**University of Management and Technology**

**Course Outline**

Course code EL360 Course title: Control System Lab

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| --- | --- |
| Program | BSEE |
| Credit Hours | 1 |
| Duration | One Semester |
| Prerequisites | Signals and Systems |
| Resource Persons | Asfa Javed  Muhammad Atif |
| Counseling Timing | See Office doors. |
| Contact | [asfa.javed@umt.edu.pk](mailto:asfa.javed@umt.edu.pk)  [muhammad.atif@umt.edu.pk](mailto:muhammad.atif@umt.edu.pk) |

**Chairman/Director signature………………………………….**

**Dean’s signature…………………………… Date………………………………………….**

**Learning Objective:**

**The objectives of this course are:**

This course aims to develop mathematical and analytical skills necessary to analyze digital signals both in time and frequency domains. From the system’s perspective, the objective is to incorporate extensive design skills in the students enabling them to develop relevant prototypes with the desired level of accuracy.

**Learning Methodology:**

**Lecture, interactive, participative ,active learning.**

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Lab Sessional Evaluation 40%

Final Viva Voce 60%

Total 100%

**Recommended Text Books:**

Lab Manual.

**Reference Books:**

1. **Control Systems Engineering** by Norman S. Nise, 6th edition (Dec 14, 2010)
2. **Modern Control Engineering** (5th Edition) by Katsuhiko Ogata (Sep 4, 2009)

**Calendar of Course contents to be covered during semester**

**Course code……EL 360……………… Course title……Control System Lab**

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| --- | --- | --- |
| **Week** | **Course Contents** | **Reference Chapter(s)** |
| 1 | MATLAB for Control Systems | Lab 1 |
| 2 | SIMULINK for Control Systems | Lab 2 |
| 3 | Differential Equation Modeling and Analysis of DC Motor speed | Lab 3 |
| 4 | Magnetic Levitation system model and Analysis in SIMULINK | Lab 4 |
| 5 | Control System Stability Transient and Steady State Response and Performance | Lab 5 |
| 6 | Study of on/off controller, open and closed loop control systems | Lab 6 |
| 7 | PID Control design and analysis of DC motor in Simulink | Lab 7 |
| 8 | Design and analysis of PID Control for Magnetic Levitation system in Simulink | Lab 8 |
| 9 | SIMULINK modeling and Control of DC motor speed | Lab 9 |

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| 10 | Simulation based Root Locus Analysis and Controller design for DC motor speed | Lab 10 |
| 11 | Root Locus Analysis and Controller design for Magnetic Levitation in Simulink | Lab 11 |
| 12 | Frequency Response Control of DC motor using MATLAB | Lab 12 |
| 13 | Ball-and-Beam system Modeling and Analysis | Lab 13 |
| 14 | Controllers for Ball-and-beam using MATLAB/Simulink | Lab 14 |