Basic Logic Module

University of St Andrews, Fall 2023

Module Coordinator and Lecturer: Matteo Nizzardo (he/him)
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Office Hours: Wednesday 13:00-15:00

GENERAL INFORMATION

Sessions: Friday 14:00–16:00, KEN: 003 Garden Seminar Room.

We will have a total of 8 sessions. During each session, we will have a 1 hour lecture followed by an examples class in which we will go through various proofs and exercises.

The sessions are scheduled for weeks 2, 3, 4, 5, 7, 8, 9, 10, 11. There is no teaching in weeks 1, 6 (independent study week) nor 12.

We do not have a dedicated page on MMS. Instead, we will communicate via email. You can always contact me at my institutional email address, indicated above. Please feel free to contact me with questions about the module, as well as with suggestions and criticisms.

COURSE CONTENT and LEARNING OUTCOMES

In this module, we will learn about the essential concepts and techniques of propositional logic and predicate logic. We will learn what distinguishes good arguments from bad ones, and how to decide whether an argument is good or bad. We will also learn how to formalise arguments in the formal languages of propositional logic and predicate logic, and how to prove in a rigorous way whether a conclusion follows from a set of premises. This will involve a close study of two proof-theoretic methods: i.e. Natural Deduction, and Semantic Trees (Tableaux).

By the end of the module, you will master basic logical vocabulary, as well as Natural Deduction and Semantic Trees. This will give you an in-depth understanding of proof-writing techniques, which are important in math, computer science, and akin disciplines. You will be able to construct a formal proof, and to understand the subtleties involved in many philosophical and non-philosophical arguments.

ASSESSMENT

This is a not-for-credit optional module designed for those who have not taken much formal logic before or who need a refresher course. Therefore, there will be no assessment. You will have no final examination, nor take home assignments.

Each week I will suggest some exercises you can do in your free time. This is because an important component of learning logic is to engage, first hand, with its techniques. However, please always remember these exercises are not mandatory.

TEXTBOOK

We will use the following textbook: Read, S. & Wright, C. *Formal Logic. (Lecture Notes).*

This resource is produced by members of the then Department of Logic & Metaphysics at St Andrews.

ADDITIONAL RESOURCES

If you find yourself very interested in logic, and you want to broaden your understanding of the subject, there are many books you could read. Here are some:

Tomassi, P. (1999) *Logic.* Routledge.

Forbes, G. (1994) *Modern Logic.*

Velleman, D. (2006) *How to Prove It.* Cambridge University Press.

Restall, G. (2005) *Logic: An Introduction.* Routledge.

Howson, C. (1997) *Logic with Trees.* Routledge.

Always remember that different books employ slightly different logical systems, so please be always aware of these differences.

SCHEDULE

Sept 22 (Week 2): Arguments & Vocabulary of Propositional Logic
Reading: Read & Wright, Part 1: Chapter 1 and 2

Sept 29 (Week 3): Truth-Tables.
Reading: Read & Wright, Part 1: Chapter 3

Oct 6 (Week 4): Propositional Logic: Semantic Trees

Reading: Read & Wright, Part 1: Chapter 4

Oct 13 (Week 5): Predicate Logic: Syntax
Reading: Read & Wright, Part 1: Chapter 5

Oct 27 (Week 7): Predicate Logic: Models & Counterexamples
Reading: Read & Wright, Part 1: Chapter 6

Nov 3 (Week 8): Predicate Logic: Semantic Trees
Reading: Read & Wright, Part 1: Chapter 7

Nov 10 (Week 9): Natural Deduction: $\&$, $\neg$, $\rightarrow$
Reading: Read & Wright, Part 2: Chapter 1, 2, and 3

Nov 17 (Week 10): Natural Deduction: $\vee$, $\leftrightarrow$, $\forall$
Reading: Read & Wright, Part 2: Chapter 2, 6, 10,

Nov 24 (Week 11): Natural Deduction: $\exists$, $=$
Reading: Read & Wright, Part 2: Chapter 11