

**Summary of Material.** This course examines the main elements of *deductive logic*, the modern form of the discipline which has traditionally studied correct forms of inference and reasoning, which is one of the oldest and most important branches of philosophy. Deductive Logic is primarily concerned with correctly deducing a *conclusion* from given *premises*, thus with what is often called *valid inference* or *argument* or *logical consequence* or (informally) ‘following [logically] from’. The key ideas are introduced using a simplified language, here called FOL, which abbreviates ‘first-order logic’. We develop this language first using a special case, where we have (solely) names for objects and then what we call *predicates* of those names, corresponding to properties of objects and simple relations between them. This gives rise to elementary sentences; we then look at some ways to connect them (with what we call *connectives*) to form more complex sentences and, with them, arguments, in effect chains of sentences. This yields what is often called (classical) *propositional logic*, an important part of logic expressed in a fragment of FOL. Using this fragment, we define central notions of logic such as equivalence, consistency, tautology, and above all valid inference/logical consequence, and we explore the central links between all these. We then proceed to develop a *proof* or *deduction* system for this fragment, i.e., a way of *deriving* step-by-step logical consequences from given sentences as a starting point. (The proof/deduction system in effect is built on a small number of valid inferences, which can then be shown to yield *all* valid inferences.) In the second part of the course, we consider a more complex version of FOL, incorporating what are called *quantifiers* and *variables*, which gives a correspondingly more complex means of expression allowing us to deal above all with *generality* (so we can speak of ‘all students’ or ‘all triangles’, and form sentences built around phrases like these). Along with this expansion of the means of expression we expand to a modified definitions of the key notions, and then a correspondingly more complex system of deduction. (Again, a small number of valid inferences is selected, yielding *all* valid inferences.)

The exposition in the lectures will follow that of the textbook, which means that *the textbook is indispensable*, and regular reading of it is **ESSENTIAL**. Examples are to be found in abundance in the textbook, and should be worked through as a matter of **routine**, *without being instructed so to do*. The lectures will concentrate more on the *theoretical* side of the material rather than on examples; the exercises supply the examples, and it is above all through working with the examples that you will come to understand the material. Moreover, questions on the exams and assignments will be somewhat similar in form to these. Some of them will be challenging, not just asking you to reiterate what you have learnt, but to use this in ways which at first sight might not be entirely clear. However, the main theoretical aim is to understand *why* the mechanisms presented work, and not simply to be able to apply them. Correspondingly, some of the questions on the tests and assignments will be *theoretical* in nature. (**You should take note of this fact now.**) Please note: *the final exam, worth 50% of the overall mark, will range over material from the whole course.*

**Conferences:** As implied above, formal logic is very much a subject where practice is essential, and where the exercises really instil familiarity with the material. In addition to the lectures, there will be one conference hour per week: the main purpose of these conferences will be to work through selected examples; **attendance at conferences is therefore indispensable**, and proper preparation for the conferences requires prior practice of the relevant exercises. *Note that conference size is limited; please sign-up promptly to get the time you desire.* Very early on, a weekly guide to the course will be posted; this is to be regarded (as its title makes clear) as a *preliminary* schedule for the course. Above all, it should be taken as an informal guide to the reading and the exercises you ought be doing at a given stage of the course.

**Warning:** Many students standardly find the second half of the course much more difficult and complicated than the first. Thus, finding the initial stages easy is not a sign that you will find the whole course so. Understanding the material is also by its nature cumulative; one cannot neglect the course for a few weeks, and then expect to understand the new material. The same applies to the readings/sections/exercises marked out in the schedule: if you’re behind on this, you must try to catch up in order, and not skip.

**Handouts etc.:** Handouts, slides, assignments, mid-term exam will be distributed via *MyCourses*; announcements will also be distributed through the announcement/e-mail functions available there. Note that this system uses *only* your official McGill e-mail address, so this (as well as *MyCourses*) should be checked regularly and routinely.

**Reading Matter.** The textbook for the course is:

- Barker-Plummer, Barwise, Etchemendy et al.: *Language, Proof and Logic. Second Edition.* (CSLI Publications.)

This will be available from The Word Bookstore, 469 Milton Street (250 metres from the University Street Gates).

**This text is essential. NB.** *Cheques and cash only; no credit cards.*

**Software** The book comes with a CD which contains a (useful) PDF version of the text, but also contains software which is essential for many of the exercises. There are 4 software programs which are to be used to practice various aspects of the course, and a bank of files for use in these programs. The computer-based exercises standardly begin with one of these files, and your solutions to many of the exercises can be checked by submitting them to an on-line marker, which you'll be encouraged to use. **(You can only register for this if you have a book-ID which is unused;** if you acquire the book second-hand, then it's overwhelmingly likely that the ID has been used before. Note that the exercise checker is useful, but not essential.) Please read carefully the section *Essential Instructions about Homework Exercises*, pp. 5–10 of the book. **(IMPORTANT:** Please specify only your OWN e-mail address for the 'Submit' function.) NB

**Marking and Assessment** There will be two assignments, worth 12.5% each; one take-home mid-term test worth 25%; one formal, final exam worth 50%. **Moreover, it is required that you pass the final exam to be able to pass the course.** (The Assignments will be due at approximately the 1/4 and 3/4 points of the semester, and the Mid-Term Exam at approximately the half-way point. *Extensions to deadlines set will be granted only in very exceptional circumstances, usually only for medical reasons and with a medical note, or for other emergencies, appropriately documented. Certainly no allowance can be made for travel, no matter how far ahead it was arranged.* **Please keep copies of work submitted.** This is essential: with upwards of 300 students in the course and many TAs/instructors, work can easily be mislaid. NB

**Policy for Late Work** Late work will be penalised at the rate of a third of a full letter grade (or about 5%) per day overdue. Thus, an assignment judged to be worth a B+ (or around 77%) but late one day will be assigned B (or around 72%), late two days B– (67%), and so on. NB

### **McGill Policies**

1. *McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures. (See [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity) for more information.)* NB
2. *In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.*
3. *Students have the right, without seeking permission, to submit work in French..*