

MODULE HANDBOOK
MATHEMATICS II



**BACHELOR DEGREE PROGRAM
DEPARTMENT OF
MATHEMATICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

ENDORSEMENT PAGE



MODULE HANDBOOK MATHEMATICS II DEPARTMENT OF MATHEMATICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER

Proses <i>Process</i>	Penanggung Jawab <i>Person in Charge</i>			Tanggal <i>Date</i>
	Nama <i>Name</i>	Jabatan <i>Position</i>	Tandatangan <i>Signature</i>	
Perumus <i>Preparation</i>	Dr. Tahiyatul Asfihani, M.Si	Dosen <i>Lecturer</i>		March 28, 2019
Pemeriksa dan Pengendalian <i>Review and Control</i>	Mathematics lecturer team	Tim kurikulum <i>Curriculum team</i>		April 15, 2019
Persetujuan <i>Approval</i>		Koordinator RMK <i>Course Cluster Coordinator</i>		July 17, 2019
Penetapan <i>Determination</i>	Subchan, S.Si, M.Sc, Ph.D	Kepala Departemen <i>Head of Department</i>		July 30, 2019

MODULE HANDBOOK

MATHEMATICS II

Module name	Mathematics II	
Module level	Undergraduate	
Code	KM184201	
Course (if applicable)	Mathematics II	
Semester	2 nd semester	
Person responsible for the module	Alvida Mustika Rukmi, S.Si, M.Si	
Lecturer	Alvida Mustika Rukmi, S.Si, M.Si; Amirul Hakam, S.Si, M.Si; Dian Winda Setyawati, S.Si, M.Si; Dr. Budi Setiyono, S.Si, MT; Dr. Darmaji, S.Si, M.T; Dr. Dieky Adzkiya, S.Si, M.Si; Mohammad Iqbal, S.Si, M.Si; Dr. Dra. Rinurwati, M.Si; Dr. Drs. Bandung Ary S., M.Ikomp; Dr. Drs. Hariyanto, M.Si; Dr. Imam Mukhlash, S.Si, MT; Dr. Sena Safarina, S.Si, M.Si; Dr. Dwi Ratna Sulistyaningrum, S.Si, MT; Dr. Tahiyatul Asfihani, S.Si, M.Si; Dra. Laksmi Prita W., M.Si.; Dra. Nur Asiyah, M.Si; Dra. Nuri Wahyuningsih, M.Kes; Dra. Wahyu Fistia Doctorina, M.Si; Drs. Daryono Budi Utomo, M.Si; Drs. IGN Rai Usadha, M.Si.; Drs. Iis Herisman, M.Si; Drs. Kamiran, M.Si; Drs. Komar Baihaqi, M.Si; Drs. Lukman Hanafi, M.Sc; Drs. Nurul Hidayat, M.Kom; Drs. Sadjidon, M.Si; Drs. Sentot Didik Surjanto, M.Si; Drs. Soetrisno, M.I.Komp.; Drs. Suhud Wahyudi, M.Si; Endah Rokhmati MP, Ph.D; Mohammad Iqbal, S.Si, M.Si; Muhammad Luthfi Shahab, S.Si, M.Si; Prof. Dr. Basuki Widodo, M.Sc; Prof. Dr. Chairul Imron, M.I.Komp.; Prof. Dr. Dra. Erna Apriliani, M.Si; Prof. Dr. M. Isa Irawan, M.T; Soleha, S.Si., M.Si.; Subchan, S.Si, M.Sc, Ph.D; Sunarsini, S.Si, M.Si; Wawan Hafid Syaifudin M.Si., MAct.Sc	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory , 2 nd semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	1. Lectures: 3 x 50 = 150 minutes per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private learning: 3 x 60 = 180 minutes (3 hours) per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	CLO.1 Able to understand the basic concepts of integration technique.	PLO.1

	CLO.2 Able to solve the problem relating to the definite integral CLO.3 Able to apply the definite integral to the areas of the plane shapes, the volume of solids by the method of rings or the method of disks, the center of mass, the application of Guldin theorem, force, and fluid pressure. CLO.4 Able to understand the polar coordinate system and parametric equation, perform a graph, and apply to the areas of the plane shapes and arc length. CLO.5 Able to calculate the convergence of sequences, test the convergence of the infinite series and calculate the convergence infinite series, transform the function to the Taylor series or the MacLaurin Series.	
Content	This course provides the basic concepts of mathematical thinking (extent solution, the procedures of the solution) for students to solve the real cases and artificial problems, modeling related to the application of integral. This course also creates the ability of the students to pursue the advanced course with basic concepts of mathematics and analysis. The material of this course including: Integration technique concept, finite integral concept, improper integral and its application, polar coordinate and parametric equation including the application of the areas of the plane shapes and arc length, infinite sequences and series, power series, Taylor series, and MacLaurin series.	
Study and examination requirements and forms of examination	• In-class exercises • Assignment • Mid-term exam • Final exam	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	1. Kreyzig, E, Advanced Engineering Mathematics, 10-th edition, John Wiley & Sons, Singapore, 2011 2. Purcell, J, E, Rigdon, S., E., Calculus, 9-th edition, Prentice-Hall, New Jersey, 2006 3. James Stewart , Calculus, ed.7, Brooks/cole-Cengage Learning, Canada, 2012	

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Bahan Kajian <i>Study Materials</i>	Konsep teknik integrasi, Konsep Integral tertentu, integral tak wajar dan Aplikasinya, Koordinat kutub dan persamaan parametrik beserta aplikasinya penghitungan luas bidang datar dan panjang busur, volume dan kulit benda putar, pusat massa, Barisan dan deret tak hingga, deret pangkat, Deret Taylor dan deret Mac Laurin <i>The integration concept, the Finite integral concept, improper integral and its application, Polar coordinate and parametric equation including the application of calculation the areas of plane shapes and arc length, the volume and surface area of solid revolution, the center of mass, the infinite sequences and series, power series, Taylor series, and Maclaurin series.</i>
CPL yang dibebankan MK <i>PLO</i>	CPL 1. Mahasiswa mampu mengidentifikasi dan menjelaskan pondasi matematika yang meliputi murni, terapan dan dasar-dasar komputasi <i>PLO1. Students are able to identify and explain foundations of mathematics that include pure, applied, and the basic of computing</i>
CP-MK <i>CLO</i>	CPMK.1 Mampu menguasai konsep dasar teknik integrasi. CPMK.2 Mampu menyelesaikan Integral tertentu. CPMK.3 Mampu mengaplikasikan integral tertentu pada luas bidang datar, volume benda dengan metode cakram dan metode cincin, pusat massa, penerapan teorema Guldin, gaya dan tekanan fluida. CPMK.4 Mampu memahami sistem koordinat kutub dan persamaan parametrik, dapat menggambar grafiknya, mengaplikasikan pada luas dataran dan panjang busur. CPMK.5 Mampu menghitung kekonvergenan barisan, mampu menguji kekonvergenan deret tak hingga dan menghitung jumlah deret tak hingga yang konvergen, mentransformasikan fungsi ke dalam bentuk deret Taylor atau deret Mac Laurin <i>CLO.1 Able to understand the basic concepts of integration technique.</i> <i>CLO.2 Able to solve the problem relating to the definite integral</i> <i>CLO.3 Able to apply the definite integral to the areas of the plane shapes, the volume of solids by the method of rings or the method of disks, the center of mass, the application of Guldin theorem, force, and fluid pressure.</i> <i>CLO.4 Able to understand the polar coordinate system and parametric equation, perform a graph, and apply to the areas of the plane shapes and arc length.</i> <i>CLO.5 Able to calculate the convergence of sequences, test the convergence of the infinite series and calculate the convergence infinite series, transform the function to the Taylor series or the Maclaurin Series.</i>

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Perte- muan <i>Meeting</i>	Kemampuan Akhir Sub CP-MK <i>Final Ability</i>	Keluasan (materi pembelajaran) <i>Extent (learning material)</i>	Metode Pembelajaran <i>Learning methods</i>	Estimasi Waktu <i>Duration</i>	Bentuk Evaluasi <i>Evaluation Type</i>	Kriteria dan Indikator Penilaian <i>Assessment Criteria and Indicators</i>	Bobot Penilaian <i>Scoring</i>
1	Mampu menyelesaikan Integral parsial dan integral fungsi trigonometri <i>Able to solve the partial integration and trigonometry function integration</i>	Teknik Integrasi <i>Integration technique</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menyelesaikan integral tak tentu <i>Able to solve the infinite integration</i>	- o Ketajaman menggunakan rumus ntegral parsial - o Ketajaman menyelesaikan integral fungsi trigonometri - o <i>The ability to apply the partial integration</i> - o <i>The ability to solve the trigonometric function integration</i>	5
2	Mampu menyelesaikan Integral fungsi rasional. <i>Able to solve the rational function integration</i>	Teknik Integrasi <i>Integration technique</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'		Ketajaman dalam menyelesaikan Integral fungsi rasional. <i>The ability to solve rational function integration</i>	5
3	Mampu mengaplikasikan Teknik teknik integral yang lain <i>Able to apply the other integration technique</i>	Teknik Integrasi <i>Integration technique</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'		Ketajaman mengaplikasikan Teknik teknik integral yang lain <i>The ability to apply the other integration technique</i>	
4	RESPONSI <i>RESPONSIVE</i>						
5	Mampu menyelesaikan Integrasi numerik: aturan trapezoidal dan simson <i>Able to solve the numerical integration: the trapezoidal rule and simpson's rule</i>	Teknik Integrasi <i>Integration technique</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menghitung integral hampiran <i>Able to calculate the approximate integration</i>	Ketajaman menghitung Integrasi numerik: aturan trapezoidal dan simson <i>The ability to calculate the numerical integration: the trapezoidal rule and simpson's rule</i>	5

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6	Mampu menghitung Integral tak wajar <i>Able to calculate the improper integral</i>	integral tak wajar <i>Improper integral</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menghitung integral takwajar <i>Able to calculate the improper integral</i>	Ketajaman menghitung menghitung Integral tak wajar <i>The ability to calculate the improper integral</i>	5
7		integral tak wajar <i>Improper integral</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'			
8	RESPONSI <i>RESPONSIVE</i>						
9	Mampu menghitung Luas bidang datar <i>Able to calculate the areas of the plane shapes</i>	aplikasi intergral <i>The application of integral</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menghitung Luas <i>Able to calculate the areas of the plane shapes</i>	Ketajaman menghitung Luas bidang datar <i>The ability to calculate the areas of the plane shapes</i>	5
10	Mampu menghitung Volume benda putar <i>Able to calculate the volume of the solid revolution</i>	aplikasi intergral <i>The application of integral</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menghitung volume benda putar <i>Able to calculate the volume of the solid revolution</i>	Ketajaman menghitung Volume benda putar metode : o Metode cakram o Metode cincin silinder <i>The ability to calculate the volume of the solid revolution: o The method of disk o The method of ring</i>	5
11		aplikasi intergral <i>The application of integral</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'			5
12	RESPONSI <i>RESPONSIVE</i>						

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18	Mampu menggambar Grafik dalam koordinat kutub <i>Able to perform a graph in polar coordinates</i>	Koordinat kutub <i>Polar coordinates</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Dapat menggambar grafik fs bentuk kutub	Ketajaman dalam menggambar Grafik dalam koordinat kutub	5
19	Mampu menentukan persamaan Garis singgung, dan menghitung Luasan dalam koordinat kutub <i>Able to determine the tangent equation and calculate the area in polar coordinates</i>	Koordinat kutub <i>Polar coordinates</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Memahami fungsi bentuk kutub dan aplikasinya <i>Understand the polar function and its application</i>	- o Ketajaman menentukan persamaan Garis singgung, - o Kemampuan menghitung Luasan dalam koordinat kutub - o <i>The ability to determine the tangent equation</i> - o <i>The ability to calculate the area in polar coordinates</i>	5
20	Mampu menghitung panjang busur dan dalam koordinat kutub <i>Able to calculate the arc length in polar coordinates</i>	Koordinat kutub <i>Polar coordinates</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'		Ketajaman menghitung panjang busur dan dalam koordinat kutub <i>The ability to calculate the arc length in polar coordinates</i>	5
21	RESPONSI <i>RESPONSIVE</i>						
22	Mampu memahami Persamaan parametrik, turunan dan menghitung luas dalam bentuk persamaan parametrik	Persamaan parametrik <i>Parametric equation</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Memahami fungsi bentuk parametrik dan aplikasinya <i>Understand the parametric</i>	Ketajaman: - o memahami Persamaan parametrik - o Turunan fungsi parametrik - o Menghitung luas dalam bentuk persamaan parametrik	5

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	<i>Able to understand the parametric equation, derivative, and calculate the areas in the parametric equation expressions</i>				<i>equation and its application</i>	- Understand the parametric equation - The derivative of parametric equation - Calculate the areas in the parametric equation expressions	
23	Mampu memahami Barisan dan deret tak hingga <i>Able to understand the infinite sequences and series</i>	Barisan dan deret tak hingga <i>Infinite sequences and series</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Memahami barisan, deret dan kekonvergenannya <i>Understand the sequences, series, and its convergence</i>	Ketajaman memahami Barisan dan deret tak hingga <i>The ability to understand the infinite sequences and series</i>	10
24	Mampu menentukan kekonvergenan barisan, mampu menguji kekonvergenan deret tak hingga (disinggung deret Geometri, harmonik, deret _P ,) <i>Able to determine the convergence of the sequences and test the convergence of infinite series (Geometric series, harmonic series)</i>	Barisan dan deret tak hingga <i>Infinite sequences and series</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'		Ketajaman : - menentukan kekonvergenan barisan - kekonvergenan deret tak hingga <i>The ability to:</i> - determine the convergence of the sequences - the convergence of infinite series	5

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30	Diferensiasi dan integrasi deret pangkat <i>Differential and power series integration</i>	Deret Taylor dan Deret Mac Laurint <i>Taylor series and MacLaurin series</i>	Ceramah dan Latihan <i>Lecture and Exercises</i>	3x50'	Menerapkan turunan dan integral pada deret <i>Apply the derivative and integration to the series</i>	Ketajaman mendiferensiasi dan integrasi deret pangkat <i>The ability to differentiate and apply the power series integration</i>	5
31	EAS FINAL EXAM						
32							

PUSTAKA UTAMA/MAIN REFERENCES:

1. Tim Dosen Jurusan Matematika ITS, *Buku Ajar Kalkulus 2*, Edisi ke-4 Jurusan Matematika ITS, 2012
2. Anton, H. dkk, *Calculus*, 10-th edition, John Wiley & Sons, New York, 2012

PUSTAKA PENDUKUNG/SUPPORTING REFERENCES:

1. Kreyzig, E, *Advanced Engineering Mathematics*, 10-th edition, John Wiley & Sons, Singapore, 2011
2. Purcell, J, E, Rigdon, S., E., *Calculus*, 9-th edition, Prentice-Hall, New Jersey, 2006
3. James Stewart, *Calculus*, ed.7, Brooks/cole-Cengage Learning, Canada, 2012