



**Universitas Negeri Surabaya**  
**Faculty of Mathematics and Natural Sciences**  
**Undergraduate Mathematics Study Program**

Document Code

## SEMESTER LEARNING PLAN

<b>Courses</b>	<b>CODE</b>	<b>Course Family</b>	<b>Credit Weight</b>	<b>SEMESTER</b>	<b>Compilation Date</b>																																																																																				
Analytical Geometry	4420103042	Compulsory Study Program Subjects	T=3 P=0 ECTS=4.77	4	July 17, 2024																																																																																				
<b>AUTHORIZATION</b>		<b>SP Developer</b>	<b>Course Cluster Coordinator</b>	<b>Study Program Coordinator</b>																																																																																					
		.....	.....	Prof. Dr. Raden Sulaiman, M.Si.																																																																																					
<b>Learning model</b>	<b>Case Studies</b>																																																																																								
<b>Program Learning Outcomes (PLO)</b>	<b>PLO study program that is charged to the course</b>																																																																																								
	<b>Program Objectives (PO)</b>																																																																																								
	<b>PO - 1</b>	• Develop mathematical thinking starting from an understanding of vector algebra, linear geometric analysis to quadratic geometry.																																																																																							
	<b>PO - 2</b>	• Apply linear geometry and quadratic geometry in solving geometric problems.																																																																																							
	<b>PO - 3</b>	• Responsible for completing every task given.																																																																																							
	<b>PLO-PO Matrix</b>																																																																																								
	<table border="1" style="margin: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> </table>	P.O	PO-1	PO-2	PO-3																																																																																				
P.O																																																																																									
PO-1																																																																																									
PO-2																																																																																									
PO-3																																																																																									
<b>PO Matrix at the end of each learning stage (Sub-PO)</b>																																																																																									
	<table border="1" style="margin: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																	PO-3																				
P.O	Week																																																																																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																																																									
PO-1																																																																																									
PO-2																																																																																									
PO-3																																																																																									
<b>Short Course Description</b>	Studying various geometric shapes on the coordinate plane, namely the position of points in R1 and R2, lines in R2, positions, parabolas, ellipses, circles, hyperbolas, planes, lines in R3, and balls through active learning that trains students to think logically-analytically.																																																																																								
<b>References</b>	<b>Main :</b>																																																																																								
		1. Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company																																																																																							
	<b>Supporters:</b>																																																																																								
		1. Horatio Nelson Robinson, 2010, Conic Sections and Analytical Geometry: Theoretically and Practically Illustrated. Nabu Press 2. Chatterjee, 2009. Analytical Geometry: Two and Three Dimensions. Alpha Science International Limited 3. Mittal dan Shanti Narayan ,2005, Analytical Solid Geometry. International Book Distributing Company 4. Thomas Grenfell Vyvyan, 2010, Analytical Geometry for Beginner: Part I. The Straight Line and Circle. Nabu Press																																																																																							
<b>Supporting lecturer</b>	Dr. Agung Lukito, M.S. Rudianto Artiono, S.Pd., M.Si. Ahmad Wachidul Kohar, S.Pd., M.Pd. Nina Rinda Prihartiwi, S.Pd., M.Pd.																																																																																								
<b>Week-</b>	<b>Final abilities of each learning</b>	<b>Evaluation</b>	<b>Help Learning, Learning methods, Student Assignments, [ Estimated time]</b>	<b>Learning materials</b>	<b>Assessment Weight (%)</b>																																																																																				

	stage (Sub-PO)	Indicator	Criteria & Form	Offline ( offline )	Online ( online )	[ References ]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Understand vectors, vector operations, vector and point coordinates, vector product.	<ul style="list-style-type: none"> <li>1. • Perform addition and subtraction operations on vectors</li> <li>2. • Determine the coordinates of vectors and points</li> </ul>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<p><b>Material:</b> • Vectors, Vector Operations, Vector and Point Coordinates, Vector Products.</p> <p><b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%
2	Understand vectors, vector operations, vector and point coordinates, vector product.	<ul style="list-style-type: none"> <li>1. • Perform addition and subtraction operations on vectors</li> <li>2. • Determine the coordinates of vectors and points</li> </ul>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<p><b>Material:</b> • Vectors, Vector Operations, Vector and Point Coordinates, Vector Products.</p> <p><b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%
3	Understand curves and surfaces.	<ul style="list-style-type: none"> <li>• Distinguish between parametric equations, implicit equations and explicit equations</li> </ul>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<p><b>Materials:</b> • Curves and Surfaces.</p> <p><b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%
4	Understand curves and surfaces.	<ul style="list-style-type: none"> <li>• Distinguish between parametric equations, implicit equations and explicit equations</li> </ul>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<p><b>Materials:</b> • Curves and Surfaces.</p> <p><b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%
5	Understand the equations of straight lines and planes	<ul style="list-style-type: none"> <li>1. • Determine the equation of the line in <math>R^2</math></li> <li>2. • Determine the equation of the line in <math>R^3</math></li> <li>3. • Determine plane equations</li> </ul>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<p><b>Material:</b> • Equations of straight lines and planes</p> <p><b>Reference:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%

6	Understand the equations of straight lines and planes	<ol style="list-style-type: none"> <li>Determine the equation of the line in R2</li> <li>Determine the equation of the line in R3</li> <li>Determine plane equations</li> </ol>	<b>Criteria:</b> Attached  <b>Form of Assessment :</b> Participatory Activities	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<b>Material:</b> • Equations of straight lines and planes <b>Reference:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	1%
7	Understand circles and their elements	<ol style="list-style-type: none"> <li>Determine the equation of a circle</li> <li>Determine the equation of the tangent line to the circle</li> </ol>	<b>Criteria:</b> Attached  <b>Form of Assessment :</b> Participatory Activities	Collaborative Learning Approach (Lecture, discussion and question and answer) 150 minutes		<b>Materials:</b> • Curves and Surfaces. <b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>  <b>Material:</b> • Equations of straight lines and planes <b>Reference:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	2%
8	UTS	All indicators before UTS	<b>Criteria:</b> Attached  <b>Form of Assessment :</b> Test	UTS 100		<b>Material:</b> All material before UTS <b>Reference:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	20%
9	Understand circles and their elements	<ol style="list-style-type: none"> <li>Determine the equation of the polar line on the circle</li> <li>Determine the equation of a power line on a circle</li> </ol>	<b>Criteria:</b> Attached  <b>Form of Assessment :</b> Participatory Activities	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<b>Material:</b> • <b>Reference</b> <i>Circle: Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	1%
10	Understanding the Ball and its elements	<ol style="list-style-type: none"> <li>Determine the equation of a sphere</li> <li>Determine the equation of the tangent plane to the sphere</li> <li>Determine the equation of the force field on a sphere</li> </ol>	<b>Criteria:</b> Attached  <b>Form of Assessment :</b> Participatory Activities	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<b>Material:</b> Bibliography : <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	1%

11	Understanding the Ball and its elements	<ol style="list-style-type: none"> <li>1. Determine the equation of a sphere</li> <li>2. Determine the equation of the tangent plane to the sphere</li> <li>3. Determine the equation of the force field on a sphere</li> </ol>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<p><b>Material:</b> Bibliography : <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	1%
12	Understanding Conical Sections in the form of Parabolas and Paraboloids and their elements	<ol style="list-style-type: none"> <li>1. Determine the equations of parabolas and paraboloids</li> <li>2. Determine the equation of the tangent line to the parabola</li> <li>3. Determine the equation of the tangent plane to the paraboloid</li> </ol>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities, Practice/Performance</p>	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<p><b>Material:</b> • Parabolas and Paraboloids <b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	10%
13	Understanding conic sections in the form of ellipses and ellipsoids and their elements	<ol style="list-style-type: none"> <li>1. Determine the equations of ellipses and ellipsoids</li> <li>2. Determine the equation of the tangent line to the ellipse</li> <li>3. Determine the equation of the tangent plane to the ellipsoid</li> </ol>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities, Practice/Performance</p>	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<p><b>Material:</b> • Parabolas and Paraboloids <b>References:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	10%
14	Understanding Conical Sections in the form of hyperbolas and hyperboloids and their elements	<ol style="list-style-type: none"> <li>1. Determine the equations of hyperbolas and hyperboloids</li> <li>2. Determine the equation of the tangent line to the hyperbola</li> <li>3. Determine the equation of the tangent plane to the hyperboloid</li> </ol>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities, Practice/Performance</p>	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<p><b>Material:</b> • Hyperbolas and Hyperboloids <b>Bibliography:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	10%
15	Understanding Conical Sections in the form of hyperbolas and hyperboloids and their elements	<ol style="list-style-type: none"> <li>1. Determine the equations of hyperbolas and hyperboloids</li> <li>2. Determine the equation of the tangent line to the hyperbola</li> <li>3. Determine the equation of the tangent plane to the hyperboloid</li> </ol>	<p><b>Criteria:</b> Attached</p> <p><b>Form of Assessment :</b> Participatory Activities, Practice/Performance</p>	Collaborative Learning Approach (Lectures, discussions, demonstrations, and questions and answers) 150		<p><b>Material:</b> • Hyperbolas and Hyperboloids <b>Bibliography:</b> <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i></p>	9%

16	UAS	All indicators before UAS	Criteria: Attached  Form of Assessment : Test	UAS 100		Material: All material before UAS Reference: <i>Ian Visman, 1997, Analytical Geometry (Series on University Mathematics). World Scientific Publishing Company</i>	30%
----	-----	---------------------------	---	------------	--	---	-----

#### Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	30.5%
2.	Practice / Performance	19.5%
3.	Test	50%
		100%

#### Notes

- Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- Forms of assessment:** test and non-test.
- Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.