## *SCI2002 - Discrete Mathematics*

**Course coordinator / Lecturer:** Dr. G. Schoenmakers, Faculty of Humanities and Sciences, Dept. of Knowledge Engineering, e-mail: gm.schoenmakers@maastrichtuniversity.nl Tel: 043-3882680 .

**Course description:**

The language of mathematics is an unambiguous one, which makes it play an important part in many scientific studies. In the Discrete Mathematics course students learn to speak the mathematical language, to think like a mathematician.

**Topics per chapter:** The following basic issues will be discussed within the framework of the mathematical language:

**Chapter 1:** In this chapter we discuss several types of numbers, like integers, natural numbers, rational numbers, real numbers and prime numbers. We investigate all kinds of properties that these numbers possess. We do so by means of (mathematical) propositions and logic. The students learn how to use logic to construct mathematical proofs.

**Chapter 2:** Here we apply the knowledge we obtained in chapter 1 on a different type of mathematical object: the set. We discuss a.o. intersections, unions, complements and sizes of sets, as well as the concept of infinity.

**Chapter 3:** Here we apply the knowledge we obtained in chapters 1 and 2 on (mathematical) relations and functions. We discuss properties like symmetry and transitivity for relations and injectiveness and surjectiveness for functions.

**Chapter 4:** (Enumerative) Combinatorics; the art of smart counting. Chapter 4 will not be discussed as a separate chapter. Rather, the discussion will be spread out over the whole course. Whenever there is an item discussed in one of the earlier chapters that gives rise to an interesting combinatorics question, the appropriate part of chapter 4 will be discussed immediately.

**Objectives:** The objectives of the course are

(1) to make students familiar with the above mentioned concepts of mathematics and
(2) to get the students to notice how beautiful the world of mathematics really is.

**Instructional format:**

***Lectures:*** There will be two 2-hour lectures per week, consisting of

(1) a frontal, but interactive instruction and
(2) a training in comprehending the instructed material by spending some time on problem solving, either individually or jointly with other participants.

During the lectures instruction and practice will alternate in line with the progress of the material in the book and the lecture notes.

***Practicals:*** The third meeting every week is a practical. Students prepare for the practical by making exercises. This can also be done during the practical, but most of the time will be spent on discussing the solutions of the exercises.

**Literature:**

- The book *Discrete Mathematics* by A. Chetwynd & P. Diggle will be used throughout the course and is mandatory.
- A set of lecture notes will be provided through ELEUM.

**Examination:**

There will be two 2-hour written exams, a midterm in the middle of the course on chapter 1 and the first part of chapter 2 (+ some parts of chapter 4) and a final exam in the examination week on the rest of the material. **Your grade will be the average of the 2 scores for the exams.** If you fail the course, then in the resit-week you will have to do a ***3-hour resit on the full course material***.

**Attendance:** There is no attendance requirement. Not following lectures is at your own risk.

**Calculators:**

It is not allowed to use a graphical calculator during any of the exams; an ordinary calculator is allowed.