**University of Management and Technology**

School of Engineering

Department of Electrical Engineering

**Course Outline**

Course code……EL-315…... Course Title………Signals & Systems Lab………

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| --- | --- |
| Program | BSEE |
| Credit Hours | 1 |
| Duration | One semester |
| Prerequisites | nill |
| Resource Person | Hassan Tariq |
| Counseling Timing  (Room# ) | See Office doors |
| Contact | [hassantariq@umt.edu.pk](mailto:hassantariq@umt.edu.pk) |

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

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

**Learning Objective:**

In accordance with HEC curriculum objectives a, d, f & g, the labs have been designed in such a way to help students understand course contents from a practical perspective, get sound engineering knowledge along with hands-on experience in the usage of laboratory equipments. This is a backbone course for many engineering programs and leads to a foundation in analyzing engineering problems. The lab begins with classification of signals and systems and then proceeds to provide analytical tools in time-domain and frequency domain for both continuous and discrete environment. Specifically, the students are trained in using convolution, Fourier series and Fourier transforms. MATALB is extensively used as a visualization and analytical tool as part of the course.

**Learning Methodology:**

Practical Experiments, interactive, participative

**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 Manuals & Performance: 40%

Final Viva or Quiz + Performance: 60%

Total 100%

**Recommended Text:**

Lab Manual

Text Book: Signals & Systems by Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley & Sons

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

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| --- | --- | --- |
| **EL-315 Signals & Systems Lab**  **List Of Experiments** | | |
| **Week** | **Experiments** | **Text Book Reading Topics** |
| **1** | Introduction to MATLAB |  |
| **2** | Implementation of basic sequences and calculation of their energy and power. | 1.4: Classification of Signals.  1.6: Elementary Signals. |
| **3** | Generation of complex exponential, real exponential, sinusoidal and random signals on Matlab | 1.6: Elementary Signals. |
| **4** | Implementation of signal addition, multiplication, scaling, shifting, folding, sample summation, even and odd synthesis on Matlab | 1.5: Basic Operations on Signals. |
| **5** | Calculation of impulse response and step response of Linear-Time-Invariant (LTI) system | 2.7-8 : Impulse Response of LTI system ; Step Response of LTI system. |
| **6** | Simulation of Linear-Time-Invariant (LTI) system  Properties | 2.7:Relations between LTI  System properties. |
| **7** | Continuous time convolution | 2.4-5: Convolution Integral and its Evaluation. |
| **8** | Discrete time convolution | 2.2-3: Convolution Sum an Evaluation. |
| **9** | Fourier series, magnitude and  phase calculation on Matlab | 3.3-5: Fourier Representation  of Signals, Discrete Time  Fourier Series, Continuous  Time Fourier Series. |
| **10** | Fourier transform | 3.6-7: Discrete Time Fourier Transform, Continuous Time Fourier Transform. |
| **11** | Time and frequency characterization of signals and systems | 3.8-16: Properties of Fourier Representation. |
| **12** | Comparison of continuous-time & discrete-time Signals and Sampling and Signal Reconstruction | 4.5: Sampling. |
| **13** | Z-transform using residuez method, pole-zero plot | 7.1-3: Introduction to Z Transform, Properties of region of Convergence for Z Transform |
| **14** | Inverse z-transform on matlab | 7.5: Inversion of Z Transform |