Study programme(s): Information Technologies

Level: Master

Course title: Methodics of Programming

Lecturer: Mirjana Ivanović

Status: elective

ECTS: 7

Requirements: none

Learning objectives

Introduction of students to the elementary methodical principles and different programming techniques. Instructing students (future teachers in schools) to present principles of programming in modern way in different programming environments and tools and adjust topics to pupils ages.

Learning outcomes

Minimal: At the end of the course, a successful student will be able to demonstrate ability to understand elementary concepts of programming, be able to analyze and define problems, design and realize their solution, and present them in a methodical manner.

Optimal: At the end of the course, a successful student will be able to to demonstrate ability to understand elementary concepts of programming, be able to analyze and define problems from real life based on logic, design and realize efficient and elegant solutions on a very high methodical level. Be able to adjust problems and approach to the pupils age and preknowledge.

Syllabus

Theoretical instruction

Forms of thinking in a process of programming. Basic characteristics of popular programming languages. Elementary concepts existing in almost all programming languages. Programming styles and programming languages supporting them. Sintax differences. Programming languages aimed for solving specific problems. Choice of the first programming language, criteria, advantages, and disadvantages. Overview of programming languages used in schools. Topics covered in schools. Appropriate assignments for illustration of introduced concepts. Simple data types – basic concepts, similarities and differences. Control structures. Structured data types. Formal specification of a program. Program development process. Program testing and error analysis. Environments and tools for visualization of program execution. Development environments and other tools for support of program development. On-line програмирање (CodeSchool, Codeacedemy…). Methodical approach to web programming. Problems of innovations of methodological approach to teaching programming. Standards and necessary knowledge and skills that teachers in primary and secondary schools have to possess.

Practical instruction

Class preparation, class delivery in real educational processes in primary and secondary schools, analysis od teaching activities and prepared material for illustration of programming language concepts. Presentation of elementary concepts of programming languages, creation of different program solutions and their comparative analysis. Comparative analysis of more complex programs in several different programming paradigms.

Literature

1. Steve McConnell: Code Complete, Microsoft Press, A Division of Microsoft Corporation, One Microsoft Way, Redmond, Washington ,1993.
2. Pedagogical Pattern Editorial Board: Joseph Bergin, Jutta Eckstein, Markus Völter, Marianna Sipos, Eugene Wallingford, Klaus Marquardt, Jane Chandler, Helen Sharp, Mary Lynn Manns (Eds.) Published by Joseph Bergin Software Tools, 2012
3. Sestoft P., Programming Language Concepts (Undergraduate Topics in Computer Science) 2012th Edition, Springer
4. Зборници радова са конференције о историји и учењу програмских језика.

Weekly teaching load				Other:
Lectures: 2	Exercises: 1	Practical Exercises: 2	Student research:	

Teaching methodology

At lectures, classical methodology is applied, through usage of beam-projector and slides. The most important programming principles are explained, illustrated through appropriate examples. At theoretical exercises, introduced principles are exercised, illustrative examples are analyzed, and own solutions are designed. During the practical exercises, students apply gained techniques, producing different applications, where complexity and abilities grow during the semester (according to gained knowledge). Studens analyze and use different tools for visualization of results of program application.

Knowledge is tested through two tests, while at practical exercises students solve practical problems, which is also evaluated. At oral exam, studens should present comprehensive understanding of basic programming principles.

Grading method (maximal number of points 100)

Pre-exam oblications	**points**	**Final exam**	**Points**
Practical tasks	60	Oral exam	40