

The University of Western Ontario  
London, Canada.  
Department of Computer Science  
CS 2209B - Applied Logic for Computer Science  
Winter 2021

## 1 Course information

### Course Description

This course presents an introduction to mathematical logic with emphasis on methodologies and applications in Computer Science. Topics include propositional and predicate logic, methods for deductive reasoning, an introduction to SAT solving, and programming languages based on logic (if time permits).

### Technical requirements

**This course will be run 100% online.** Students must ensure a stable internet connection, a computer along with a working microphone and webcam. A tablet to write on could be very useful to show the work while asking a mathematical question. We will use zoom for all contacts including office hours and tutorials. For more detailed information see Section-7 (Academic policies) in this article.

### Prerequisites

Either 1) Computer Science 1027A/B, Computer Science 1037A/B, Computer Science 2101A/B, Computer Science 2121A/B or Digital Humanities 2221A/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 will 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.

## Content delivery and schedule

The majority of the content will be delivered via the following media:

- Recorded video lectures. This is the main medium through which the content of the course will be delivered. This will be your regular ‘class’ sans discussions.
- Zoom lectures in the regular scheduled class hours\*. These will be used for solving exercises and for discussions regarding the video lecture content. It will be helpful to have a device to show me while you write something although not strictly necessary.
- Tutorials by TAs. These will be used for problem practice sessions and discussing your assignments.

\*Regular class hours: Tuesday, Wednesday, Thursday 2:30 PM - 3:30 PM Eastern Time Zone.

## 2 Instructor information

Dinesh Valluri

Office: N/A

Office hours: TBA (Online)

E-mail: [dvalluri@uwo.ca](mailto:dvalluri@uwo.ca)

## 3 Course Syllabus, Schedule, Delivery Mode

### Course Topics

Introduction to logic

Propositional logic: the language

Propositional logic: proofs (natural deduction; resolution)

Restricted languages: definite clauses, Horn clauses

Proof techniques for restricted languages

Predicate logic: the language

Predicate logic: proofs (natural deduction; resolution)

Restricted languages: definite clauses, Horn clauses

Proof techniques for restricted languages

Sets, Mathematical Induction and Recursion

Other topics (SAT solving, Prolog, Answer Set Programming) if time permits

The course topics above should be thought of as guidelines. There might be minor changes to the topics as the course runs.

## Tutorials

One tutorial per week. The time of the tutorial depends on your chosen section. All tutorials will be delivered via zoom (unless specified) and web links will be provided for the same. Please check the Western time tables for this (<https://studentservices.uwo.ca/secure/timetables/master/tt/ttindex.cfm>). Tutorials will start on the week of September 15th.

## TA tutorial hours

TBA

## 4 Course Materials

The textbook will be a zyBook. Here are the instructions to subscribe for the zyBook:

1. Sign in or create an account at [learn.zybooks.com](http://learn.zybooks.com)
2. Enter zyBook code: UWOCOMPSCI2209ValluriSpring2021
3. Subscribe

As you go through the textbook please note that the interactive exercises (called Participation Activities or PAs) there are an integral part of the text, NOT supplementary material. A large part of these will be included in your assignments as well.

Additional class notes, suggested readings, and supplementary materials will be available on OWL as the instructor finds it appropriate.

## Supplementary Reading

- M. Huth and M. Ryan, *Logic in Computer Science: Modelling and reasoning about systems*.
- N. Nisanke, *Introductory logic and sets for computer scientists*, Addison Wesley, 1999.
- I. Copi, *Introduction to logic*, (numerous editions). B. Mates, *Elementary logic*, Oxford University Press, 1972, 2nd ed.
- E. Mendelson, *Introduction to mathematical logic*, Van Nostrand, 1997, 4th ed. H. Enderton. *A mathematical introduction to logic*, Academic Press, 1978.

## Course Website

<http://owl.uwo.ca>

Students should check the course website as well as OWL on a regular basis for news and updates. These are the primary methods by which information will be disseminated to all students in the class. The missing of critical information due to your failure to check the course website or OWL cannot be used as a basis for appeal.

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.

## 5 Course Work Evaluation

Assignments: 33%

Midterm: 32%

Final: 35%

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

It is 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.

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: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

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.

Every effort will be made to have assignments, quizzes and tests marked and handed back within 2 weeks of the hand-in date.

If for any reason the assignment schedules given below cannot be adhered to, the assignment marks will be pro-rated. (The 6 assignments are worth 33% of the overall mark for the course. If an assignment has to be cancelled for any reason, the remaining assignment weights will be prorated to add up to 33%.)

## Tentative Assignment, Quiz and Test Schedule, and Other Test and Exam Rules

Assessment	Due Date	Mode of submission	Weight
Assignment 1	Due January 21st 11:55 PM	zyBook	3%
Assignment 2	Due February 1st 11:55 PM	zyBook	3%
Assignment 3	Due February 12th 6:00 PM	Gradescope	8%
Assignment 4	Due February 23rd 11:55 PM	zyBook	3%
Midterm	TBD, 11:00 AM - 2:00PM	Zoom	32%
Assignment 5	Due March 12th 11:55 PM	Gradescope	8%
Assignment 6	Due March 30th	Gradescope	8%
Final	TBD	TBD	35%

Generally, no extensions to assignments will be given (except for lengthy illness, or other compassionate grounds). In those cases where an extension is granted, only the course instructor can grant the extension. If you have serious medical or compassionate grounds for an extension, you should take supporting documentation to the office of the Dean of your faculty, who will contact the instructor. There will be no makeup Midterm Exam, except for students requesting a Special Midterm Exam for religious reasons. These students must have notified the course instructor and led documentation with their Dean's office at least 2 weeks prior to the Midterm Exam in question. If you miss the Midterm Exam for any other reason, and present valid documentation to the Dean's office, your Final Exam mark will be reweighed to include the weight of the Midterm Exam. You must notify the course instructor within a week of the missed Midterm Exam, and documentation must be received by your Dean's office within 2 weeks of the missed exam. For computer-marked multiple-choice tests and/or exams, use may be made of software to check for unusual coincidences in answer patterns that may indicate cheating. If for any reason the assignment and quiz schedules cannot be adhered to, the marks will be pro-rated. No electronic devices may be in your possession during tests and exams. All exams, tests and quizzes are closed book. A reference sheet (provided by the instructor) is allowed for the Midterm Test and Final Exam, but not for the quizzes. In case of questions regarding the marks, please note that no quizzes or exams will be accepted for re-marking later than two weeks after they have been marked. We reserve the right not to re-mark quizzes or exams that have been written in pencil. **All students are expected to view all recorded video lectures and attend the zoom classes during the regularly scheduled hours.** If you are unable to meet a course requirement 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. If you are a science student, the Academic Counselling Office of the Faculty of Science is located in WSC 191, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is <https://www.uwo.ca/sci/counselling/>. A student requiring academic accommodation due to illness is recommended to follow the policy on Accommodation for Illness [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Consideration\\_for\\_absences.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf) (which includes a link to the Student Medical Certificate) There are no make-up tests or quizzes. If your faculty's Academic Counselling Office has approved your circumstances, the value of the missed test or quiz will be reallocated. 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). You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation": [https://registrar.uwo.ca/academics/examinations/exam\\_conflicts.html](https://registrar.uwo.ca/academics/examinations/exam_conflicts.html)

## Assignment Submission

Assignment-1, 2 and 4 will be exercises in zybook which will be marked automatically. The format of the rest of the assignments will be a written assignment that is to be uploaded in gradescope. You can either create these files with software (for example LaTeX), or scan a paper copy, or photograph a paper copy and convert the photo to a PDF file.

## Ethical Conduct

All assignments are individual assignments. You may discuss approaches to problems among yourselves; however, the actual details of the work must be an individual effort. The standard departmental penalty for assignments that are judged to be the result of academic dishonesty is, for the student's first offence, a mark of zero for the assignment, with an additional penalty equal to the weight of the assignment also being applied. You are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf) and Rules of Ethical Conduct [https://www.csd.uwo.ca/undergraduate/current/policies/ethical\\_conduct.html](https://www.csd.uwo.ca/undergraduate/current/policies/ethical_conduct.html) The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking.

# 6 Accommodation and Accessibility

## 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 at: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/AcademicAccommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/AcademicAccommodation_disabilities.pdf)

## 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 instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. 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 Faculty.

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Consideration\\_for\\_absences.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf) and for the Student Medical Certificate (SMC), see:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf)

## 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: <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see [http://www.registrar.uwo.ca/examinations/exam\\_schedule.html](http://www.registrar.uwo.ca/examinations/exam_schedule.html)).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See Academic Calendar for details (under Special Examinations).

## 7 Academic policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, [https://wts.uwo.ca/identity/identities\\_and\\_access/activation.html](https://wts.uwo.ca/identity/identities_and_access/activation.html), 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.

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.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

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.

Tests and examinations in this course will be conducted using the remote proctoring service, such as Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. More information about this remote proctoring service 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 technical requirements for this service. Information about the technical requirements are available at the following link: <https://www.proctortrack.com/tech-requirements/>

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>

Proctortrack will require you to provide personal information (including some biometric data). The session will be recorded. By taking this course, you are consenting to the use of this software. More information about remote proctoring 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 and technical requirements for both Zoom and Proctortrack. Information about the system and technical requirements are available at the following links: <https://www.proctortrack.com/tech-requirements/> <https://support.zoom.us/hc/en-us>



\* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

## 8 Support Services

Please visit the Science Basic Medical Sciences Academic Counselling web page for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>

Please contact the course instructor if you require lecture or printed material 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 accommodations.

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: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) 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.

Students who are in emotional/mental distress should refer to Mental Health@Western ([http://www.health.uwo.ca/mental\\_health](http://www.health.uwo.ca/mental_health)) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.