Research Center for Modeling & Simulation (RCMS)
National University of Sciences & Technology

Title : Fundamentals of CSE
Code : CSE-800
Credit Hours: 3-1

Course Objectives

1. The objective of this course is to introduce students to the fundamental concepts of CS&E, including basic and applied mathematics, descriptive and inferential statistics, introduction to probability, random variables, and introduction to computing focusing computer architecture and programming. This course will serve as a foundation for core subjects/courses of MS CS&E.

2. **Course Contents**

For Mathematics

a. Matrices and Determinants
b. Functions and graphs
c. Limits and continuity
d. Derivatives, Maxima and Minima
e. Integration and Area
   (1) **Labs.** Matrix operations, Basic Plotting Functions, Derivatives and Integration of different functions in Matlab/Mathematica

For Statistics

a. Introduction to Statistics
b. Presentation and description of Data
c. Introduction to Probability, Random variables, Probability distributions and its properties
d. Survey Sampling
e. Statistical Inference including Estimation, Hypothesis testing
   (1) **Labs.** Graphs, descriptive statistics, Computing Probability and probability distribution Reliability of the questionnaire and its analysis, Computing estimation and hypothesis testing using Minitab/SPSS

For Computing

a. Basic Computer Architecture
b. Introduction to Operating Systems, Linux OS, Kernel, Shell, Basic Commands
c. Introduction to Computer Programming
d. Problem solving in Computer Science

Outcomes

3. After completing this course, students have a clear understanding of the fundamentals of Core of CS&E and its uses/applications in various fields

4. Text Books/Reference Material

a. S. M. Yusuf, Abdul Majeed, Muhammad Amin, 2000, Mathematical Methods, Ilmi Kitab Khana
b. Thomas, Calculus, 11th Edition. Addison Wesley Publishing Company, 2005.
c. Stewart, James. Single Variable Calculus: Early Transcendentals 6th edition, Cengage Learning, 2010
d. Howard Anton, Barnard Kolman and Bonnie, 1982, Mathematics with Applications for the Management life and social Sciences, Academic Press
e. Sheldon M. Ross, A First Course in Probability (8^{th} Edition) Pearson Education, 2010
f. M. H. DeGroot and M. J. Schervish: Probability and Statistics (3^{rd} Edition), Addison-Wesley, 2002.
g. Robert B. Ash, Basic Probability Theory, Dover. 2008.
h. R. E. Walpole, R. H. Myers, S. L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists (7^{th} Edition), Prentice Hall, 2002.
i. Peter Norton, Introduction To Computers
j. Linux, The Complete References