Information technology

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November 5, 2015

Handouts 1

Information technology

1.1 Studies in English

This course is a part of an undergraduate programe taught fully in English. For more on studying in English at Cracow University of Technology please visit http://www.civ-eng.pk.edu.pl

1.2 Course description

The course will enable students to comprehend the concepts and practice of Computer Science, the main focus is however put on developing programming skills. The main environment to exercise programming concepts is Octave. The minor goal is to give the student wider perspective on operating systems and software tools thus during the labs GNU/Linux will be used. The student should also develop appreciation of the implications of computer use in solving engineering and scientific problems.

Duration:	1 semester
Number of hours:	15 (lectures) + 15 (laboratories). The lectures and laboratories are every two weeks (90 min. each)
Instructors:	dr inż. Roman Putanowicz (lecturer)

1.3 Assessment method

Studendt's work will be evaluated on the basis of short tests (3 or 4 in term) and student's engagement with the subject and activity during the lab.

1.4 On-line resources

All course materials are available on-line from the course web page:

- http://www.l5.pk.edu.pl/ putanowr/iten.html

The materials on the above page are available also in PDF[1] format: please search for the "Export PDF[2]1" link in the toolbox in the left panel.

1.5 Lectures

No	Content
1	Information technology overview. Course aim and scope. Computer as a work, research and study tool. Limitations of computing. Slides
2	Overview of computer operating systems. Basic introduction to GNU/Linux. Slides Questions
3	Introduction to Octave. Slides
4	Elements of computer programming. Programming languages. Execution of computer programs. Compilers and interpreters.Slides
5	Major generic kinds of statements in imperative languages. Slides
6	Introduction to algorithmic problem solving. Basic algorithms for sequences of numbers: summation, extreme elements, sub-sequences.Slides
7	Plotting and 3D graphics in Octave. Slides
8	Extension packages for Octave Slides
9	Representation of computer data. ASCII[3] and UNICODE. Text files versus binary files. Slides
10	Number systems and representations. Computer arithmetic. The IEEE 754 standard for binary floating point arithmetic Slides
11	Basic algorithms and data structures. Scalars, arrays and lists. Slides
12	More advanced algorithms. Recursion
13	Sources of errors in computer programs
14	Sources of errors in computer programs (cont.)
15	Computer systems in scientific and engineering applications.

[1] Portable Document Format
[3] American Standard Code for Information Interchange

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1.6 Lab assignments

No	Title
1	Introduction to GNU/Linux operating system
2	Getting started with Octave
3	Defining and using functions
4	Control flow : loops and conditional statements
5	More on control flow; Octave versus Matlab
6	Solving problems; more on plotting
7	Solving problems; operating on files
8	Summary

1.7 Self-checking projects (not mandatory)

Some students may wish to check their programming skills by solving problems more complex than the ones presented during the labs. Some ideas for such problems are presented below. Students are encouraged to extend the projects with their own ideas. **These projects are not mandatory**. Students wishing to have their solution to be checked, should prepare a report as indicated at each project sheet.

The report should be prepared as PDF[4] 1 file and send by e-mail to the respective tutor. There are no specific requirements on the document preparation system. One can use

- LaTeX please see the notes
- Microsoft Office,
- web based solutions (raw HTML[5] or some wikis and then printing),
- other

[5] HyperText Markup Language

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No	Project description	Assignment sheet
1	Trajectory of the mass center of three points	mass_centre_project.pdf
2	Velocity of a point moving along given trajectory	trajectory_project.pdf
3	The first and the second derivative of a function	derivatives_project.pdf
4	The shape of a deforming circle	deforming_circle_project.pdf
5	The sum of a function series	adding_signals_project.pdf
6	The volume and area surface of a solid	volume_surface_project.pdf

1.8 Reading list

1.8.1 Primary readings

1. Pugh, Kenneth. 1994. UNIX for the MS-DOS User. PTR Prentice Hall.
2. Eaton, John W., Bateman, David, and Hauber, Sørensen. 2008. GNU Octave Manual Version 3. Network Theory Limited.
3. Dale, Nell and Lewis, John. 2007. Computer Science Illuminated, Third Edition. Jones and Barlett.

1.8.2 Additional readings

1. Octave homepage, 2010, `http://www.gnu.org/software/octave/`
2. Arthur, Lowell Jay and Burns, Ted. 1998. Unix - programowanie w Shellu. Zakad Nauczania Informatyki "Mikom".

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