

K to 12 BASIC EDUCATION CURRICULUM
SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT

Grade: 11
Core Subject Title: Pre-Calculus

Semester: First Semester
No. of Hours/ Semester: 80 hours/ semester
Pre-requisite (if needed):

Subject Description: At the end of the course, the students must be able to apply concepts and solve problems involving conic sections, systems of nonlinear equations, series and mathematical induction, circular and trigonometric functions, trigonometric identities, and polar coordinate system.

CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCIES	CODE
Analytic Geometry	<i>The learners demonstrate an understanding of...</i> key concepts of conic sections and systems of nonlinear equations	<i>The learners shall be able to...</i> model situations appropriately and solve problems accurately using conic sections and systems of nonlinear equations	<i>The learners...</i> 1. illustrate the different types of conic sections: parabola, ellipse, circle, hyperbola, and degenerate cases.***	STEM_PC11AG-Ia-1
			2. define a circle.	STEM_PC11AG-Ia-2
			3. determine the standard form of equation of a circle	STEM_PC11AG-Ia-3
			4. graph a circle in a rectangular coordinate system	STEM_PC11AG-Ia-4
			5. define a parabola	STEM_PC11AG-Ia-5
			6. determine the standard form of equation of a parabola	STEM_PC11AG-Ib-1
			7. graph a parabola in a rectangular coordinate system	STEM_PC11AG-Ib-2
			8. define an ellipse	STEM_PC11AG-Ic-1
			9. determine the standard form of equation of an ellipse	STEM_PC11AG-Ic-2
			10. graph an ellipse in a rectangular coordinate system	STEM_PC11AG-Ic-3
			11. define a hyperbola	STEM_PC11AG-Id-1
			12. determine the standard form of equation of a hyperbola	STEM_PC11AG-Id-2

K to 12 BASIC EDUCATION CURRICULUM
SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT

CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCIES	CODE
			13. graph a hyperbola in a rectangular coordinate system	STEM_PC11AG-Id-3
			14. recognize the equation and important characteristics of the different types of conic sections	STEM_PC11AG-Ie-1
			15. solves situational problems involving conic sections	STEM_PC11AG-Ie-2
			16. illustrate systems of nonlinear equations	STEM_PC11AG-If-1
			17. determine the solutions of systems of nonlinear equations using techniques such as substitution, elimination, and graphing***	STEM_PC11AG-If-g-1
			18. solve situational problems involving systems of nonlinear equations	STEM_PC11AG-Ig-2
Series and Mathematical Induction	key concepts of series and mathematical induction and the Binomial Theorem.	keenly observe and investigate patterns, and formulate appropriate mathematical statements and prove them using mathematical induction and/or Binomial Theorem.	1. illustrate a series	STEM_PC11SMI-Ih-1
			2. differentiate a series from a sequence	STEM_PC11SMI-Ih-2
			3. use the sigma notation to represent a series	STEM_PC11SMI-Ih-3
			4. illustrate the Principle of Mathematical Induction	STEM_PC11SMI-Ih-4
			5. apply mathematical induction in proving identities	STEM_PC11SMI-Ih-i-1
			6. illustrate Pascal’s Triangle in the expansion of $(x + y)^n$ for small positive integral values of n	STEM_PC11SMI-Ii-2
			7. prove the Binomial Theorem	STEM_PC11SMI-Ii-3
			8. determine any term of $(x + y)^n$, where n is a positive integer, without expanding	STEM_PC11SMI-Ij-1
			9. solve problems using mathematical induction and the Binomial Theorem	STEM_PC11SMI-Ij-2

**K to 12 BASIC EDUCATION CURRICULUM
SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT**

CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCIES	CODE
Trigonometry	key concepts of circular functions, trigonometric identities, inverse trigonometric functions, and the polar coordinate system	1. formulate and solve accurately situational problems involving circular functions	1. illustrate the unit circle and the relationship between the linear and angular measures of a central angle in a unit circle	STEM_PC11T-IIa-1
			2. convert degree measure to radian measure and vice versa	STEM_PC11T-IIa-2
			3. illustrate angles in standard position and coterminal angles	STEM_PC11T-IIa-3
			4. illustrate the different circular functions	STEM_PC11T-IIb-1
			5. uses reference angles to find exact values of circular functions	STEM_PC11T-IIb-2
			6. determine the domain and range of the different circular functions	STEM_PC11T-IIc-1
			7. graph the six circular functions (a) amplitude, (b) period, and (c) phase shift	STEM_PC11T-IIc-d-1
			8. solve problems involving circular functions	STEM_PC11T-IId-2
		2. apply appropriate trigonometric identities in solving situational problems	9. determine whether an equation is an identity or a conditional equation	STEM_PC11T-IIe-1
			10. derive the fundamental trigonometric identities	STEM_PC11T-IIe-2
			11. derive trigonometric identities involving sum and difference of angles	STEM_PC11T-IIe-3
			12. derive the double and half-angle formulas	STEM_PC11T-IIf-1
			13. simplify trigonometric expressions	STEM_PC11T-IIf-2
			14. prove other trigonometric identities	STEM_PC11T-IIf-g-1
			15. solve situational problems involving trigonometric identities	STEM_PC11T-IIg-2
	3. formulate and solve accurately situational problems involving appropriate trigonometric functions	16. illustrate the domain and range of the inverse trigonometric functions.	STEM_PC11T-IIh-1	
		17. evaluate an inverse trigonometric expression.	STEM_PC11T-IIh-2	
		18. solve trigonometric equations.	STEM_PC11T-IIh-i-1	
		19. solve situational problems involving inverse trigonometric functions and trigonometric equations	STEM_PC11T-IIi-2	
	4. formulate and solve accurately situational problems involving the polar coordinate system	20. locate points in polar coordinate system	STEM_PC11T-IIj-1	
		21. convert the coordinates of a point from rectangular to polar systems and vice versa	STEM_PC11T-IIj-2	
		22. solve situational problems involving polar coordinate system	STEM_PC11T-IIj-3	

***Suggestion for ICT-enhanced lesson when available and where appropriate

**K to 12 BASIC EDUCATION CURRICULUM
 SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT**

Code Book Legend

Sample: STEM_PC11AG-Ia-1

LEGEND		SAMPLE	
First Entry	Learning Area and Strand/ Subject or Specialization	Science, Technology, Engineering and Mathematics Pre-Calculus	STEM_PC11AG
	Grade Level	Grade 11	
Uppercase Letter/s	Domain/Content/ Component/ Topic	Analytic Geometry	
-			
Roman Numeral <i>*Zero if no specific quarter</i>	Quarter	First Quarter	I
Lowercase Letter/s <i>*Put a hyphen (-) in between letters to indicate more than a specific week</i>	Week	Week one	a
-			
Arabic Number	Competency	illustrate the different types of conic sections: parabola, ellipse, circle, hyperbola, and degenerate cases	1

DOMAIN/ COMPONENT	CODE
Analytic Geometry	AG
Series and Mathematical Induction	SMI
Trigonometry	T

K to 12 BASIC EDUCATION CURRICULUM
SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT

References:

Aufmann, Richard N., Barker, Vernon C. and Nation, Richard D. *College Trigonometry*. Boston: Houghton Mifflin Company, 2008.

Cabral, Emmanuel A., De Las Penas, Ma. Louise Antonnet .N., De Lara-Tuprio, Elvira P., Francisco, Flordeliza F., Garces, Ian June L., Marcelo, Reginald M. and Sarmiento, Jumela F., *Precalculus*. Q.C.: Ateneo de Manila University Press, 2010.

Larson, Ron. *Precalculus with Limits*. Kentucky: Brooks/Cole, Cengage Learning, 2014.

Leithold, Louis, *College Algebra and Trigonometry*. Singapore: Pearson Education Asia Pte. Ltd., 2002.

Margaret L., Hornsby, John and Schneider, David I. *College Algebra and Trigonometry and Precalculus*. Boston: Addison-Wesley Educational Publisher, Inc., 2001.

Stewart, James, Redlin, Lothar, and Watson, Saleem, *Precalculus: Mathematics for Calculus*. Boston: Brooks/Cole, Cengage Learning, 2012.

Sullivan, Michael, *Algebra & Trigonometry*. Singapore: Pearson Education, Inc., 2012.

Young, Cynthia, *Algebra and Trigonometry*. New Jersey: John Wiley & Sons, Inc., 2013.