Study programme(s): Applied Mathematics – Data Science	
Level: master studies	
Course title: Advanced programming for mathematicians	
Lecturer: Srđan M. Škrbić	
Status: elective	
ECTS: 5	
Requirements: none	

Learning objectives

This is an introductory course for C++. It is intended for students of mathematics with little programming experience. The goal is to study main constructions of C++, including object-oriented programming and to gain basic knowledge of the usage of this programming language for scientific purposes.

Learning outcomes

Minimal: At the end of the course, it is expected that students understand basic concepts of the C++ language, including object-oriented programming. It is also expected that students know how to apply this knowledge in practical programming and science.

Desirable: At the end of the course, it is expected that a successful student shows ability to identify optimal way to solve specific given problem using C++. It is also expected that a successful student has active knowledge of all advanced concepts of this language.

Syllabus

Theoretical instruction

At the beginning of the course, an introduction to basic constructions of C++ is given – program structure, data types, constants, operators and flow control. In the continuation, functions, arrays, strings and pointers are presented. The second part of the course is an introduction to object-oriented programming using C++.

Practical instruction

Inside exercise classes, concepts covered by lectures are practiced through examples motivated by science applications. The accent is on usage of object-oriented programming and its applications in science.

Literature

Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley, 2000.

Scott Meyers,Effective C++, Addison-Wesley, 2005.

Bruce Eckel, Thinking in C++, Prentice Hall, 2000.

William Press, Saul Teukolsky, William Vetterling, Brian Flannery, Numerical Recipes: The Art of Scientific Computing, Third Edition in C++, 2007.

Weekly teaching load				Other:
Lectures: 2	Exercises: 2	Other forms of teaching:	Student research:	

Teaching methodology

During theoretical classes classical methods of teaching with the use of a projector are used to present stated topics. On practical classes, classical methods of teaching with the use of a projector and computers with appropriate software installed are used to practically master the skills of usage of suggested tools. A premise for successful practical classes is the existence of enough computers so that every student may work individually.

Grading method (maximal number of points 100)			
Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	Oral exam	50