
Pure Mathematics 415 Foundations

(see Course Descriptions under the year applicable: <http://www.ucalgary.ca/pubs/calendar/>)

Syllabus

<u>Topics</u>	<u>Number of Hours</u>
Introduction: Review of informal set theory, Russell's Paradox, the need for axioms, formal language, history.	2
Ordered pairs, relations and functions, equivalence relations, ordering relations, partial order and well orderings, trees.	3
Axiomatic foundation of Set Theory. Power and limitations of the axiomatic method.	5
Axiom of choice and equivalents, paradoxes.	5
Cardinal and ordinal numbers, arithmetic, induction and recursion on ω and wellfounded sets.	9
Infinitary combinatorics, stationary sets and clubs, filters and ideals. Further axioms and applications.	9
TOTAL AMOUNT	33

PMAT 415 Course Outcomes

By the end of this course, students will be fluent in the basic and central techniques of informal Set Theory including its role in the Foundation of Mathematics, and be exposed to how they apply to address problems from various areas of Logic and Mathematics in general.

Specifically, by the end of this course, students will:

1. Be able to work with the notions of sets, relations, functions, and orderings.
2. Recognize the importance of axioms in the foundation of Mathematics, their power and limitations
3. Recognize the particular role of the axiom of choice.
4. Be fluent with notions of infinity.
5. Be able to work with cardinal and ordinal numbers, in particular perform arithmetic operations on these numbers, and perform induction and recursion with these numbers.
6. Be exposed to some selective notions of infinitary combinatorics.

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