FACULTY OF OCEAN ENGINEERING TECHNOLOGY AND INFORMATICS

Course Information

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1	Course Name:	Computer Aided Geometric Design / Rekabentuk Geometri Berbantu Komputer	
	Course Code:	MKG4113	
	Course Classification:	Elective (core)	*Remarks:*
2	Synopsis:	This course discusses the principles of geometric modeling focusing on Bezier and B-Splines curves and surfaces. Clear comprehension of the underlying mathematics of curve and surface design may prepare the students to explore various applications such scientific visualization, manufacturing design and computer graphics.	
3	Name(s) of Academic Staff:	1 Associate Prof. Dr. Gobithaasan Rudrusamy	
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		4	
		5	
4	Semester and Year offered:	Year Offered: 3	Semester: 1 *Remarks:*
5	Credit Value:	3	2+1
6	Pre-requisite/ co-requisite (if any):	None	
7	At the end of the course, student should be able to:		

Course Learning Outcomes (CLO)	CLO1	Identify the methods of modeling curves and surfaces in the field of computer-aided geometric design. [PLO3-C4]
	CLO2	Build curves and surfaces using standard Bezier and B-spline functions using scientific programming language. [PLO2-P3]
	CLO3	Explain about ethics and profesionalism in the field of curve and surface modelling. [PLO6-A4]

10 Distribution of Student Learning Time (SLT)

Note: This SLT calculation is designed for home grown programme only.

	Course Content Outline and Subtopics	CLO*	Learning and Teaching Activities**								NF2F Independent Learning (Asynchronous)	Total SLT
			Face-to-Face (F2F)									
			Physical				Online/ Technology-mediated (Synchronous)					
			L	T	P	O	L	T	P	O		
1	**Chapter 1: Introduction** ● History of CAD software ● Point and line representation ● Types of affine transformation ● Triangulation	CLO1, CLO2	1	1	2						5	
2	**Chapter 2: Curve Representation** ● Types of curves ● Tangent, normal dan offset ● Curvature computation ●Various types of curve interpolation	CLO1, CLO2	3	1	2						10	
3	**Chapter 3: Bezier Curves** ● Introduction to Bezier curves ● Properties of Bezier curves ● Rational Bezier curves ● Representation of cone sections ● de Casteljau Algorithm ● Derivatives of Bezier curves ● Bezier Splines with parametric & geometric continuity	CLO1, CLO2, CLO3	6	2	3						20	
4	Chapter 4: B-Spline curves ● Introduction to B-Splines ● Properties of B-Splines ●Types of B-Splines ● de Boor Algorithm ● Introduction to NURBS ● Properties of NURBS	CLO1, CLO2	4	2	3						15	
5	**Chapter 5: Representation of Surfaces** ● Introduction to surfaces ● Various types of surfaces ● Bezier surfaces ● Surface normal computation	CLO1, CLO2, CLO3	3	1	2						10	

12	References (include required and further readings, and should be the most current)	1. Hastings, C., Mischo, K. & Morrison, M. (2016) .Hands-on start to Wolfram Mathematica (2nd Edition). Wolfram Media, Inc., USA, Philadephia: Springer.
		2. Gallier, J. & Gallier, J. H. (2018). Curves and surfaces in geometric modelling: theory and algorithms. Morgan Kaufmann series.
		3. Taha Sochi, (2017), Introduction to Differential Geometry of Space Curves and Surfaces-CreateSpace Independent Publishing Platform
		4. Shoshichi Kobayashi - Differential Geometry of Curves and Surfaces-(Springer Undergraduate Mathematics Series), Springer Singapore (2019)
		5. David H. von Seggern, (2016) CRC Standard Curves and Surfaces with Mathematica, Chapman and Hall/CRC.
		6. Kristopher Tapp (2016), Differential Geometry of Curves and Surfaces-(Undergraduate Texts in Mathematics) ,Springer International Publishing.
13	Other additional information (if applicable)	1. Gray, A., Abbena, E. & Salamon, S. (2006). Modern differential geometry of curves and surfaces with Mathematica. Chapman & Hall/CRC. 2. Farin, G. (2013), Curves and surfaces for CAGD: A practical guide (5th Ed.). Berkeley, USA: The Morgan Kaufmann Series in Computer Graphics.