

PMATH 432/632 - First Order Logic and Computability

Winter 2020 – Corona Virus Edition

This an updated version of the course outline.

- Instructor: Dino Rossegger
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- Teaching Assistants:
 - Luke Maclean: `lrmaclea@uwaterloo.ca`
- Lectures: For the remainder of the course, course notes will be posted online. I will also post recordings of me discussing the notes.
- Grading scheme: There will be 7 assignments. The first 6 assignments are each worth 12.5% of the grade, the last assignment is worth 25% of the grade. It will contain assignments on all parts of the course. Assignment 7 will be posted on March 29th and is due April 12th. Late submissions are not accepted except in extreme cases.
- Course description:

The concepts of formal provability and logical consequence in first order logic are introduced, and their equivalence is proved in the soundness and completeness theorems. Gödel's incompleteness theorem is discussed, making use of the halting problem of computability theory. Then further topics in mathematical logic are discussed with a focus on relative computability and the Turing degrees.

Update: Due to the Coronavirus outbreak and classes being suspended for one week we will not be able to cover relative computability and Turing degrees. Instead we will finish the course with a proof of Gödel's incompleteness theorems.
- Required Texts and class style:

The majority of the course is based on: Ebbinghaus, H-D., Jörg Flum, and Wolfgang Thomas. Mathematical logic. Springer Science & Business Media, 2013.

For the computability part I will post course notes online.

- **Piazza and Office Hours:**

Due to the Corona Virus outbreak there will be no more office hours this term. I encourage students to use the piazza forum for discussions. In case there are personal matters you wish to discuss with me please write me an email. I can also arrange to talk over skype or other voice platforms.

There will be one virtual office hour slot on March 31st at 1pm to discuss course material. I will communicate modalities in time. Further slots on demand.

Academic Integrity: In order to maintain a culture of academic integrity, member of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. Refer to Academic Integrity website (<https://uwaterloo.ca/academic-integrity/>) for details.

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 (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) Student Petitions and Grievances, Section 4. When in doubt, please 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 an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g. plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71 (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) Student Discipline. For typical penalties check Guidelines for the Assessment of Penalties (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/guidelines/guidelines-assessment-penalties>).

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) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: AccessAbility Services (<http://uwaterloo.ca/disability-services/>), located in the new addition to Needles Hall, Room 1401, 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 office at the beginning of each academic term.