

Course TITLE: Basic Principles of Algorithms and Coding

Instructor: Elena Tsomko

Title/Position : Professor

Institution : Dongseo University



Course Overview:

In order to prepare students for the job market of the future they need to acquire additional skills along with the major ones. Computational thinking and coding are nearly the basic skills that might be required in future jobs, no matter - engineering ones or humanities and social sciences. While learning the basic principles of algorithms and coding, students will practice in logically ordering and analyzing data, creating solutions using algorithms, and they will see how problem-solving is important across all disciplines, including math, science, and the humanities.

Once, they start learning simple coding, humanities and social sciences students will see how almost anything can be converted into data, including literary and non-literary texts, artistic images, professional documents and records, etc., since nearly everything becomes available in digital form. This will prepare the students for 21st century jobs where organizing, manipulating, visualizing and analyzing humanistic, social, and cultural data might become essential skills due to more and more of our personal and professional lives are enabled by the actions of devices and information systems that run on computer code.

Course Full Description:

This course consists of two parts.

In the first part students will learn about basic principles of algorithms, understand what is a series of ordered steps and why their order is important. Simple coding examples and various practical problems will be studied and their solutions will be discussed. This will prepare students for the following part of study - programming.

In this second part of the course, students will develop basic programming skills with Python, since this programming language is a popular general-purpose one that has been used for a broad range of applications.

The course plan (for 15 lectures):

1. Introduction.
(What is data? What is coding? Why is it important in 21st century? Its relation to the 4th Industrial Revolution)
2. Before coding: Algorithms.
(What is algorithm? Algorithms in our everyday lives. Computer Algorithms)
3. Learning coding with smartphones.
(practicing in instructions with Mekorama and coding with Lightbot)
4. Block coding: Introduction.
(Practice the first basic steps/commands)
5. Block coding: drawing with the commands - 1
6. Block coding: drawing with the commands - 2
7. Scratch: Introduction
(An overview on alternative free online source for developing interactive stories, games and animations)
8. Midterm exam
9. Python: Introduction.
(Understanding basics of programming using Python as a calculator, i.e. learning numbers, strings, lists)
10. Python: Control Flow Tools.
(*if* statements, *for* statements, the *range()* function)
11. Python: More Control Flow Tools.
(*break* and *continue* statements, and *else* clauses on loops; *pass* statements; defining functions)
12. Python: Data Structures
13. Python: Input and Output
14. Review.
(Summarize and practice in coding for additional problems in order to prepare for the final exam)
15. Final exam

Course materials:

1. Lecture notes
2. Python - <https://www.python.org>

Grading:

Attendance	10%
Midterm Exam	30%
Final Exam	40%
Quizzes	10%
Assignments	10%