

AK/AS/SC/MATH3190.03–Set Theory and Foundations of Mathematics

Course Outline–Winter Session 1999

COURSE DIRECTOR

Prof. G. Tournakis

Room 518 Atkinson College

Telephone: (416)736-2100-1-66674

e-mail: tgeorge@yorku.ca

Web: <http://csm05.atkinson.yorku.ca/~george>

CLASSES

T12:30–2:30 and R12:30–1:30

Classroom: FC203

York Campus

This course deals with the basic elements of informal (non axiomatic) set theory.

The relevance of set theory to a mathematician (student or otherwise) is equivalent to the relevance to an intelligent human being of the ability to speak, read, and write. Practically the entire “modern” literature in mathematics (Topology, Analysis, Algebra, etc.) relies heavily on the “language” of set theory, but also on the deeper results involving cardinal and ordinal numbers.

Additionally to the above considerations of “relevance” one will want to study set theory for its own sake.

We shall first look into the basic (informal) definitions and notations, eventually leading to the notions of relations and functions, equivalence relations and partial orders. *En route* we will get a flavour of the *foundational* difficulties that a purely “informal” approach entails. We will see—in a “naive” manner—how the introduction of axioms helps to get around these paradoxes. We will be “fixing” the theory as we go by introducing appropriate “assumptions” (axioms)—as needed—regarding the behaviour of sets.

Next, the Axiom of Choice and a number of its equivalent variants (including “Zorn’s Lemma”) will be discussed, and some of its elementary consequences will be considered.

The balance of the course will involve a careful discussion of cardinal and ordinal numbers, including their ordering and arithmetic.

Prerequisite.

As per Arts or Atkinson Calendar (“mathematical maturity” is the operative—vague—keyword here).

Work-Load and Grading.

Assignments	70%
Final Exam	30%

Textbook.

Type-set notes from a pre-print of *Set Theory*, by G. Tournakis.