



## MODULE SPECIFICATION

### Faculty of Engineering

Last Updated (22 October 2018)

**1. Module Title**

Modelling and Simulation

**2. Module Code**

EM2106

**3. Number of credits**

10

**4. Level**

2

**5. Semester**

4

**6. Pre-requisites for admission to the module**

Normal progression rules

**7. Module Coordinator**

Dk Dr. Seri Rahayu binti Pg Yaakub

**8. Aims**

Introduce students to modern computational tools used for design, modelling and engineering analysis. The focus is on design and modelling of mechanical parts and systems using CAD/CAE tools. A simple finite element analysis for solution visualisation will also be applied.

**9. Summary of Contents**

The module covers the following topics:

- **Introduction to solid modelling:** Introduction to 3D CAD systems & Solid Modelling: software, interface and system. Start-up parametric solid modelling in SolidWorks. Setting, configuring and customising the system.
- **Parametric modelling:** Creating and understanding of different types of Files such as Part, Assembly, Drawing. Creating features by using 2D Sketch Panels. Creating Solid model using basic Part Features. Applied features: Chamfer, Fillet, and Shell. Using Rib, Pattern and Mirror features.
- **Drawing formats & styles and creating geometrical tolerance.** Selection Paper Size & Orientation. Creating views such as Projection, Auxiliary, General, Detailed, Revolve and, half and full sections. Detailed dimensions manually or automatically. Creating drawing notes, text and tables. Adding drawing format to the sheets. Manipulating additional sheets of drawing. Creating Drawings from existing solid part model or assembly.
- **Advanced feature-based design.** Creating advanced features of parts: Sweep, loft and emboss, decal, etc
- **Assembly and sub-assembly modelling.** Understanding of simple assembly. Creating base feature in Assembly and assemble components to the base feature by

using the critical constraints such as Insert, Mate. Understand about parent and child relation between components. Modification and regeneration of the drawing. Generate Bill of Material and Balloons. Create exploded view and set the status of explosion. Presentation: exploded/unexploded animations.

- **Introduction to simple linear finite element analysis (FEA).** Introduction to perform a stress analysis using the simulation on how 3D model reacts to stresses applied.
- **Visualise and validate the finite element analysis (FEA) result.** Performing the stress analysis on Von Mises stress criterion and estimation of the safety factor at every point in the model.

## 10. Module Intended Learning Outcomes (MILOs)

Upon successful completion of this module, students will be able to:

No.	MILOs	Weightage (%)
1	Apply the concepts of feature-based, parametric, solid modeling, documentation and data exchange in engineering design	15
2	Construct surface, basic and advanced 3D solid models with engineering drawing techniques	35
3	Model sub-assembly and assembly structure	30
4	Apply simple linear finite element analysis	10
5	Demonstrate the result of simple linear finite element analysis	10

## 11. Teaching and Learning Activities (TLAs)

MILO No.	TLAs	Functions	Hours/Week
1 – 5	Lecture	Oral presentation intended to present and convey critical information and theories	2
1 – 5	Laboratory Practical	Interactive problem-solving session used for transfer of knowledge by example through a set of instructions to complete a task	2

## 12. Assessment Tasks/Activities

MILO No.	Type of Assessment Tasks/Activities	Weightage (%)
1 - 2	2 Class Tests	30
1 - 3	2 Assignments	20
1 - 5	Project	50

### Assessment Criteria:

Assessment components of the module shall be 100% Coursework. To achieve a pass in the module students must obtain a minimum overall mark of 40%.

**Reassessment:** Students eligible for reassessment shall be assessed according to the programme area examination board recommendation.

## 13. Attendance Requirements

Students are expected to attend all lectures, tutorials and lab sessions.

#### 14. Contribution to Programme Intended Learning Outcomes

PILO		MILO No.				
		1	2	3	4	5
1	Science & Mathematics	✓			✓	✓
2	Engineering Analysis				✓	✓
3	Design		✓	✓		
4	Advanced Design				✓	✓
5	Economic, Legal, Social and Ethical Contexts					
6	Engineering Practice	✓	✓	✓		
7	General Skills					

#### 15. Grading of Student Achievement

Marks (%)	Grades	Grade Definition
85-100	A+	Excellent
75-84	A	
70-74	B+	Very Good
65-69	B	
60-64	C+	Good
55-59	C	
50-54	D+	Satisfactory
45-49	D	
40-44	E	Marginal
0-39	F	Fail

#### 16. Resources

##### Primary texts

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	CADArtifex	2018	SOLIDWORKS 2018: A Power Guide for Beginners and Intermediate Users	5th	CreateSpace Independent Publishing Platform	978-1984967664

2	Randy H. Shih	2018	Introduction to Finite Element Analysis Using SOLIDWORKS Simulation 2018	-	SDC Publications	978-1630571559
---	---------------	------	--	---	------------------	----------------

### Secondary texts

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	D.A. Madsen	2011	Engineering Drawing and Design	5th	Cengage Learning	978-1111309572
2	Jami J. Shah, Martti Mäntylä	1995	Parametric and Feature-Based CAD/CAM: Concepts, Techniques, and Applications	-	Wiley	978-0-471-00214-7