Diskretna matematika I - Teorija množic
Discrete Mathematics I - Set theory
UP Famnit, 2012/2013, Fall Semester

Instructor: Assist. Prof. Dr. Martin Milanič; martin.milanic@upr.si
Office hours: Monday 15:00-16:00, after the lecture, or by appointment (in advance by e-mail).
Office: Kettejeva 1 (2nd floor, Department of Mathematics (Oddelek za matematiko)).

Teaching Asssistant: Ademir Hujdurović; ademir.hujdurovic@upr.si
Office: Kettejeva 1 (2nd floor, Department of Mathematics (Oddelek za matematiko)).

Exam rules

The **grade** is obtained with **quizzes** (6 quizzes during lectures, 15 minutes each, every quiz is worth up to 4 points), **midterms** (2 midterms) or **written exam** (4 exam terms, the first exam will coincide with 2nd midterm) and an **oral exam** (typically 1-3 days after the written exam). For passing the practical part (quizzes, mindertms/written exam), one must collect at least 50% of points from the following sum

$$\min\{\text{number of points on quizzes, } 20\} + 80\%(\text{midterms or written exam})\,.$$

In the case of midterms, at least 25% of point have to be obtained on each of the two midterms. Quizzes are ignored for June and September exam terms.
Final grade is obtained according to the following table:

50-58: 6, 59-67: 7, 68-76: 8, 77-85: 9, 86-100: 10.

A passing grade in the practical part is a necessary condition for taking the oral exam. If the oral exam is not taken immediately after passing the practical part, the result of the practical part gets invalidated. The grade obtained in the practical part can be either maintained, improved or worsened at the oral exam (improvement or worsening can be only for the difference of 1 grade). In the case of grade 6 at the practical part, and failure at the oral exam, the oral exam can be retaken in one of the next exam terms (but at the latest by the end of the final exam period in the academic year 2012/2013).

On midterms and exams you are allowed to have one handwritten A4-sized sheet (without solved exercises). No use of literature is allowed on quizzes.

A timely registration for each midterm and exam through the "ŠIS" system is required. There will be four (written and oral) exam terms.

Expected syllabus

- **Mathematical logic:** propositions, the basic logical connectives, truth tables, logical equivalences, canonical (disjunctive and conjunctive) forms, switching circuits, logical implications, sets of propositions, logical consequences.
- **Sets, relations and functions:** basic relations among sets, ways of representing sets, Russell's antinomy, ordered pair, union, intersection, difference of sets, complement of a set, Venn diagrams, power set, Cartesian product, binary relations, equivalence relation, various definitions of functions, graph of a function, surjectivity, injectivity, images and preimages, inverse relation, composition, restrictions and extensions, canonical decomposition of a function.
- **Ordered structures:** hierarchy of ordered structures, Hasse diagram, first element, minimal element, well-order, immediate successor, last element, lower and upper bounds, infimum, supremum, lattice, complete lattice.
- **The Axiom of Choice:** the choice function, axiom of Cartesian product, the Axiom of Choice and its importance for Mathematics, principles of maximality, well-ordering theorem.
- **Equipollent sets:** the relation of equipollence, comparability of sets, Schröder-Bernstein Theorem, the Law of Trichotomy, finite sets, the principle of induction, infinite sets, the set of natural numbers, Peano axioms, infinite sets, Cantor's diagonalization, continuum, Cantor's Theorem, The Continuum Hypothesis

Literature

Notes from lectures and exercises
E-lecture room (E-učilnica)

N. Prijatelj: Osnove matematične logike, 1. del*
N. Prijatelj: Matematične strukture I
V. Batagelj in S. Klavžar: DS1 - logika in množice: naloge*
P. Halmos, Naive set theory*
S. Lipschutz, Schaum's Outline of Theory and Problems of Set Theory and Related Topics*
R. L. Vaught, Set Theory, An Introduction*
L. E. Sigler, Exercises in Set Theory

* *This book is available in the library TeMeNa.*