1. Course number and name

RB-S1-19-W20-2B, IT and introduction to programming

2. Credits and contact hours*

5 ECTS, lectures: 15 hours**, laboratory: 45 hours**

3. Instructor's or course coordinator's name

Grzegorz Wandzik, CEng, MSc, PhD, DSc, Assoc. Prof.

4. Text book, title, author, and year

- Borland Delphi 4 in 21 Days, Macmillan Computer Publishing, 2008
- M. Cantu: Mastering Delphi 6, Sybex, 2001
- G. Wandzik: IT and Introduction to programming, teaching materials, 2020.

a. other supplemental materials

- web page: https://www.embarcadero.com/resources.
- web page : https://en.smath.com/view/SMathStudio/summary.

5. Specific course information

a. brief description of the content of the course (catalog description)

Lectures:

(1) Data in IT and data management (2) Math programs for engineers (3) Computer programming (4) Programming IDE (5) Data types in programming (6) Program organization (7) Building algorithms, structural programming, OOP.

Laboratories:

Project No 1 – Algorithm solving individual problem in MathCAD/SMath Studio,
Project No 2 – Program solving individual problem (related to mechanics, physics, geometry) elaborated in Pascal language (Lazarus).

b. prerequisites or co-requisites

No prerequisites

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required.

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic

The student can:

- understand process of the creation of computer applications,

- recognize data types and data management,
- split the more complex problem into simple components using basic programming methods,
- understand the idea of object oriented programming,
- prepare simple program with GUI,
- recognize possibilities of office applications enhancement by use of macros and code written in VBA,
- elaborate document including matrix operations, functions, units, graphs etc. in MathCAD/SMath Studio.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

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7. Brief list of topics to be covered

1. Data in IT and data management: Data, text and binary files, text coding, unicode (UTF systems), text formats: txt, csv, rtf, html, xml, json; Graphic formats – bitmap, compression, vector graphics, formats used for graphic data exchange.
2. Math programs for engineers (MathCad/SMath Studio environment): range variables and arrays, operations on matrices, units, functions, calculus and derivatives in mechanical problems – symbolic and numerical calculations, graphs.
3. Computer programming: interpreters and compilers, languages (similarities and differences), syntax, Pascal, .NET Framework, Python, VBA.
4. Programming IDE: RAD systems, building application interface, events driven applications, adding components on form, types of components, object inspector, debug code, breakpoints, stack.
5. Data types in programming: predefined and user-defined data types, naming conventions, numbers representation, local and global variables, constants, arrays, lists, records, functions (methods), classes and objects, events; functions arguments – transfer data by value or reference; enumerated types, open arrays, streams, files.
6. Program organization in Pascal: syntax, block statement, conditional statements in Pascal (if, case), loops (for, while, repeat), code compilation, protected mode and exceptions (try – except), removing errors – debugging code, trace.
7. Building algorithms and organization of the code: splitting task into simple problems, units and reference to units, interface and implementation, overloading.

*- Consultations were not included in the contact hours

**-per semester