FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Engineering & Technology

Reverse Engineering in Mechanical Design

Information :

Course Code :	Man 547	**Level :**	Undergraduate	**Course Hours :**	2.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Mohamed Fathy Abdel Rahman Badran	8
Teaching Assistant	Mostafa Mahmoud Sabry Sadek	4

Area Of Study :

- Develop the ability to select the correct techniques for reverse engineering a part.
- Develop the ability to select the correct method to rapid prototype a part.
- Enrich the understanding of the different techniques for each of the reverse engineering phases.

Description :

Effect of reversing engineering in mechanical design, Reversed engineering Process, Contact and non-contact 3-D scanning, Procedure for geometric modeling, Fitting of standard and free form surfaces, Identification of other design parameters, Transfer of geometric data to CAD/CAM systems.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Explain the reasoning behind reverse engineering.
2 -	Differentiate between reverse engineering and rapid prototyping.
3 -	Explain the physics behind contact and non-contact scanners.
4 -	Describe the different phases of a reverse engineering process
5 -	Identify the different hardware and software required for reverse engineering
6 -	Identity the current technologies and materials used for rapid prototyping.
b.Intellectual Skills: :	
1 -	Solve a reverse engineering problem of a part or assembly based on limited information.
2 -	Divide the reverse engineering problem of any product into several process steps.
3 -	Select the appropriate technique for each reverse engineering process of any product.
4 -	Select the proper rapid prototyping method for any product.
c.Professional and Practical Skills: :	
1 -	Generate the point cloud of a physical part.

2 -	Utilize computer aided drafting software to develop the digitized drawing of a physical product from a generated point cloud.
3 -	Select the proper reverse engineering process flow for different products
4 -	Prepare and present a project technical report.
d.General and Transferable Skills: :	
1 -	Work in a group project
2 -	Submit on time assignments and project.
3 -	Conduct appropriately course project presentation using power point.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to Reverse Engineering	4	2	2
Spline Interpolation Linear Quadratic Cubic	4	2	2
Methodologies and Techniques for Reverse Engineering Computer-aided Reverse Engineering Computer Vision and Reverse Engineering Structured-light Range Imaging Scanner Pipeline	8	4	4
Reverse Engineering-Hardware and Software Introduction Reverse Engineering Hardware Reverse Engineering Software	8	4	4
Introduction to Rapid Prototyping The Basic Process Current Techniques and Materials Applications	8	4	4
Relationship between reverse engineering and rapid prototyping Introduction The adaptive slicing approach for cloud data modelling Planar Polygon curve construction for a layer Determination of adaptive layer thickness Application Examples	8	4	4
Reverse Engineering in the Automotive Industry Reverse engineering-Workflow for automotive body design Reverse Engineering for better quality Convergence of digital and physical worlds	4	2	2
Reverse Engineering in the Aerospace Industry RE in aerospace-A work in progress Reducing costs of hard tooling Digitizing a NASA space vehicle	4	2	2
Project Follow up	4	0	4
Midterm Exams	4	4	0
Project Presentations	4	2	2

Teaching And Learning Methodologies :
Interactive Lecturing
Problem solving
Project
Research

Course Assessment :			
Methods of assessment	**Relative weight %**	**Week No**	**Assess What**
1st Midterm	15.00	6	
2nd Midterm	15.00	11	
Assignments, Participation, & Quizzes	10.00		
Attendance and class participation	10.00		
Final Exam	40.00	16	
Project	10.00		

Course Notes :
Lecture notes on the course Moodle page, FUE website.