Jordan University of Science and Technology

Faculty of Engineering

Mechanical Engineering Department

ME593 Projects In Mechanical Design - JNQF Level: 7
Second Semester 2023-2024

Course Catalog
2 Credit Hours. Introduction to computer aided engineering environment. Solid modeling.Introduction to Finite Element Methods.Optimum design.Computer applications in mechanical design.
Teaching Method: On Campus

Text Book	
Title	Engineering Analysis with SolidWorks Simulation 2017
Author(s)	Paul M. Kurowski
Edition	1st Edition
Short Name	Text
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#1	Analysis of Machine Elements Using SOLIDWORKS Simulation	John R. Steffen,Ph.D., P.E. and Shahin S. Nudelhi, Ph.D.	12th Edition	

Instructor	
Name	**Mr. Jamal Al Farran**
Office Location	M6L2
Office Hours	
Email	jfarran@just.edu.jo

Class Schedule & Room

Section 1:
Lecture Time: Sun : 11:30 - 12:30
Room: CAD3-E1L0

Section 2:
Lecture Time: Sun : 12:30 - 13:30
Room: A3132

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
254333	ME433 Machine Design (2)	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
	SolidWorks revision: Installation, sample, disable add-ins, environment (toolbars, ribbon, pull-down, standard views [Normal to], zoom, shade, mouse, browser, resources), New part, units, sketch, 2D commands(line, circle, delete, trim, relations, fillet, smart dimensions), Sketch requirements, fully defined sketch, over defined, 2D mirror/array, construction geometry, extrude, revolve, Merge result, Datum plane.	
	PPT. intro, solid model, start simulation, define static study, Material, constraints types, load, results, chart options(units, clip, probe), copy study, refine (finer, curvature based, mesh control), h/p-adaptive, convergence graph, report.	
	Optimization: Fillet 3D, Global variables, equations, static simulation. define design study, variables, constraints, goals, Run, Singularities: Results?Stress hot spot.	
	Plane stress: Symmetry, plane stress, plane strain, draw ? model, display symmetric result, Define composite material, split/solid bodies, Contact visualization plot, Define contact for components, pressure load.	
	Axisymmetric: 2D Axisymmetric, 3D Axisymmetric, check DOF (using Contact visualization plot), compare results, cyclic symmetry, centrifugal load.	
	Shell: Shells, offset, convert entities, shell manager, immovable constr., roller/slider constr., coordinate system, Fixing failures, showing under constrained DOF, bearing load, composite materials, List Result force.	
	Beams, treat as beam, beam definition, roller support, Non-uniformly distributed load (Table driven), moment at point, - shear & moment diagrams, Weldments, truss, distributed mass load	
	Thermal: Steady state thermal, split load, heat power, convection, - symmetry surface?NO B.C.? s, feature scope, thermal stresses.	
	Topology: Buckling analysis, buckling load factor, frequency analysis, Topology optimization	
	Assembly: Assembly, toolbox, explode, Global/Component/Local contacts, smart fastener, bolt connection, screw connection, torque, list connector force, or define pin/bolt check plot, contact pressure plot, spot weld.	
	Mechanism: dynamic assembly, material, position, joint friction, Toolbox (gear), mechanical mates (Gear), belt/chain, Motion study, motion by gravity, place key, motor, force, spring/damper, contact, results, motion with simulation	

	Revision & Discussion.	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Use CAD tools to make professional three-dimensional models. [1SO2] [1L7S2]	10%	
Analyze mechanical parts to obtain stress distribution using commercial finite element software. [1SO2] [1L7S2]	40%	
Use commercial finite element software to evaluate optimal design parameters. [1SO2] [1L7S3]	30%	
Analyze mechanical parts to account for thermal effects using commercial finite element software. [1SO2] [1L7S1]	10%	
Analyze stress in assemblies using commercial finite element software. [1SO1] [1L7S3]	10%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
10	90					

Relationship to NQF Outcomes (Out of 100%)		
L7S1	L7S2	L7S3
10	50	40

Evaluation	
Assessment Tool	**Weight**
mid	30%
Final	40%
Classwork & Homework	25%
Project	5%

Date Printed: 2024-03-17