Syrian Arab Republic		**الجمهورية العربية السورية**
Ministry of Higher Education		**وزارة التعليم العالـــي**
Syrian Virtual University		**الجامعة الافتراضية السورية**

MATLAB for Numerical Computing Course Definition File

1- Basic Information:

Course Name	MATLAB for Numerical Computing
Course ID	CML201
Contact Hours (Registered Sessions)	30
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	
Exam	1.5
Registered Sessions Work Load	30
Synchronized Session Work Load	18
Credit Hours	5

2- Pre-Requisites:

Course	**ID**
Introduction to Programming	IPG101
Mathematical Algebra	GMA101
Mathematical Analysis	GMA102

3- Course General Objectives:

This course aims to provide an introduction on MATLAB® programming language and dealing with MATLAB® software from MathWorks® Corporation, in order to make this software the basic tool in data analyzing, processing and visualization, solving mathematical problems and simulating communications systems.
This course includes an introduction to fundamentals of MATLAB® programming language like using variables and functions that are available within the software libraries, building function to perform specific tasks and dealing with matrices, which are the basic element in simulation process, and using them in data representation and signal processing. The course also aims to teach how to create Graphical User Interface GUI, working with Simulink® to simulate systems, in addition getting to know about Toolboxes which allow users to perform simulation for communications systems and their parts in order to understand and apply the concepts of signal processing, digital and analogue communications.

4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Getting to know about the software, and mastering the fundamentals of MATLAB® programming language.
ILO2	Using the software libraries functions, those are related to various mathematical, signal processing and communications concepts, commensurate with the needs of the user.
ILO3	Building Functions programmatically in order to solve some mathematical or engineering problems.
ILO4	Dealing with data (analysis, import, export data, extract the results and visualize it), and dealing with the data structures of all kinds.
ILO5	Using Simulink® in simulation processes.
ILO6	Dealing with signals, images and sound files, and applying some mathematical concepts that are related to statistics, linear algebra and integration.
ILO7	building Graphical User Interface and getting to know about the software Toolboxes that are related to the concepts of signal processing, statistics and probability, digital and analogue communications.

5- Course Syllabus (18 hours of total synchronized sessions)

- **RS:** Recorded Sessions**; SS:** Synchronized Sessions**;**

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	**Introduction to MATLAB® Environment (General Concepts):** • Introduction to the software, its features and how to install it. • Getting to know about the software main interfaces. • Available resources from MathWorks Corporation (Help and Documentation).	1.5	1.5	☐ Exercises ☐ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.
ILO1 ILO2	**Fundamentals of MATLAB® Programming Language (Syntax and Variables):** • Introduction to basic syntax and entering commands. • Dealing with variables of all types like scalar variables, vectors and matrices.	1.5	1.5	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.
ILO1 ILO2	**Programming in MATLAB® -1- (Use of Scripts files and**	1.5	1.5	☒ Exercises ☒ Assignments	In this course, theoretical and practical parts are

ILO3	**Functions):** • Using scripts files to write programs. • Building Functions using MATLAB language. • Getting to know about Text Editor within MATLAB.			☐ Seminars ☐ Projects ☐ Practices ☐ Others	integrated together.
ILO1 ILO2 ILO3 ILO4	**Programming in MATLAB® -2- (Control Flow Statements, Graphics and Visualization, Strings):** • Getting to know and using of control flow statements (if else, for, while). • Create 2D and 3D Plots to show results (Plots, Mesh). • Working with Strings.	3	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.
ILO1 ILO2 ILO4 ILO6 ILO7	**Data Representations (Data Import & Export, Dealing with Images & Sounds, Toolboxes):** • Dealing with files, import and export data. • Dealing with images and sound files and modify it. • Getting to know the available Toolboxes within the software.	1.5	1.5	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.
ILO1 ILO2 ILO3 ILO4	**Mathematical Exercises using MATLAB® (Linear Algebra, Solving Equations, Derivation, Integration, Transforms and Polynomials):** • Providing wide and various set of exercises include the previous mathematical concepts.	3	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.
ILO1 ILO3 ILO5	**Simulation using Simulink®:** • Getting to know about Simulink® which integrated within the software and its features. • Simulating simple models. • Simulating a communication system.	3	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.

ILO1 ILO3 ILO7	**Graphical User Interface GUI:** • Importance • Building simple examples. • Building functions linked to GUI.	3	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	In this course, theoretical and practical parts are integrated together.

6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration		Ex	Exams		Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments		PW	Practice Work			

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Getting to know about the software, and mastering the fundamentals of MATLAB® programming language.		X	X	X		X
ILO2	Using the software libraries functions, those are related to various mathematical, signal processing and communications concepts, commensurate with the needs of the user.		X	X	X		X
ILO3	Building Functions programmatically in order to solve some mathematical or engineering problems.		X	X			X
ILO4	Dealing with data (analysis, import, export data, extract the results and visualize it), and dealing with the data structures of all kinds.		X	X	X		X
ILO5	Using Simulink® in simulation processes.		X	X			X

ILO6	Dealing with signals, images and sound files, and applying some mathematical concepts that are related to statistics, linear algebra and integration.		X	X	X		X
ILO7	Graphical User Interface building and getting to know about the software Toolboxes that are related to the concepts of signal processing, statistics and probability, digital and analogue communications.		X	X			X

7- Practice Tools:

Tool Name	Description
MATLAB® software	MATLAB® is a high-performance high-level programming language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include: • Math and computation. • Algorithms development. • Modeling, simulation, and prototyping. • Data analysis and visualization. • Scientific and engineering graphics. • Application development, including Graphical User Interface building.

8- Main References

1- "Documentation and Help available from MathWorks® on official website www.mathworks.com ", link for all Documentation http://www.mathworks.com/help/index.html.
2- Tutorial on MATLAB® http://www.tutorialspoint.com/matlab/index.htm, available PDF Format.

9- Additional References

1- "Introduction to Programming in MATLAB®", MIT Open Course, by Danilo Scepanovic, January 2010.
2- "Essential MATLAB® for Engineers and Scientists", by Brian D. Hahn, Daniel T. Valentine, published by ELSEVIER, Third edition 2007.
3- "Practical MATLAB® Basics for Engineers", by Misza Kalechman, published by CRC Press, 2009