Course: Automated and interactive theorem provers	
Course instructors: Silvia Ghilezan	
Course type: elective	
Credit points ECTS: 12	
Prerequisites: Mathematical logic	

Course objectives:
Introduction to the basic ideas, concepts and results of automated theorem provers and interactive theorem provers (proof assistants), as well as practical applications.

Learning outcomes:
At the end of the course, the student will get acquainted with the basic ideas, concepts and results of automated and interactive theorem provers, and will be able to independently apply these ideas, concepts and results in scientific research within the same or some other scientific field.

Course description (outline):
Theoretical classes.
Automated theorem provers: theoretical foundations, DPLL procedure, resolution method, tableaux method, SAT solvers, SMT solvers.
Interactive theorem provers: theoretical foundations, lambda calculus, type theory, dependent types, higher-order logics.
Practice classes.
Work with automated theorem provers (Prover9, LCF, Z3, Vampire).
Work with interactive theorem provers (COQ, Agda, Isabelle).

References:
1. H.P. Barendregt, Lambda Calculus:Its Syntax and Semantics, North-Holland, 1984
2. П. Јаничић, Математичка логика у рачунарству, 2008
   http://poincare.matf.bg.ac.rs/~janicic//books/mlr.pdf
3. Ф. Марић, A survey of interactive theorem proving, Zbornik radova, Matematički institut SANU 18(26): 173-223, 2015
   http://elib.mi.sanu.ac.rs/files/journals/zr/26/zrn26p173-223.pdf
4. B. Pierce, Software Foundations, University of Pennsylvania
   https://softwarefoundations.cis.upenn.edu/current/index.html
5. The COQ Proof Assistant, https://coq.inria.fr
6. Isabelle Proof Assistant, https://isabelle.in.tum.de
7. Agda Proof Assistant, https://wiki.portal.chalmers.se/agda/pmwiki.php

Active teaching hours: 5	Theoretical classes:	Practice classes:

Methods of teaching:
Classical teaching methods with video projectors and interaction with students. Students' knowledge is tested through homework and defense of seminar papers. The final oral exam checks the comprehensive understanding of the presented material.

Grading structure (100 points)
Pre-exam requrements:
• activity during classes 10 points,
• seminar paper or oral seminar 30 points.
Oral exam 60 points.