University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Engineering Science and Materials

Course Syllabus

1. General Information:

Alpha-numeric codification: INGE 3016
Course Title: Algorithms and Computer Programming (Visual Basic)
Number of credits: 3
Contact Period: 3 hours of lecture per week

2. Course Description:

English: Development of algorithms and their implementation in a structured high level language. Programming techniques applied to the solution of engineering and mathematical problems.

Spanish: Desarrollo de algoritmos y su implantación utilizando un lenguaje estructurado de alto nivel. Técnicas de programación aplicadas a la solución de problemas de ingeniería y de matemáticas.

3. Pre/Co-requisites and other requirements:

MATE 3031

4. Course Objectives:

After completing the course, the student should be able to apply acquired computer programming skills to the solution of engineering problems. The student will be able to:

- Demonstrate ability to edit, compile, and run a simple computer program in a high level language
- Demonstrate ability to write a bugs-free and robust computer program
- Use algorithm development tools to develop a computer solution for engineering related problems.
- Divide a complex problem in simple problems (modules).
- List the steps necessary to solve problems in an organized and sequential manner
- Design and apply control structures to the solution of problems.

5. Instructional Strategies:

☒conference ☐discussion ☒computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring

☐research ☐other, please specify:

6. Minimum or Required Resources Available:

The General Engineering Department Computer Lab located at S-210.

7. Course time frame and thematic outline

Outline	Chapter	Hours
Introduction to Computer Systems and MS Excel Spreadsheet	**Notes & 1, 3, 13**	
a. Basic Components & Definitions		1.5
b. Basic Characteristics of Machine Language		0.5
c. Programming Languages and Compilers		0.5
d. Use of Computer Terminals (Computer Center)		1.0
e. Use of MS Excel for spread sheeting		1.5
f. The Visual Basic Editor		2.0
Problem Analysis and Design of Algorithms	**Notes**	
a. Problem Analysis and Design of Algorithms		1.0
b. Algorithms		2.0
1. Definition		
2. Flow charts		
3. Pseudocodes		
c. Structured Algorithms		3.0
1. Sequential Structure		
2. Selection Structure		
3. Repetition Structure		
d. Fundamental Programming Principles in sequential structures		0.5
e. Fundamental of Excel Object Model		0.5
First Test		**1.0**
Fundamentals of a High Level Language	**Notes & 2,5,6**	
a. General Characteristics		0.5
b. Constants and Variables		0.5
c. Types of Data		0.5
d. Objects		1.0
e. Arithmetic Expressions		1.0
f. Assignment Statement		0.5
g. Input/Output		1.0
Control Structures	**Notes & 7**	
a. Selection		5.0
1. Logical Expressions		
2. Multi-alternative Selection		
3. Nested Selection		
b. Repetition		5.0
1. Iteration Techniques		
2. Concept of a Counter and an Accumulator		
3. Nested Loops		
Second Test		**1.0**
Modular Programming	**Notes & 10**	
a. Definition and Importance		1.0
b. Concept of a Subprogram		4.0
Arrays & Collection	**Notes & 5, 9**	
a. Declaration of Arrays		1.0

b. I/O of Arrays		1.0
c. Manipulation of Arrays		1.5
d. Declaration of Collections		0.5
e. I/O of Collections		0.5
f. Manipulation of Collections		0.5
Third Test		**1.0**
File Processing	**Notes & 5,12**	
a. I/O of Files		1.0
b. Useforms		1.0
c. Macros		1.0
Total hours: (equivalent to contact period)		**45.0**

8. Grading System

☒ Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**2 to 4**	**60 to 80**
☒ **Final Exam**	**1**	**20 to 30**
☒ **Short Quizzes**	**Variable**	**0 to 10**
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**Variable**	**0 to 10**
☐ **Journals**		
☐ **Other, specify:**		
TOTAL:		**100%**

10. Bibliography:

Textbook: VBA for Modelers: Developing Decision Support Systems with Microsoft Office Excel, Albright, S. Christian, Third Edition, Duxbury, Thomson Learning, 2010.
Reference Books:
Excel 2002 Visual Basic for Applications Fundamentals, Reed Jacobson, 2001, Microsoft Press.
Microsoft Office Excel 2003, Stinson, Craig, 2004, Microsoft Press.
Microsoft Excel Version 2002 Step by Step, Frye, Curtis,2001, Microsoft Press.

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

Prepared by,

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