news and updates will be available. Announcements on OWL may be used to communicate important updates including but not limited to: an error in an assignment, and the midterm date/time. Students are responsible for checking OWL on a regular basis.

If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

## Protection of online content

The instructor owns the intellectual property (IP) of the lectures and lecture materials even when such lectures or materials are posted online. Students are not to post lectures or lecture materials (assignment statements, assignment solutions, etc.) to any other websites or platforms or use the lecture recording or materials for any other purpose.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written consent of the instructor.

## Class schedule

While lecture and tutorial time slots appear on the Undergraduate Fall/Winter Academic Timetable, course content is offered asynchronously in the form of recorded videos, lecture slides, and tutorial question posted weekly.

## Computer requirements

Students must have a reliable internet connection and a computer that is compatible with online learning (including working microphone and webcam) and testing system requirements.

As for web browser, using [Mozilla Firefox v80.0 or Higher](#) is required. Firefox supports MathML, while Chrome currently does not; you may need MathML support to be able to view some math symbols correctly for assignments/exams.

## Methods of evaluation

The overall course grade, out of 100, will be calculated as follows:

- 5 assignments, each worth 5%, the sum of which will constitute 25% of the final grade;
- one midterm exam worth 25%,
- the final exam worth 50%.

None of the components will be dropped, and it is not possible to have the components re-weighted unless they were legitimately missed.

The Midterm is a written exam that will last 1 hr 45 min. The 3-hour written Final exam will be scheduled during the exam period.

**NOTE:** if your mark for the Final exam is better than your mark for the Midterm then your Midterm mark will be automatically **raised by half of the absolute difference of their percentage scores**, provided that you took the Midterm. For example, if you had 60% on the Midterm and 80% on the Final, then your Midterm mark would be raised to:  $60\% + |80\% - 60\%| \div 2 = 70\%$ .

More details about the Midterm and Final exams will become available closer to their date. These details will include things such as: which course content may be tested and information about the format.

It is a Faculty of Science policy that a student who chooses to write a test or exam deems themselves fit enough to do so, and the student must accept the mark obtained. Claims of medical, physical, or emotional distress after the fact will not be considered.

To obtain a passing grade in the course, a student must obtain at least 50% on the final exam and the weighted average on the assignments and final exam.

## Tentative assignment schedule

	Posted/Given	Due	Weight
Assignment 1	Th. Jan. 21	We. Feb. 3, 23:55	5%
Assignment 2	Th. Feb. 4	We. Feb. 24, 23:55	5%
Assignment 3	Th. Feb. 25	We. Mar. 10, 23:55	5%
Midterm Exam	TBA (expect early Mar.)		25%
Assignment 4	Th. Mar. 11	We. Mar. 24, 23:55	5%
Assignment 5	Th. Mar. 25	We. Apr. 7, 23:55	5%
Final Exam	TBA		50%

## Rules about assignments

Assignment descriptions will be posted on the OWL website of the course at least one week before the due date of the assignment.

Any changes, updates, and clarifications to assignments will also be posted on the OWL website of the course. It is the responsibility of the students to monitor these pages closely.

The submission of assignments is electronic using OWL.

**Assignments must be typed using a text editor and submitted in PDF format.** Furthermore, images of handwritten work made into a PDF are not acceptable submissions. Failure to submit assignments in the correct format **will result in a mark penalty.**

The following list shows the penalty (amount you will lose) for a submission of any incorrect format that is not handwritten:

- 10% on assignment 1
- 25% on assignment 2
- 50% on assignment 3
- 75% on assignment 4
- 100% on assignment 5

**Submission of handwritten work without approved accommodation will receive a penalty of 100% (resulting in a mark of 0%) on all assignments.**

When a student submits an assignment for evaluation, this student automatically certifies that the material she/he has handed in is exclusively her/his own work.

It is the student's responsibility to keep up-to-date backups of assignment disk files in case of system crashes or inadvertently erased files.

## Grading policies

Every effort will be made to have homework assignments and exams marked and handed back within 2 weeks of the hand-in date. If we are unable to comply with our intended return dates, revised dates will be posted on the course website.

In case of questions regarding the marks, please note that no assignments or exams will be accepted for re-marking later than 2 weeks after they have been marked.

When an assignment is returned you will be provided with information about which TAs to contact with inquiries.

## Online proctoring

Examinations in this course will be conducted using Zoom. You will be required to keep your camera and microphone on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session will not be recorded. More information about the use of Zoom for exam invigilation is available in the Online Proctoring Guidelines at the following link:

<https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link: <https://support.zoom.us/hc/en-us>

To minimize the number of conflicts between tests that could occur if instructors are given free rein to schedule their own tests, the Registrar's Office is developing a mechanism to request times for midterm tests. In addition, central management is necessary to ensure that capacity for proctored online exams is not exceeded.

## Late assignment policy

Late assignments are penalized as follows (amount you will lose):

- 10% for one day late
- 25% for two days late
- 50% for three days late
- 75% for four days late

After five days have passed from the due-date, no assignments will be accepted for marking.

**No extensions will be given for any assignment.**

If there is an academic accommodation approved by the Dean's office (see Accommodations section below) the corresponding assignment will be dropped and its weight will be added to the other assignments.

## **Rules about not meeting a course requirement**

If you are unable to meet a course requirement (final exam or assignment due date) due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

No make-up Midterm will be given. If you miss the Midterm without an academic/medical accommodation, your Midterm mark will be half of the percentage mark you receive on the Final exam (as detailed earlier when your Final exam mark is higher than your Midterm mark). If you have a valid accommodation for missing the midterm, then the entire weight will be moved to the Final exam making it worth 75% of your grade. The Final exam will cover the material of the whole course.

If you miss the Final Exam, contact your faculty's Academic Counselling Office as soon as possible. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

## **Academic consideration for student absence**

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructor within 24 hours of the end of the period of the self-reported absence. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year.

If the conditions for a Self-Reported Absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home

For policy on Academic Consideration for Student Absences, follow this [link](#), and for the Student Medical Certificate (SMC), follow this other [link](#).

## Accommodation policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found [here](#).

## Religious accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the [Western Multicultural Calendar](#).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" , follow the [link](#).

## Academic policies

The website for Registrarial Services is [here](#).

In accordance with this [policy](#), the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

As mentioned above, participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

As mentioned above, examinations in this course will be conducted using the remote proctoring service, such as [Zoom](#). By taking this course, the students are consenting to the use of this software and acknowledge that they will be required to provide personal information. More information about this remote proctoring service is available in the [Online Proctoring Guidelines](#).

## Ethical conduct

Scholastic offences are taken **seriously** and students are directed to read the appropriate policy, specifically, the definition of what constitutes a **Scholastic Offence**, at this [website](#).

Computer-marked, multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that

may indicate cheating. In particular, checking software, such as [MOSS](#), [Turnitin](#) or others will be used randomly for detecting similarity in assignment submission.

All assignments are individual assignments. You may discuss approaches to problems among yourselves. However, the actual details of the work (assignment coding, answers to concept questions, etc.) must be your individual effort. Assignments that are judged to be the result of academic dishonesty will, for the student's first offence. You are responsible for reading and respecting the Computer Science Department's policy on [Rules of Ethical Conduct](#) and [Scholastic Offenses](#).

## Support services

Please visit the Science & Basic Medical Sciences Academic Counselling [webpage](#) for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters.

Please contact the course instructor if you require lecture in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodation.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience [website](#) to manage your academics and well-being. .

Learning-skills counsellors at the [Student Development Centre](#). are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling. See also the services provided by the [University Students' Council](#).

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