Information technology

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

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 Matlab. The minor goal is to give the student wider perspective on operating systems and software tools for data processing, visualization, geometric modelling. 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)

Assessment method

The computer labs grade is the same time the course grade.

Computer lab grading rules

- Students prepare to computer lab in their own study time.
- It is allowed to miss only one computer lab.
- The grade for computer labs is based on student's engagement, activity, progress and the results of a test written during the last lab.
- Students who failed to get passing grade for computer labs have one additional resit term for the test. The data for the resit term will be depending on the circumstances (generally one date for all students).

Important

- Generally I distinguish just two groups of students: the one who want to learn something and the others. Everything else are just less important details.

- The accuracy and objectivity of grading depends in fact on how much feedback on your engagement and achieved results you provide.
- **All the time it is possible to discuss the marks.**

Grading table

Effects	**Engagement**		
	small	medium	big
small	2.0	3	3.5
medium	3.5	3.5	4
big	4	4.5	5

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 format: please search for the “Export PDF” link in the toolbox in the left panel.

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 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.

Lecture	Title	Content
6	Introduction to geometric modeling	Geometric models and their representations. B-Rep i CSG. Meshes as data structures. Basic geometric transformations. Selected tools: GMSH, OpenScad, Blender.
7	Overview of software engineering	Repositories. Git, GitHub. Documenting code. Markdown. Linux environment. Automating repetitive tasks. Software licences.
8	Summary	
The role of programming in engineering curriculum.		

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

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 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 or some wikis and then printing),
- other

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

No	Project description	Assignment sheet
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

Reading list

Primary readings

Additional readings

<BIBTEX: file=it_additional_readings style=chicago> <texit> \begin{enumerate} \item Octave homepage, 2010, \url{http://www.gnu.org/software/octave/} \item Arthur, Lowell Jay and Burns, Ted. 1998. Unix - programowanie w Shellu. Zakad Nauczania Informatyki “Mikom”. \end{enumerate} </texit>
