



Lahore University of Management Sciences
EE100: Engineering Laboratory
Spring 2017

Course Catalog Description	
This course is designed for freshmen engineering and science students to provide them a basic introduction of various stages involved in an engineering product design. It will help students to interpret and create computer aided mechanical parts and assembly drawings, interpret and create schematic and layout drawings for electronic circuits, Identify materials and select manufacturing processes for engineering products. Students will also be given an opportunity to get hands on experience on conventional and non-conventional machines such as CNC and 3D printers for rapid prototyping. The course is divided into four modules each of which contains lab tasks for practice and module project to test the concepts learned. The final module is a course project in which students shall use all the concepts learned in this course in order to consolidate their learning and to give them an opportunity to work with in larger team.	

Course Details	
Credit Hours	1
Core	Core Course for Electrical Engineering
Elective	No
Open for Student Category	SBASSE
Closed for Student Category	N/A

Course Prerequisite(s)/Co-Requisite(s)	
Pre-requisites: None	
Co-requisites: None	

Course Offering Details						
Lecture(s)	Number of Lecture Per Week	1	Duration	170 min	Timings and Venue	Fri. 0800-1050 – Section I – EE LAB 6 Mon. 1330-1620 – Section II – EE LAB 6 Mon. 0930-1220 – Section III – EE LAB 6 Wed. 0930-1220 – Section IV – EE LAB 6
Course Modules	Number of Modules Per Semester	5	Duration	PCB : 04 Weeks CAD : 05 Weeks Machining Processes : 02 Weeks Electrical Wiring : 01 Weeks Course Project : 03 Weeks		

Course Instructor	Dr. –Ing. Ahmad Kamal Nasir
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Telephone	+92 (42) 3560 8486
Lab Engineer	Engr. Muhammad Usman
Lab Technician	Omer Qureshi
Teaching Assistance	(TBA) (TBA)
TA Office Hours	Tuesday : 0000-0000 (TBA) Wednesday : 0000-0000 (TBA)
Course URL (if any)	LMS, http://web.lums.edu.pk/~akn/

EE100 Course Learning Outcomes (CLO)	
	The students should be able to:
CLO1:	Identify electrical/electronic devices and usage of electrical/mechanical measurement tools.
CLO2:	Create and interpret electronic schematics and layout drawings.
CLO3:	Create and interpret mechanical drawings.
CLO4:	Use modern conventional workshop machines, CAD/CAM and other rapid prototyping tools for engineering product design.



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Relation to EE Program Learning Outcomes (PLO)				
CLO	Related PLO	Levels of Learning	Teaching Methods	CLO Attainment checked in
CLO1	PLO1	Cog-1,2	Lecture, Demonstration	Final Exam, Lab Tasks
CLO2	PLO1	Cog-1,2	Lecture, Demonstration	Final Exam, Lab Tasks, Project
CLO3	PLO1	Cog-1,2	Lecture, Demonstration	Final Exam, Lab Tasks, Project
CLO4	PLO5	Cog-1,2	Lecture, Demonstration	Final Exam, Lab Tasks, Assignment

Grading Breakup and Policy		
Assessment Module	Numbers	Weightage
Final Examination	1	36 %
Lab Tasks	12	9 x 2 + 3 x 4 = 30%
Assignment	1	4 %
Course Project	1	30 %

Textbook(s)/Supplementary Readings
Textbook: Lectures and handouts will be provided where necessary Supplementary Reading: A- Design and Technology, 2 nd Edition, James Garratt, Cambridge University Press B- Creo Parametric 2.0 Introduction, Christopher F. Sikora C- Basic Engineering Drawing, R.S. Rhodes & L.B. Cook

COURSE OVERVIEW				
Week No.	Module	Topic	Reference	Related CLOs & Additional Remarks
1	PCB	<ul style="list-style-type: none"> Introduction to the course and its contents Introduction to basic electronics components PCB Fabrication: Introduction to conventional/non-conventional PCB fabrication process. Lab Task 1: Draw schematic circuit for simple problem Lab Visit: Overview of workshop facilities Workshop Safety Practices Demonstration: Etching and soldering Demonstration: PCB CNC milling and drilling 	A-Ch6	CLO1, CLO2 Total Lab Tasks: 4 Lab Task 1: 2% Lab Task 2: 2% Lab Task 3: 2% Lab Task 4: 4%
2		<ul style="list-style-type: none"> Introduction to Proteus ISIS Schematic Design and Simulation Tutorials: Create computer schematic and simulate circuit Lab Task 2: Create schematic drawing in Proteus ISIS 	Lecture Notes	
3		<ul style="list-style-type: none"> Introduction to Proteus ARES Circuit Layout Design Tutorials: Create computer PCB layout for electronic circuits Lab Task 3: Create Layout drawing in Proteus ARES 	Lecture Notes	
4		<ul style="list-style-type: none"> Lab Task 4: PCB Soldering and Troubleshooting 	Lecture Notes	
5	CAD	<ul style="list-style-type: none"> Design methodology for scientists and engineers Introduction to Engineering Drawing Engineering Drawings <ul style="list-style-type: none"> Projections, Dimensions, Drawing interpretation Lab Task 5: Sketch orthographic projections of solid objects 	A- Ch2 C- Ch1,2	CLO3 Total Lab Tasks: 5 Lab Task 5: 2% Lab Task 6: 2% Lab Task 7: 2% Lab Task 8: 2% Lab Task 9: 4%
6		<ul style="list-style-type: none"> Computer Aided Modeling <ul style="list-style-type: none"> Intro to PTC Creo and its features 2D sketching Basics of 3D object modeling Lab Task 6: 3D part modeling. 	B	
7		<ul style="list-style-type: none"> Advanced features of PTC Creo Parametric 2.0: Lab Task 7: 3D part modeling 	B	
8		<ul style="list-style-type: none"> Assembly Lab Task 8: Assembly task 	B	
9		<ul style="list-style-type: none"> Lab Task 9: Create parts and assembly drawings for a robotic 		



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		hand (gripper)		
10	Machining Processes	<ul style="list-style-type: none"> • Introduction to engineering materials and their properties • Workshop Technologies <ul style="list-style-type: none"> ○ Conventional: (Introduction to the Process and basic tools) (Casting, Forging ,Welding, Molding, Machining, Fitting) ○ Non –Conventional Prototyping Techniques/Additive manufacturing (3D Printing, Selective Laser Sintering,) • Demonstration: Conventional Machining Operations • Lab Task 10: Materials and Processes 	Lecture Notes	CLO1, CLO4 Total Lab Tasks: 3 Lab Task 10: 2% Lab Task 11: 2% Lab Task 12: 2% Assignment: 4% <u>Assignment deadline (1 Week)</u>
11		<ul style="list-style-type: none"> • CNC Machine Basics • Demonstration: 3D Printer • Demonstration: CNC Milling machine • Lab Task 11: G-Codes for a part file • Assignment: Machining a part on Lathe 	Lecture Notes	
12	Electrical Panel and Wiring	<ul style="list-style-type: none"> • Wiring systems and their uses • Lab Task 12: Electrical Wiring and Fitting 	Lecture Notes	CLO1 Lab Task 12: 4%
13	Course Project	<ul style="list-style-type: none"> • Introduction to your robot components • Robot building: Making your first mobile robot 	Lecture Notes	CLO1, CLO2, CLO3
14		<ul style="list-style-type: none"> • System integration, Testing and troubleshooting for the mobile robot • Arduino Programming Basics 	Lecture Notes	
15		<ul style="list-style-type: none"> • Course Project: Robot Competition 		

Examination Details	
Final Examination	April 2017 Combine/Separate: Combine Duration: 100 minutes Exam Specifications: MCQ, Short Questions and Answers

Prepared by:	Dr. –Ing. Ahmad Kamal Nasir
Date:	26 October 2016