Spring 2020 Schedule

Senior Design ME46300

PURDUE UNIVERSITY
Mechanical Engineering

Updated: 08-Jan-2019

Note: Italics text indicates the lecture is a video on Blackboard

Legend for Lab Schedule	
PDR - Preliminary Design Review	
CDR - Critical Design Review	**SR** - Safety Review
FDR - Final Design Review	**PE** - Peer Evaluation

	LECTURE SCHEDULE					LAB SCHEDULE				PROJECT SCHEDULE
Week	**Date**	**Day**	**#**	**Lecturer**	**Topic**	**Date**	**Day**	**Assignments Due / Student Presentations**	**Assignment Submission**	**Tasks Completed (recommended)**
1	1/13	M	1	Nelson	**Instructor & Course & Introduction**					
	1/15	W	2, 3	Nelson	**Project Initiation I, *Project Management I***	1/14 , 1/15	T or W	**"Free agents" present project ideas**	None	
			4, 5	Nelson	***Project Initiation II, Project Management II***	1/16 , 1/17	R or F	**Teams & Projects set (by instructor)**	N/A	Market Analysis, Behavioral Style discussion
2	1/20	M			**No Class - MLK Day**					Team roles, Charter, Product unique value identified
	1/22	W			**Altair - Topography & Optimization**	1/21 , 1/22	T or W	**Informed Consent, Team Registration**	Blackboard (Bb)	WBS, Network Diagram
						1/23 , 1/24	R or F			Initial concept generation, Risk Register initiated
3	1/27	M	6, 7, 8	Jensen	**Innovation, *Concept Initiation & Optimization I, Proj. Mgmt. III***					Milestone Schedule
	1/29	W	9	Bae	**Concept Initiation & Optimization II-senors and actuators**	1/28 , 1/29	T or W			
						1/30 , 1/31	R or F			Concept down-selection, Preliminary Budget
4	2/3	M	10	Bae	**PEARL Lab intro, Concept Initiation & Optimization III-controllers and power**					Full Schedule, Business Proposition, Low-Fidelity prototype
	2/5	W	11	Boregowda	**Robust Design Methods**	2/4 , 2/5	T or W	**Low-Fidelity Prototype**	In-person review with instructor	Oral & Written PDR draft
						2/6 , 2/7	R or F	**Oral PDR, Written PDR, SR #1, PE#1**	Present & Bb, Bb, Bb, email, CATME	
5	2/10	M	12	Jensen	**Iterative Preliminary Design I – Reusable Mechanical Models**					Final concept selection
	2/12	W	13	Jensen	**Iterative Preliminary Design II – Reusable Mechanical Analyses**	2/11 , 2/12	T or W			
						2/13 , 2/14	R or F			
6	2/17	M	14	Jensen	**Iterative Prelim. Design III - Adding Mfg. Knowledge and Heuristics**					
	2/19	W	15	Jensen	**Detailed Design I - Mechanical systems**	2/18 , 2/19	T or W			
						2/20 , 2/21	R or F			Preliminary detailed design, initial analysis
7	2/24	M	16	Bae	**Detailed Design II - Electronic systems**					
	2/26	W	17	Jensen	**Systems Engineering**	2/25 , 2/26	T or W			
						2/27 , 2/28	R or F			Final design, final analysis, BOM, final budget
8	3/2	M	18	Jensen	**Fabrication I - Mechanical Systems**					Manufacturing drawings, Mid-Fidelity Prototype
	3/4	W	19	Bae	**Fabrication II - Electrical Systems (Wiring, board options, calibration)**	3/3 , 3/4	T or W	**Mid-Fidelity Prototype Demo**		Oral & Written CDR draft
						3/5 , 3/6	R or F	**Oral CDR, Written CDR, SR#2, PE#2**	Present in class, Bb, Bb, Bb, email, CATME	
9	3/9	M	20		**Machine shop & BIDC overview**					
	3/11	W	21	Jensen	**Testing & Validation I - Mechanical Systems**	3/10 , 3/11	T or W			Purchase orders submitted to instructor
						3/12 , 3/13	R or F	**All purchase orders placed**	email (purchase requests)	
10	3/16	M	**No Class - Spring Vacation**							Final Prototype Fabrication begun
	3/18	W				3/17 , 3/18	T or W	**No Class - Spring Vacation**		
						3/19 , 3/20	R or F			
11	3/23	M	22	Bae	**Testing & Validation I - Electrical Systems**					
	3/25	W	23		**FE --> Dr. Vincent P. Drnevich, P.E.**	3/24 , 3/25	T or W			
						3/26 , 3/27	R or F			
12	3/30	M			**No Class**			**Malott Project Descriptions**	Blackboard	
	4/1	W			**No Class**	3/31 , 4/1	T or W			
						4/2 , 4/3	R or F	**SR #3 (any time before testing)**	email	Final Prototype Fabrication & Assembly complete
13	4/6	M			**No Class**					
	4/8	W			**No Class**	4/7 , 4/8	T or W			
						4/9 , 4/10	R or F			
14	4/13	M			**No Class**					Initial validation testing complete
	4/15	W	24	Nelson	**Review Upcoming Events and Processes**	4/14 , 4/15	T or W			
						4/16 , 4/17	R or F			
15	4/20	M			**No Class**			**Malott poster to Mike Black (by end of day)**	email (blackm@purdue.edu)	Design iteration/optimization complete
	4/22	W			**No Class**	4/21 , 4/22	T or W			
						4/23 , 4/24	R or F			Final validation testing complete, Oral & Written FDR draft
16	4/27	M			**No Class**					Oral & Written FDR practiced 10x
	4/29	W			**No Class**	4/28 , 4/29	T or W	**Oral FDR, Written FDR, PE#3**	Present & Bb, Bb, CATME	
						4/30	R	**Set-up Malott display (4:30 - 6:00pm)**	ME 1178 or ME 1185 (as directed)	
						5/1	F	**Set-up public display (12- 1pm), Display (1-4pm)**	Gatewood 2nd floor (as directed)	
Finals	5/4	M			**No Class**					
	5/6	W			**No Class**	5/6	W	**Clean up PEARL lab rooms (9:00am - 12:00pm)**	Lab work station & room	

Lecture Details			
#	**Lecturer**	**Title**	**Topics**
1	Nelson	**Instructor & Course & Introduction**	Lecturers Intro, Course overview, Creating a Vision & Mission
2	Nelson	**Project Initiation I**	Market Analysis, Behavioral Styles, Team formation stages
3	Nelson	***Project Management I***	WBS, Network Diagram
4	Nelson	***Project Initiation II***	Team roles & responsibilities, Peer Evaluations, Managing conflict, Charter
5	Nelson	***Project Management II***	Schedule in Microsoft Project
6	Jensen	**Innovation**	Invention vs. Innovation; Innovation in design/analysis/manufacturing/testing
7	Jensen	**Concept Initiation & Concept Optimization I**	How are concepts generated; How are concept down selected; Brainstorming; Sketches, 1D Analysis, Topology
8	Nelson	***Project Management III***	Budget, Business Proposition, Risk Register
9	Bae	**Concept Initiation & Concept Optimization II**	Here we will survey through the reprentatitve type of sensors and actuators. Overall specification will be listed to
10	Bae	**Concept Initiation & Concept Optimization III**	Here we will go over the list of microcontrollers and power options (i.e. batteris).
11	Boregowda	**Robust Design Methods**	
12	Jensen	**Iterative Preliminary Design I – Reusable Mechanical Models**	Building reusable Parametric CAD Models; Why take the time;
13	Jensen	**Iterative Preliminary Design II – Reusable Mechanical Analyses**	What Analyses are required; Coupling the Analysis Results to Refinement and update the reusable parametric CAD
14	Jensen	**Iterative Preliminary Design III - Adding Manufacturing Knowledge and Heuristics**	Preliminary Prototypes and Manufacturing Driven Model Refinement
15	Jensen	**Detailed Design I - Mechanical Systems**	Mechanical Drawings, Tolerances, Fits; Are my designs ready for manufacturing; Are my drawing releasable
16	Bae	**Detailed Design I - Electrical Systems**	Here we will talk about control and circuit Diagram which encompasses the individual component selection we talked
17	Jensen	**Systems Engineering**	Integration engineering, Final Analyses & where to focus prototype testing, Stocked hardware/components vs.
18	Jensen	**Fabrication I - Mechanical Systems**	Mechanical Component Process Planning, Mechanical Component Manufacturing, Low to High Fidelity prototype
19	Bae	**Fabrication II - Electrical Systems**	We will discuss about PCB Process Planning, PCB and Wire Harnesses Manufacturing, Calibration, Low to High
20		**Machine Shop & BIDC Oveview**	Learn how to use the ME Student Machine Shop and the Bechtel Innovation Design Center for manufacturing
21	Jensen	**Testing & Validation I - Mechanical Systems**	Validation test plans, component testing, system testing, gathering & interpreting results
22	Bae	**Testing & Validation I - Electrical Systems**	We will talk about the component testing and validation procedure for the electronic sub-systems.
23	Drnevich	**Fundamentals of Engineering (FE) Exam**	Learn the benefits of taking the FE
24	Nelson	**Review Upcoming Events and Processes**	Final assignments, Malott competition, Other end of semester activities/requirements