**Computational Methods**

Authors: Baybikova T.N.

tbaibicova@hse.ru

Syllabus

1. Course Description
   1. **Title of a Course**: «Computational Methods»
   2. **Pre-requisites**:   
      General understanding of Math and Programming.  
      (optional) MathLab programming skills.
   3. **Abstract:**This is an introductory course to computational methods. You will get familiar with some concepts and algorithms of computational methods and their realization in modern programming packages. You will be able to realize your calculations and present the results of calculations in 2D and 3D formats.   
      The practical part of the course includes working with Matlab. Programming skills are welcome, but not strongly required. You will get all necessary instruction for the usage of built-in functions and for creating your own user functions in this programming package.
2. **Learning Objectives:**   
   The main practical goal of the course is to teach students the basics of computational methods and ways of their applications. As the result, students will learn how to apply these methods with the usage of modern programming packages; they will master basic programming tools for computational methods.
3. **Learning Outcomes:**• programming skills: implementing a simple computational algorithm;   
   • analytical skills: define a computational problem and find a suitable solution to it;   
   • presenting skills: demonstrating your own program solution.
4. **Course Plan**

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| --- | --- | --- | --- | --- |
| № | Topic | Course hours, total | Classroom activities | |
| Lectures | Practical  studies |
| 1 | Theory of metering error | 2 | 1 | 1 |
| 2 | Matrix processing in Matlab. | 2 | 1 | 1 |
| 3 | Numerical solution of simultaneous equations. | 2 | 1 | 1 |
| 4 | Methods of solving of system of linear algebraic equations. | 2 | 1 | 1 |
| 5 | Numerical solution of differential equations. | 2 | 1 | 1 |
| 6 | Numerical solution of integral equations. | 2 | 1 | 1 |
| 7 | MatLab functions for computational method. | 2 | 1 | 1 |
|  | **Sum:** | **16** | **8** | **8** |

1. **Reading List**
   1. **Required**  
      Gilat A. MATLAB: An Introduction with Applications. 5th edition. — John Wiley & Sons, 2014. — 416 p.
   2. **Optional**  
      Gilat A. Numerical Methods for Engineers and Scientists: An Introduction with Applications using MATLAB. 3 edition. — John Wiley & Sons, Inc., 2014. XVI, 559 p.
2. **Grading System**   
   2 Credits based on attendance and participation in at least one major activity (either small programming project or research presentation)
3. **Guidelines for Knowledge Assessment:**• programming skills: implementing a simple computational algorithm;   
   • analytical skills: define a computational problem and find a suitable solution to it;   
   • presenting skills: demonstrating your own program solution.
4. **Methods of Instruction:**Lectures, practical studies.
5. **Special Equipment and Software Suppor**t (if required)  
   MathLab is required and preferred;  
   projector; computer class.