# Course Specification
## (Bachelor)

| | |
|---|---|
| **Course Title:** | Programming for Engineers |
| **Course Code:** | GE 1108 |
| **Program:** | Bachelors of Engineering |
| **Department:** | Architechtural, Civil, Chemical, Electrical, Industrial, & Mechanical |
| **College:** | Engineering |
| **Institution:** | Imam Mohammad Ibn Saud Islamic University |
| **Version:** | 1 |
| **Last Revision Date:** | 23 March 2025 |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: ( 3 )** | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☒ College | ☐Department | ☐Track | ☐Others |
| **B.** | ☒ Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: ( Level 3rd / Year 2nd )** | | | | | |
| **4. Course General Description:** | | | | | |
| In this course, students will study fundamentals of programming, development of simple algorithms, basics to intermediate levels MatLab programming, defining variables, understanding mathematical operations in MatLab, use of built-in functions, plotting data in graphics module, M-files structure, function files, structured programming, nesting and indentation, introduction to Simulink, and solution of fundamental engineering problems through programming. | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| MATH 1115 | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| None | | | | | |
| **7. Course Main Objective(s):** | | | | | |
| In view of the importance of MatLab in the current technological world and its usefulness for engineers, scientists, data analysist, and many other professionals, the following objectives are formulated to able students to:<br>1. develop beginner to intermediate level skills of programming in MATLAB<br>2. practice hands-on experience for visualizing, analysing, and formulating intermediate and advanced level problems using MATLAB programming skills<br>3. solve real world mathematical and engineering problems by using structured programming techniques: sequence, selection, and loops<br>4. adopt MATLAB for data science, machine learning, and simulations | | | | | |

## 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 75 | 100 |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

## 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | 30 |
| 2. | **Laboratory/Studio** | 30 |
| 3. | **Field** | |
| 4. | **Tutorial** | 15 |
| 5. | **Others (specify)** | |
| **Total** | | 75 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | | | | |
| **2.0** | **Skills** | | | |
| S1 | Understand basic requirements of program and develop its algorithm using flow chart | 2.1 | Lectures, lab tutorials | Exams, sessional project |
| S1 | Develop a structured program in MatLab | 2.2 | Lectures, lab tutorials | Exams, sessional project |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | based on input and output variables | | | |
| S1 | Visualize and analyze engineering data using MatLab plotting tools | 2.3 | Lectures, lab tutorials | Exams, sessional project |
| S1 | Apply and execute user-defined functions to solve mathematical and engineering problems | 2.4 | Lectures, lab tutorials | Exams, sessional project |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| V1 | Demonstrate ethical awareness and professional responsibility in programming by adhering to best practices in code integrity, data privacy, and security while developing engineering solutions | 3.1 | Lectures | Sessional project |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | **Introduction to programming and algorithms, development of algorithms in the form of flow charts, ethics and responsibilities of a programmer, cybersecurity** | **10** |
| 2. | **Introduction to MatLab, MatLab environment, definition of variables through matrices, definition of arrays, matrix arithmetic operations, solving system of linear equations** | **12** |
| 3. | **Programming in MatLab, M-file structure, first program of "Hello World" in MatLab, input and output arguments, output commands, plotting and visualization of data, 2D and 3D plots, solution of fundamental engineering problems through MatLab** | **14** |

| | | |
|---|---|---|
| 4. | User-defined functions in MatLab, structure of function's file, usage of built-in functions, writing function file to solve physical, mathematical, and engineering problems | 10 |
| 5. | Structured programming in MatLab, conditional structure: If – Else If, For and While loops and vectorization, relational and logical operators, nesting and indentation | 15 |
| 6. | User-defined classes and object-oriented programming in MatLab, introduction to MatLab apps and graphical user interface | 6 |
| 7. | Introduction to Simulink, solution of case studies in engineering through MatLab | 8 |
| Total | | 75 |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | Two quizzes | 3 and 8 | 10 |
| 2. | Mid Term 1 | 6 | 15 |
| 3. | Mid Term 2 | 11 | 15 |
| 4. | Sessional Project | 15 | 10 |
| 4. | Homework & assignments | Overall | 10 |
| 5. | Final Exam | 16 | 40 |
| | Total | | 100 |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| Essential References | Stephen J. Chapman, MatLab Programming for Engineers, 7th ed., 2025, Cengage Publishing |
| Supportive References | ▪ Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, 7th ed., 2017, Oxford University Press<br>▪ Amos Gilat, MATLAB: An Introduction with Applications, 6th ed., 2016, Wiley |
| Electronic Materials | MIT OpenCourseWare, Introduction to MatLab https://ocw.mit.edu/courses/6-057-introduction-to-matlab-january-iap-2019/pages/lecture-notes/ |

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|---|---|
| | www.mathworks.com |
| **Other Learning Materials** | **Lecture slides and notes** |

## 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | **Standard classroom with PCs** |
| **Technology equipment**<br>(projector, smart board, software) | **Projector, MatLab software** |
| **Other equipment**<br>(depending on the nature of the specialty) | |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Course and program coordinators | Indirect assessment through peer-to-peer discussion at the end of one academic cycle |
| Effectiveness of Students assessment | Students | Indirect assessment through course evaluation survey at the end of each semester |
| Quality of learning resources | Quality Committee | Direct at the end of every semester |
| The extent to which CLOs have been achieved | Instructor/Quality Committee | Direct at the end of every semester |
| Other | | |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

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|---|---|
| **COUNCIL /COMMITTEE** | |
| **REFERENCE NO.** | |
| **DATE** | **MARCH 26, 2025** |