

ECE 108: Discrete Math & Logic

Winter 2020

University of Waterloo, Faculty of Engineering^(SEP)
Department of Electrical and Computer Engineering

Lectures: **January 6 – April 3, 2019**
 Wednesdays, 5:30am –8:20pm in room E7 5343

Instructor:

Prof. Mark Crowley, E5 4114
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Office hours: arrange for appointment by email

Course TAs:

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Course Description

Introduction to discrete mathematics, including propositional/Boolean logic, syntax and semantics, proof theory, and model theory; set theory, relations and functions, combinatorics (counting techniques, permutations, and combinations), graph theory. Applications in electrical, computing, and software engineering.

Website:

<https://uwaterloo.ca/scholar/mcrowley/ece108>

Textbook:

Thistle & Tripunitara, ``Discrete Math & Logic". Free text available as pdf (available on LEARN, website and git). Corrections and input always welcome, changes and updates will be posted to LEARN and git.

Evaluation:

20% Assignments – 4 out of 5 assignments will be graded, graded leniently

30% Midterm Exam – focus on first half of course, practice at doing the exam, some questions on final will be very similar

50% Final Exam – all topics

Getting Help:

- **Discussion board:** piazza.com/uwaterloo.ca/winter2020/ece108
 - Go there and sign up with your UWaterloo email
- **Tutorials:**
 - Mondays 10:30am-11:20am in MC 4063
 - Tuesdays 10:30am-11:20am in E7 5343
 - Thursdays 10:30am-11:20am in MC 4063
- AccessAbility Services : <http://uwaterloo.ca/accessability-services>
 - If you need any accommodations, or assistance with exams, learning environment, assignments, talk to this office and they can help anonymously.

Recipe for success:

Attend lectures. Do the assignments promptly. Use the discussion board. Come to tutorials for more depth into the topics. Most of all, have fun.

Rough* Content Schedule

Week	Topics	“Textbook” pages
(1) Jan 6–10	Introduction, Propositional logic	Chapter 1, Chapter 2 page 9–19
(2) Jan 13–17	Proof techniques	Chapter 2, page 19–30
(3) Jan 20–24	Sets	Chapter 3, pages 31–38
(4) Jan 27–Jan 31	Ordered pairs, relations, functions	Chapter 3, page 38–45
(5) Feb 3–8	Set cardinality	Chapter 3, page 46–51
(6) Feb 10–14	Relations	Chapter 3, page 52–63
Feb 17-21, Reading Week, No Classes		
Feb 24–Feb 28, Midterm Week, Midterm Exam, No Classes		
(7) Mar 3–7	Counting	Chapter 4, page 65–73
(8) Mar 10–14	Counting, Probability	Chapter 4, page 73–77
(9) Mar 17–21	Probability	Chapter 4, page 78–82
(10) Mar 24–28	Probability, Expectation	Chapter 4, page 82–88
(11) Mar 30–Apr 3	Expectation and Review	Chapter 4, page 88–96

* The instructor reserves the right to diverge somewhat from this schedule if needed. All efforts will be made to cover the content required for later courses, so if some extra time is taken in early sections, some less critical topics may be covered briefly or skipped.

Policies and Rules

Assignments:

All assignments are worth the same, 5% of the final grade. Assignments will be marked leniently. Use them to your advantage for practice. Solutions will be posted to Learn after the submission deadline.

Lateness policy: no late submissions accepted. However, your lowest scoring assignment will be dropped from consideration.

Collaboration: Discussion of assignments with your classmates and with your TAs and Prof are encouraged to understand the material. But assignments *must be answered independently*. After any discussion you should go away and on your own come up with the answer based on your new understanding. Each student will download the pdf for the assignment from crowdmark and complete it by hand, then scan or take a photograph of the pages to submit back to crowdmark. This system allows the Teaching Assistants and Prof to easily grade each question in succession and to easily compare between assignments to look for signs of cheating. See the Academic Integrity section for process and repercussions for cheating on any graded assessments at UWaterloo.

Exams:

The midterm will, obviously, focus on the first half of course. However, it will also be practice at doing this kind of exam. So it will be marked fairly and answers will be provided afterwards. The final exam will cover the entire course content and some questions for the first half topics on the final exam will be very similar to the midterm. Questions on later topics will be of a similar style.

The exams will be closed book, closed notes, no calculators or other devices allowed. All you will need will be a pencil or pen. We will provide a cheat-sheet of formulas and definitions if needed.

Academic Integrity:

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. Check <https://uwaterloo.ca/academic-integrity/> for more information.

Grievance:

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline:

A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action

constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>. For typical penalties check Guidelines for the Assessment of Penalties, <http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm>. Plagiarism-detection software may be used on any submitted work.

Appeals:

A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>.

Note for students with disabilities:

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.