

Computer Science 1002

Introduction to Logic for Computer Scientists

Fall 2020



Department of Computer Science

Instructor: Antonina Kolokolova

Email: kol@mun.ca

- Please send your emails from an account that has your real name, @mun.ca account if possible, so that I know who you are. Also, please include the course number in the subject line of any emails to me or other instructional staff.

Main course page: Login to [Brightspace](#) with your MUN login/password.

At the beginning of the course, I will also maintain [a course webpage under my home page](#).

Lectures and tutorials: Lectures (except tutorials) will be pre-recorded, and posted throughout the semester on the [Brightspace](#). We will have a special one hour synchronous lecture ("tutorial") every week (with several options for time slots, to be decided by a survey at the start of the semester, likely on Fridays). It will be offered on Zoom.

Labs: The lab descriptions will be posted weekly, ahead of time, together with practice exercises for the week. The labs themselves will consist of a group activity, done synchronously on Zoom, during lab time slots. The slots will be split into two shifts 1 hour and 15 minutes each; use "groups" tool on Brightspace to select which shift you prefer. The questions based on each lab will appear in a corresponding weekly quiz due Thursday evening, together with questions based on that week's practice exercises.

- The first lab, Lab 0, will be on Monday Sep 14 (section 1)/ Thursday Sep 17 (section 2). It will focus on using the software.
- Please complete "exercises" for Week 0, including selecting your lab shift and tutorial time slot, by Saturday Sep 12.

Office hours: I will hold office hours on Zoom, time to be decided by a survey at the start of the semester.

Equipment: The two tools we are going to use are [Brightspace](#) (course shell) and [Zoom](#) (videoconferencing). All course materials will be posted on [Brightspace](#). You should be automatically enrolled when you register for the course; click [Brightspace](#) link to login (with your MUN id and password) to access the course shell. Quizzes, tests, etc will take place in [Brightspace](#) as well, and links for labs and tutorials, as well as lecture recordings and slides will be posted there. I will be using [Brightspace](#) for announcements, and [Brightspace](#)'s discussion board will be our main place to ask questions and get answers.

To attend tutorials, labs, and office hours, you will need a device which can run Zoom; you do **not** need a paid Zoom account. If connecting from a computer, you will need to install Zoom app (and create a free account) in order to be able to use the whiteboard (it does not work from a browser). It would be nice, though not required, if you could connect with voice and, if possible, video (especially for the labs, to make it easier to work together); at the very least, you should be able to type in a chat and write or type on the whiteboard.

- Please use your real name in Zoom during labs, tutorials and office hours; however, do not put your student number anywhere on Zoom: your student number should be kept private!

Marking scheme:

Quizzes (Weekly, 9 quizzes x 6%, lowest mark dropped, for the total of 48%).

Drills (repeatable online exercises) 17 x 1%.

Tests: two tests of increasing length and difficulty, 15%, and 20%. Dates TBD.

Note that the last test is likely to be scheduled during the last week of classes, or during exams period.

We do not plan to have a final exam.

Textbook:

Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 7th or 8th edition, McGraw-Hill Science, 2011

- The textbook is optional; lectures cover a subset of the material, often in a different way and order.

Reference book:

[Eric Lehman, F Tom Leighton and Albert R Meyer, Mathematics for Computer Scientists](#) (available online).

Susanna S. Epp, *Discrete Mathematics With Applications*, 4th edition, Brooks Cole, 2010

Course Description:

Logic has been called the "calculus of computer science": just as sciences such as physics that deal with continuous realm rely on calculus techniques, we rely on logic. Indeed, so many areas of our field are based on logic: from designing circuits to determining complexity of problems; from verifying correctness of hardware and software to querying databases to automated reasoning in artificial intelligence.

Introduction to Logic for Computer Scientists is intended to be an introduction to mathematical logic with emphasis on Computer Science applications and methodologies. We will cover propositional and predicate logic with applications, including the Resolution proof technique, which is the basis of most modern-day automated problem solvers. Then we will discuss basic proof techniques such as mathematical induction, again with computer science applications. We will also touch upon basic combinatorics and probability, and theory of computation.

Course Prerequisites:

None

Credit Restricted:

COMP 2742, ENG 4424; MATH 2320 (if done before/with COMP 1002)

Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities (www.mun.ca/policy/site/policy.php?id=239). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity (www.mun.ca/blundon).

Tentative schedule:

Dates	Units to be Completed	Labs, quizzes and exams Quizzes due Thursdays by 21:59 (9:59pm)
Week 0: Sep 9-10	Course overview and introduction	Choose your lab shift and tutorial time.
Week 1: Sep 11- 17	Unit 1: Intro to the language of logic	Lab 0, quiz 0 due Sep 17.
Week 2: Sep 18-24	Unit 2: Reasoning in propositional logic	Tutorial 1, lab 1, quiz 1 due Sep 24.
Week 3: Sep 25-Oct 1	Unit 3: Predicate logic	Tutorial 2, lab 2, quiz 2 due Oct 1.
Week 4: Oct 2-8	Unit 4: Reasoning in predicate logic, proofs.	Tutorial 3, lab 3, quiz 3 due Oct 8.
Week 5: Oct 9-15	Thanksgiving break Oct 12-13.	Test 1 , day TBD Tutorial 4 either on Oct 9 or Oct 16, TBD
Week 6: Oct 16-22	Unit 5: Sets and strings	Tutorial 4 either on Oct 9 or Oct 16, TBD Lab 4, quiz 4 due Oct 22.
Week 7: Oct 23-29	Unit 6: Functions and binary relations	Tutorial 5, lab 5, quiz 5 due Oct 29.
Week 8: Oct 30-Nov 5	Unit 7: Induction	Tutorial 6, lab 6, quiz 6 due Nov 5.
Week 9: Nov 6-12	Unit 8: Recursive definitions	Tutorial 7, lab 7, quiz 7 due Nov 12.
Week 10: Nov 13-19	Unit 9: Combinatorics and probability	Tutorial 8, lab 8, quiz 8 due Nov 19.
Week 11: Nov 20-26	Unit 10: Algorithm correctness and efficiency	Tutorial 9, lab 9, quiz 9 due Nov 26.
Week 12: Nov 27-Dec 4	Review	Test 2 , day TBA

Evaluation components.

Each unit of material has a corresponding lab, and a set of exercises, posted (roughly) weekly, and intended to be completed during the week after the material for that unit is posted. **Labs and practice exercises are for practice, and do not have to be submitted.** Some practice problems could be submitted for optional feedback.

Note that except for a few examples, **there will be no solutions provided to labs, practice exercises or tests.** For many problems, especially proofs, there is no single right answer. We will discuss exercises during tutorials, you can ask questions about your lab work during labs, you are encouraged to discuss them all using discussion board, and you are always welcome to email me and talk to me in the office hours about your solutions.

The evaluation is based on quizzes, drills and tests. All of them will be offered through Brightspace, using Brightspace's quiz tool.

1. Quizzes.

Quizzes, based both on the lab activity and practice exercises (except "practice problems" category), will be available to start at any time throughout the week as well. Out of the 9 quizzes, the lowest mark will be dropped; the remaining quizzes each account for 5% of your total course mark; that is, 40% of your mark will be from your performance on the quizzes. They are graded automatically, so you will get your mark right after you submit it.

You get only one chance to do a lab quiz, and once you start a quiz, you will have only 30 minutes to complete and submit it. For example, if you start the quiz at 4:30pm on Monday, then you would need to submit the quiz by 5pm on that same day; you would not be able to complete it later that night or the next day, even if you had time left when you exited the quiz. **Make sure your answers to each of the questions are saved as you answer them.** If you run out of time and the auto-submit feature forces you to submit your quiz, then it will only accept the questions that have been saved. Make sure you finish and submit each quiz well before **9:59pm Newfoundland Time**, on the due date, since the time on your computer may be off by a few minutes from the Centre for Innovation in Teaching and Learning's (CITL's) system clock and CITL's system will cut you off based on its system clock.

2. Drills.

Each drill is a repeatable auto-graded mini-quiz to practice solving a specific type of problem (similar to multiplication drills you might have done in school). **Each attempt will be time-limited, however you can repeat each drill as many times as you like, until the last day of classes, Dec 4th.** However, try to do each drill at least once before doing the quiz for the corresponding unit; as quizzes cover similar topics, knowing how to do drills for that unit could help you get a better score on the quiz.

The grade for each drill is an average of your grades on all attempts on it, so even if you solved it perfectly, it might increase your mark to do it again. For example, if you tried a drill 3 times, receiving 50% on the first attempt, 90% on the second attempt, and 100% on the 3rd attempt respectively, your overall score for this exercise will be $(50+90+100)/3 = 80\%$. If you do it one more time and get 100% again, your score will become $(50+90+100+100)/4 = 85\%$. Overall, drills account for 15% of your total grade in the course.

3. Tests.

There will be two tests, with the first shorter and of less weight than the second: first test will be worth 15%, and the second 20%, for the total of 35% of your final mark. Whereas quizzes and drills are auto-marked, tests focus on long answer questions (in particular, proofs) which will be marked by hand. Other than that, the format will be similar to quizzes, with only one attempt possible in a test, within a (shorter) availability window. The "practice problems" part of the weekly exercises will contain examples of problems that could appear on the tests; your solutions to practice problems can be submitted for optional feedback. That said, problems similar to other practice exercises, drills, labs and quizzes can also show up on the tests. Dates, etc will be decided later.

You have to do all graded work (quizzes, drills and tests) by yourself; soliciting help, except from the course instructional staff, while you are working on a quiz, test or a drill is a violation of university rules. Please see the [University Calendar - General Academic Regulations \(Undergraduate\) - 6.12 \(Academic Misconduct\)](#).

If, for special circumstances (such as medical or bereavement) you miss a quiz, or an exam, notify your instructor as soon as possible, within 48 hours at the latest, providing any related documentation (if documentation is required). Failure to do this can result in a mark of 0% for that work. Please refer to the **current University policy** regarding medical notes and the information to be in them. For more information, please see the University Calendar - University Regulations - General Academic Regulations (Undergraduate) 6.7.5 (**Exemptions from Parts of the Evaluation**) and 6.15 (**Appeal of Decisions**) or consult the Registrar's Office. If your reasons for the missed work are acceptable, then your instructor may suggest an alternative evaluation scheme.

Discussion board, and what else to do if you have questions

1. Discussion board

- In this course, you are strongly encouraged to discuss the material (including practice exercises and labs, but not the questions from quizzes or tests before the quiz/test availability is over) with your peers. This can be done primarily through the **discussion board** on [Brightspace](#), but feel free to set up additional study groups and use other venues available. (You'd be surprised how much more you understand just by trying to explain a tricky concept to a fellow student, or coming up with an illustrative example!)
- The discussion board will also be the place where clarifications and announcements are posted and discussed, so please check it regularly. The instructor and instructional staff will be monitoring the discussion board, answering questions that are posted there.
- If you have questions about the material, please first read the discussion board, and if such question has not been asked yet, please post it as a new thread under the corresponding topic. If it is a variant of a question that is being discussed already, please post in the corresponding thread. And if you see unanswered questions for which you have something to say, you are encouraged to reply and give your explanation/solution: often, students find solutions from their peers to be more relatable and understandable than ones posted by the instructor.

2. Instructor

If you have questions that you feel cannot be addressed through the discussion board (for example, if you want to ask about your grade on a specific quiz), please email me (the instructor). Any e-mail messages to the instructor or instructional staff should contain **COMP1002** in the subject line and must be sent from a valid MUN email account. Please note that you **cannot** email to a Brightspace "online.mun.ca" email address from an outside address (such as "mun.ca" or "gmail.com"), nor can you email from a Brightspace "online.mun.ca" email address to an outside address: Brightspace "online.mun.ca" email addresses can only be used within the Brightspace environment.

3. Instructional assistants and Help Centre

Instructional assistants and TAs are available to answer your question in the [Help Centre](#) (see the link for the schedule). This semester, you should be automatically enrolled into Help Centre as a course on Brightspace. You can also find instructional assistants' contact information [here](#).

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