Bachelor Program in Mathematics Faculty Mathematics and Natural Sciences HASANUDDIN UNIVERSITY



Module Description of Boundary Element Methods

NA salvala Na sasa	١.	Darriedani, Flansant Mathada			
Module Name	:	Boundary Element Methods			
Module Level	:	Bachelor			
Code, if applicable	:	23H01130503			
Subtitle, if applicable	:	-			
Courses, if applicable	:	Boundary Element Methods			
Semester(s) in which the module is taught	:	3 (Third Semester)			
Module coordinator(s)	:	Prof. Dr. Jeffry Kusuma			
Lecturer(s)	:	Prof. Dr. Jeffry Kusuma			
Language	:	Bahasa (Indonesian language)			
Relation to curriculum	:	Elective course in third year for Bachelor degree in Mathematics			
Type of teaching/teaching method	:	Lecturing, Small Group Discussion, Cooperative Learning, Self- Directed Learning			
Contact hours	:	150 minutes lectures per week, 180 minutes structured activities per week, and 180 minutes independent study per week			
Workload	:	Total workload is 135 hours per semester which consists of 40 hours per semester for Learning and Teaching, 47.5 hours per semester for Self-Study, and 47.5 hours per semester for Structured Works			
Credit points	:	3 (4.8 ECTS)			
Requirements according to the examination regulations	:	Students are required to attend at least 80% of the total meetings which is recorded via the attendance menu at https://sikola-v2.unhas.ac.id/, complete all mandatory assignments, and obtain permission from the lecturer to participate in the written examination.			
Recommended prerequisites	:	None			
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. demonstrate their understanding of the transformation of partial differential equations into boundary integral equations; CLO 2. demonstrate their understanding of the discretization of boundary value problems for integral equations; CLO 3. demonstrating an understanding of using numerical integration to solve simultaneous linear systems of equations AX = B for boundary s; CLO 4. demonstrate their understanding in finding solutions at any interior point. The following is the mapping of the ILO and the CLO of this			
		course:			





				ILO 2	ILO 6	ILO 4	ILO 7		
			CLO 1	X					
			CLO 2 CLO 3	Х	X	Х	Х		
			CLO 4		X	Х	X		
Content		The Boundary Element Method course discusses numerical approaches to solving partial differential equations (PDEs) such as Laplace, diffusion-convection, and wave equations, both in steady and unsteady conditions. The course begins with the transformation of PDEs into boundary integral equations using Green's functions, followed by the discretization of the boundary domain into elements, the formation of the linear equation system AX=B, the calculation of entries in matrices A and B, and the solution of the system to obtain solutions at the boundary and within the domain. This method focuses on solving boundary value problems with high efficiency, especially for complex geometries or unbounded domains, with Laplace's							
		equation	as the main	case st	udy.				
Study and examination requirements Exams and assessment formats	:	 Study and examination requirements: Students must attend 15 minutes before the class starts. Students must switch off all electronic devices. Students must inform the lecturer if they will not attend the class due to sickness, etc. Students must submit all class assignments before the deadline. Students must attend the exam to get final grade. Participants are marked based on their performance in theory Assignments (10%), Report (60%), Quizzes (10%), and Writte Exam (20%). Assignments assess student's ability to apply concepting independently, while Reports measure analytical and writing skills. Quizzes are used to test continuous understanding weekly content. The Written Exam assesses comprehension and 						ot attend the before the de. ce in theory: and Written ly concepts and writing erstanding of ehension and	
	synthesis of all materials discussed during the ser Altogether, these components account for 100% of the grade. Students are marked based on their percentage of obtained and based on the following grade scale: Percentage of Conversion							of the final	
			Achievem		Grade		Value		
			85 – 100		Α		4.00		
			80 - <85		A-		3.75		
			75 - < 80		B+		3.5		
			70 - < 75		В	1	3.0		
			65 - < 70)	B-		2.75		

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			60 - < 65	C+	2.5	
			50 - < 60	С	2.00	
			40 - < 50	D	1.00	
			< 40	E	0.00	
Reading list	:	unt Sur 2. Bre Inti 199 3. M. diff coe DO 4. Mo Hai	of. Moh. Ivan Azis, Ituk Media Anisotro Tabaya, 2012. Sebbia, C. A., Domi Toductory Course, 192. I. Azis, A numerica Susion reaction eefficients, Math. Media 10.1002/mma.971 Shammad Ivan Azis, Itamonic Acoustic Gonometrically Gradus 131, no.4, pp1457-15	pik Homogonguez, J. WIT-Pressel solution quation cent. Appl. Sentence and the problem of the pro	Boundary Elems Boston South for unsteady and time—space ci. 47 (2024), 16: LT and BEM for Units of Arials," Engineering	nents An nampton, nisotropic variable 28–1642, Unsteady nisotropic
Last revision date	:	July 28th	, 2025			