



DEPARTMENT OF NATIONAL EDUCATION
YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
Address: Karangmalang, Yogyakarta – 55281
Phone: 0274 – 586168 Ext. 217

LESSON PLAN

1. Faculty : Mathematics and Natural Science
2. Course/Code : Integral Calculus / MAT 307
3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the indefinite integral of a function and solve differential equations.
6. Success Indicators:
 - Students are able to determine the integral of a function using general formula of integral.
 - Students are able to determine the integral of a function using the properties of indefinite integral.
7. Topic :
The indefinite integral and the introduction of differential equation
8. Activity :
Lesson 1

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Giving differential problem to investigate the pre knowledge of students 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining that integration is the opposite of differentiation and use this fact to help students to (re)formulate the formula for the integration of a function. – Giving some integration problems to students – Explaining the properties of indefinite integral 	80 minutes	Expository Discussion		

Closing	– Summarizing and concluding the explained and learned concepts.	10 minutes			
Follow Up	– Giving homework to students				

9. Evaluation :

- Essay
- Performance test

Yogyakarta,

Lecturer,

Ariyadi Wijaya, M.Sc
NIP 132310893



LESSON PLAN

1. Faculty : Mathematics and Natural Science
2. Course/Code : Integral Calculus / MAT 307
3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to determine the indefinite integral of a function.
6. Success Indicators :
 - Students are able to determine the integral of a function using general formula of integral.
 - Students are able to determine the integral of a function using the properties of indefinite integral.
7. Topic : The indefinite integral
8. Activity :
Lesson 2

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none">– Reflecting the learned topics– Motivating students by informing the use and the advantage of the topics.	5 minutes	Expository		
Main	<ul style="list-style-type: none">– Giving some integration problems to students– Discussing integration problems with students	40 minutes	Expository Discussion		
Closing	<ul style="list-style-type: none">– Summarizing and concluding the explained and learned concepts.	5 minutes	Expository		
Follow Up					

9. Evaluation :
 - Essay
 - \Performance test

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4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the indefinite integral of a function and solve differential equations.
6. Success Indicators:
 - Students are able to solve differential equations
 - Students are able to give examples the application of differential equations in real world (e.g. velocity problem)
7. Topic :
The indefinite integral and the introduction of differential equation
8. Activity :
Lesson 3

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Giving example about velocity problem (i.e. from a given function of "distance", students are asked to find the velocity and the acceleration) 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining about differential equation and the methods to solve the differential equation. – Providing a stimulating problem of differential equation (e.g. with a given function of acceleration, students are 	80 minutes	Expository Discussion		

	asked to find the velocity and the distance). – Facilitating the discussion about "acceleration" problem				
Closing	– Summarizing and concluding the the concept of differential equation.	10 minutes			
Follow Up	– Giving homework to students – Giving a task to students (in group) to find other examples about the application of differential equation				

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5. Basic Competencies :
Students are able to determine the indefinite integral of a function and solve differential equations.
6. Success Indicators :
 - Students are able to solve differential equations
 - Students are able to give examples the application of differential equations in real world (e.g. velocity problem)
7. Topic :
The indefinite integral and introduction of differential equation
8. Activity :
Lesson 4

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Reflecting the concept of differential equation – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about differential equation – Facilitating presentation and discussion about examples of the applications of differential equation in real world 	40 minutes	Expository Discussion		
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

9. Evaluation :
Essay and performance test

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine and calculate the definite integral of a function using the fundamental theorem of integral.
6. Success Indicators:
Students are able to determine and calculate the definite integral of a function using the fundamental theorem of integral.
7. Topic : Definite integral and the fundamental theorem of integral
8. Activity :
Lesson 5

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			[A]: 299–308
Main	<ul style="list-style-type: none"> – Giving the examples of differentiation of functions and some indefinite integrals – Explaining that the result of an integration can be an exact function (i.e. with a defined constant) if more information is given. – Explaining the fundamental theorem of integral – Giving some integration 	80 minutes	Expository Discussion		[A]: 337–356

	problems to stude				
Closing	– Summarizing and concluding the explained and learned concepts. –	10 minutes			
Follow Up	– Giving homework to students				

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5. Basic Competencies :
Students are able to determine and calculate the definite integral of a function using the fundamental theorem of integral.
6. Success Indicators :
Students are able to determine and calculate the definite integral of a function using the fundamental theorem of integral.
7. Topic : Definite integral and the fundamental theorem of integral
8. Activity :
Lesson 6

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none">– Explaining the objectives of the lesson– Motivating students by informing the use and the advantage of the topics.	5 minutes			
Main	<ul style="list-style-type: none">– Giving some integration problems to students– Discussing integration problems with students	40 minutes	Expository Discussion		[A]: 337–356
Closing	<ul style="list-style-type: none">– Summarizing and concluding the explained and learned concepts.	5 minutes			
Follow Up					

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4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of logarithmic, exponential and trigonometric functions.
6. Success Indicators :
Students are able to determine the integral of a logarithmic function
7. Topic : The integral of transcendent function
8. Activity :
Lesson 7

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Discussing the concept of logarithm and logarithmic function with students. – Explaining the integral of logarithmic functions. – Giving some integration problems to students 	80 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of logarithmic, exponential and trigonometric functions.
6. Success Indicators :
Students are able to determine the integral of an exponential function
7. Topic : The integral of transcendent function
8. Activity :
Lesson 8

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Asking students to explain the characteristics of exponen – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Discussing the concept of exponen and exponential functions with students. – Explaining the integral of exponential functions. – Giving some integration problems to students 	80 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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5. Basic Competencies :
Students are able to determine the integral of logarithmic, exponential and trigonometric functions.
6. Success Indicators :
Students are able to determine the integral of a trigonometric function
7. Topic : The integral of transcendent function
8. Activity :
Lesson 9

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Giving questions about trigonometric problems to students 	10 minutes			
Main	<ul style="list-style-type: none"> – Discussing the concept of trigonometry and trigonometric function with students. – Explaining the integral of trigonometric functions. – Giving some integration problems to students 	80 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to determine the integral of logarithmic, exponential and trigonometric functions.
6. Success Indicators:
 - Students are able to determine the integral of a logarithmic function
 - Students are able to determine the integral of an exponential function
 - Students are able to determine the integral of a trigonometric function
7. Topic : The integral of transcendent function
8. Activity :
Lesson 10

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none">– Explaining the objectives of the lesson– Motivating students by informing the use and the advantage of the topics.	5 minutes			
Main	<ul style="list-style-type: none">– Giving students problem of the integration of transcendent function– Discussing integration problems with students	40 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539
Closing	<ul style="list-style-type: none">– Summarizing and concluding the explained and learned concepts.	5 minutes			

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of functions using substitution methods and integration by parts.
6. Success Indicators :
Students are able to determine the integral of functions using substitution methods
7. Topic : The techniques of integration
8. Activity :
Lesson 11

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining about substitution methods as one of the techniques of integration. – Explaining about the symmetric theorem and periodic rule – Giving integration problems that needs to be solved using substitution methods. 	80 minutes	Expository Discussion		[A]: 525–533 [A]: 547 - 557
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of functions using substitution methods and integration by parts.
6. Success Indicators :
Students are able to determine the integral of functions using integration by parts.
7. Topic : The techniques of integration
8. Activity :
Lesson 12

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining about integration by parts as one of the techniques of integration. – Giving integration problems that needs to be solved using integration by parts. 	80 minutes	Expository Discussion		[A]: 525–533 [A]: 547 - 557
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to determine the integral of functions using substitution methods and integration by parts.
6. Success Indicators :
Students are able to determine the integral of functions using substitution methods
Students are able to determine the integral of a function using integration by parts
7. Topic : The techniques of integration
8. Activity :
Lesson 13

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving integration problems that needs to be solved by either substitution methods or integration by parts. – Discussing integration problems with students 	40 minutes	Expository Discussion		[A]: 525–533 [A]: 547 - 557
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of functions using trigonometric and partial integration.
6. Success Indicators :
Students are able to determine the integral of functions using trigonometric and partial integration.
7. Topic : The techniques of integration
8. Activity :
Lesson 14

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining about substitution methods as one of the techniques of integration. – Explaining about trigonometric and partial substitution – Giving integration problems that needs to be solved by trigonometric or partial integration. 	80 minutes	Expository Discussion		[A]: 541–546
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			

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5. Basic Competencies :
Students are able to determine the integral of functions using trigonometric and partial integration.
6. Success Indicators :
Students are able to determine the integral of functions using trigonometric and partial integration.
7. Topic : The techniques of integration
8. Activity :
Lesson 15

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving integration problems that needs to be solved by either trigonometric or partial integration – Discussing integration problems with students 	40 minutes	Expository Discussion		[A]: 541–546
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to determine the integral of rational functions.
6. Success Indicators :
Students are able to determine the integral of rational functions
7. Topic : The techniques of integration
8. Activity :
Lesson 16

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	10 minutes			
Main	<ul style="list-style-type: none"> – Giving examples of rational functions. – Discussing the definition of rational functions. – Explaining the technique to integrate rational functions. – Discussing problems about the integration of rational functions. 	80 minutes	Expository Discussion		[A]: 558–567
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. – 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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5. Basic Competencies :
Students are able to determine the integral of rational functions.
6. Success Indicators :
Students are able to determine the integral of rational functions
7. Topic : The techniques of integration
8. Activity :
Lesson 17

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none">– Explaining the objectives of the lesson– Motivating students by informing the use and the advantage of the topics.	5 minutes			
Main	<ul style="list-style-type: none">– Giving problems about the integration of rational functions.– Discussing integration problems with students	40 minutes	Expository Discussion		[A]: 558–567
Closing	<ul style="list-style-type: none">– Summarizing and concluding the explained and learned concepts.	5 minutes			
Follow Up					

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find the area of flat surface between two curves.
6. Success Indicators :
Students are able to find the area of various kinds of flat surfaces between two curves.
7. Topic : The area of flat surfaces between two curves
8. Activity :
Lesson 19

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Giving example about finding the area of rectangle, triangle and square that are placed on a cartesian coordinate 	10 minutes			
Main	<ul style="list-style-type: none"> – Explaining the method or formula to calculate area below the x axis – Explaining the method or formula to calculate area below the x axis. – Facilitating a class discussion to figure out the formula to calculate the area between two curves (note: this discussion is organized after students are mastering the first two 	80 minutes	Expository Discussion		[A]: 299–308

	problem, namely the area below and above x axis)				
Closing	– Summarizing and concluding the formula and method to calculate the area between two curves.	10 minutes			
Follow Up	– Giving homework to students				

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to find the area of flat surfaces between two curves.
6. Success Indicators :
Students are able to find the area of various kinds of flat surfaces formed by two curves.
7. Topic : The area of flat surfaces between two curves
8. Activity :
Lesson 20

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Re-explaining the method to find the area of surface between two curves. – Motivating students by informing the use and the advantage of the topics (i.e. to find the area of special shape that formed by two curves). 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about finding the area of surface between two curves. – Facilitating a class discussion about the application of the learned topic. And also asking students to find special shape that formed by two curves and can be solved by the method of finding the area between two 	40 minutes	Expository Discussion		[A]: 299–308

	curves.				
Closing	– Summarizing and concluding the explained and learned concepts.	5 minutes			

9. Evaluation :
- Essay
 - Performance test

Yogyakarta,
Lecturer,

Ariyadi Wijaya, M.Sc
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DEPARTMENT OF NATIONAL EDUCATION
YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
Address: Karangmalang, Yogyakarta – 55281
Phone: 0274 – 586168 Ext. 217

LESSON PLAN

1. Faculty : Mathematics and Natural Science
2. Course/Code : Integral Calculus / MAT 307
3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find the volume of solid of revolution using disk method and ring method.
6. Success Indicators:
 - Students are able to find the volume of solid that is formed by rotating a curve about either the x axis or the y axis using disk method.
 - Students are able to find the volume of solid that is formed by rotating the area between two curves about either the x axis or the y axis using ring method
7. Topic : The volume of solid of revolution
8. Activity :
Lesson 21

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Showing some special shapes whose volume are difficult to be solved using common formula of volume, such as the formula for the volume of a cube, a sphere, a cone, etc. – Motivating students by informing the use and the advantage of the topics, i.e. to find the volume of special shape. 	10 minutes			
Main	<ul style="list-style-type: none"> – Showing some cylinders that are placed on a cartesian coordinate. Asking students to find the volume of the 	80 minutes	Expository Discussion		[A]: 337–356

	<p>cylinders.</p> <ul style="list-style-type: none"> - Connecting a cylinder to the revolution of curve (i.e. cylinder can be formed by rotating a line about a given axis). - Using the formula of surface area of a cylinder to stimulate students to formulate the method to find the volume of solid of revolution - Explaining the disk method to find the volume of solid of revolution when the solid is formed by revolving a curve about a given axis. - Explaining the ring method to find the volume of solid of revolution when the solid is formed by revolving two curves about an axis. - Discussing the application of disk method and ring method in daily life. 				
Closing	<ul style="list-style-type: none"> - Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> - Giving homework to students 				

9. Evaluation :
 Essay and performance test

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LESSON PLAN

1. Faculty : Mathematics and Natural Science
2. Course/Code : Integral Calculus / MAT 307
3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to find the volume of solid of revolution using disk method and ring method.
6. Success Indicators :
 - Students are able to find the volume of solid that is formed by rotating a curve about either the x axis or the y axis using disk method.
 - Students are able to find the volume of solid that is formed by rotating the area between two curves about either the x axis or the y axis using ring method.
7. Topic : The volume of solid of revolution
8. Activity :
Lesson 22

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Re-explaining the disk method and ring method – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about finding the volume of solid of revolution that can be solved using either disk method or ring method. – Presentation by students about the application of disk method and ring method to solve real life problem 	40 minutes	Expository Discussion		[A]: 337–356
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

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LESSON PLAN

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find the volume of solid of revolution using cylinder or shell method
6. Success Indicators:
Students are able to find the volume of solid of revolution using cylinder or shell method
7. Topic : The volume of solid of revolution
8. Activity :
Lesson 23

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Showing some special shapes whose volume are difficult to be solved using common formula of volume, such as the formula for the volume of a cube, a sphere, a cone, etc. – Motivating students by informing the use and the advantage of the topics, i.e. to find the volume of special shape. 	10 minutes			
Main	<ul style="list-style-type: none"> – Showing some cylinders that are placed on a cartesian coordinate. Asking students to find the volume of the cylinders using formula $\pi.r^2.t$ 	80 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539

	<ul style="list-style-type: none"> - Connecting a cylinder to the revolution of curve (i.e. cylinder can be formed by rotating a line about a given axis). - Using the formula of surface area of a cylinder to stimulate students to formulate the method to find the volume of solid of revolution - Explaining the cylinder or shell method to find the volume of solid of revolution. - Discussing the application of cylinder or shell method in daily life. 				
Closing	<ul style="list-style-type: none"> - Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> - Giving homework to students 				

9. Evaluation :

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competency :
Students are able to find the volume of solid of revolution using cylinder or shell method.
6. Success Indicators:
Students are able to find the volume of solid of revolution using cylinder or shell method.
7. Topic : The volume of solid of revolution
8. Activity :
Lesson 24

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Re-explaining the cylinder or shell method – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about finding the volume of solid of revolution that can be solved using cylinder or shell method. – Presentation by students about the application of cylinder or shell method to solve real life problem 	40 minutes	Expository Discussion		[A]: 449–483 [A]: 534–539
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

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LESSON PLAN

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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find the length of curves using integral.
6. Success Indicators :
Students are able to find the length of various curves using integral
7. Topic : The length of curves
8. Activity :
Lesson 25

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Giving problem about finding the length of arcs of a circle 	10 minutes			
Main	<ul style="list-style-type: none"> – Re-formulating the formula to calculate the length of circle's arc when the circle is placed on cartesian coordinate. – Explaining the technique to find the length of curves. – Giving problem about finding the length of curves 	80 minutes	Expository Discussion		[A]: 525–533 [A]: 547 - 557
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to find the length of curves using integral.
6. Success Indicators :
Students are able to find the length of various curves using integral
7. Topic : The length of curves
8. Activity :
Lesson 26

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Re-explaining the technique to find the length of curves – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about finding the length of various kinds of curves using integral. – Class discussion about the length of various curves 	40 minutes	Expository Discussion		[A]: 525–533 [A]: 547 - 557
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

9. Evaluation :
Essay and performance test

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4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find the area of the surface of rotated curves.
6. Success Indicators :
Students are able to find the area of the surface of rotated curves
7. Topic : The surface of revolution
8. Activity :
Lesson 27

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Showing some special shapes whose surface area are difficult to be solved using common formula of volume, such as the formula for the volume of a cube, a sphere, a cone, etc. – Motivating students by informing the use and the advantage of the topics, i.e. to find the volume of special shape. 	10 minutes			
Main	<ul style="list-style-type: none"> – Showing some cylinders that are placed on a cartesian coordinate. Asking students to find the volume of surface area. – Connecting a cylinder to the revolution of curve (i.e. cylinder can be 	80 minutes	Expository Discussion		[A]: 541–546

	<p>formed by rotating a line about a given axis).</p> <ul style="list-style-type: none"> – Using the formula of surface area of a cylinder to stimulate students to formulate the method to find the surface area of revolved curve. 				
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	10 minutes			
Follow Up	<ul style="list-style-type: none"> – Giving homework to students 				

9. Evaluation :

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to find the area of the surface of rotated curves.
6. Success Indicators :
Students are able to find the area of the surface of rotated curves
7. Topic : The surface of revolution
8. Activity :
Lesson 28

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Re-explaining the technique to find the surface area of rotated curves – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving students problems about finding the surface area of rotated curves using integral. – Class discussion about the surface area of rotated curves in daily life 	40 minutes	Expository Discussion		[A]: 541–546
Closing	<ul style="list-style-type: none"> – Summarizing and concluding the explained and learned concepts. 	5 minutes			

9. Evaluation :
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3. Credits : Theory: 2 sks, Practice: 1 sks
4. Semester dan duration : Sem: 2 , Duration : 100 minutes
5. Basic Competencies :
Students are able to find moment and center of gravity using integral.
6. Success Indicators:
 - Students are able to solve problem about moment and center of gravity using integral
 - Students are able to give examples of the application of finding moment and center of gravity using integral.
7. Topic : Moment and center of gravity
8. Activity :
Lesson 30 dan 31

Component	Activity	Time Allocation	Methods	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. – Asking students to explain about centroid of a plane, e.g. a triangle. 	10 minutes			
Main	<ul style="list-style-type: none"> – Giving problem about determining the centroid of a triangle which all of its sides are represented by the equation of straight lines. Explaining a continuous mass distribution along a line. – Explaining the mass distribution on a plane. – Explaining the Pappus theorem to describe the relation between centroid 	80 minutes	Expository Discussion		[A]: 558–567

	and the volume of solid of revolution. – Giving contextual problem about moment and center of gravity.				
Closing	10. Summarizing and concluding the explained and learned concepts.	10 minutes			
Follow Up	– Giving homework to students				

9. Evaluation :

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4. Semester dan duration : Sem: 2 , Duration : 50 minutes
5. Basic Competencies :
Students are able to find moment and center of gravity using integral.
6. Success Indicators :
 - Students are able to solve problem about moment and center of gravity using integral
 - Students are able to give examples of the application of finding moment and center of gravity using integral.
7. Topic : Moment and center of gravity
8. Activity :
Lesson 32

Component	Activity	Time Allocation	Method	Media	References
Opening	<ul style="list-style-type: none"> – Explaining the objectives of the lesson – Motivating students by informing the use and the advantage of the topics. 	5 minutes			
Main	<ul style="list-style-type: none"> – Giving problems about finding moment and center of gravity using integral. – Presentation by students and class discussion about the examples of problem about moment and center of gravity encountered in daily life. 	40 minutes	Expository Discussion		[A]: 558–567
Closing	11. Summarizing and concluding the explained and learned concepts.	5 minutes			

9. Evaluation :
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