



**Science, Technology, Mathematics & Engineering (STEM) Disciplines Program
 Student Learning Outcome Mapping
 Course (CLO), Program (PLO), Institutional (ILO)**

Program Description: This program is designed for individuals interested in professional careers in science, technology, engineering, or mathematics. The program provides basic knowledge and skills necessary for the pursuit of a higher education in these fields.

Program Learning Outcomes	Institutional Learning Outcomes
<ol style="list-style-type: none"> 1. Apply the concepts of physics and chemistry to constructing and understanding modern technological devices; describe and differentiate the fundamental topics of classic physics and modern quantum physics. 2. Experiment and test hypotheses using modern laboratory techniques. 3. Develop various files utilizing different computer applications including word process. 4. Plan, design, develop and implement a synthetically and logically correct computer program. 5. Express a general understanding of the different areas of mathematics and how they interrelate: facilitate the importance of mathematics in a scientifically oriented society; develop classical theorem- proven skills: and apply mathematical reasoning to construct proofs. 6. Solve problems using variety of techniques, including algebraic, numerical and spatial reasoning through visualization, and read, write, translate and articulate math related materials. 	<ol style="list-style-type: none"> 1. Critical Thinking and Problem Solving: Analyze and solve problems by using informed judgment based on evidence, sound reasoning, and/or creativity to differentiate facts from opinions and to specify solutions and their consequences. 2. Communication: Effectively communicate, both orally and in writing, thoughts in a clear, well-organized manner to persuade, inform and/or convey ideas in academic, work, family and community settings. 3. Quantitative and Technological Competence: Use mathematical skills appropriate to our technological society by analyzing and solving problems that are quantitative in nature and use technology for informational, academic, personal and professional needs. 4. Diversity: Understand and appreciate differences in cultures and behaviors between the self and others by demonstrating respect, honesty, fairness, and ethical principles in both personal and professional life. 5. Civic Responsibility: Apply the principles of civility and morality to situations in the contexts of a healthy family, work, community, environment and world. 6. Aesthetics: Apply numerous means of inquiry to experience and appreciate the values of arts and nature.

PLO-ILO Mapping

PLOs	ILOs					
	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
PLO 1	X	X	X			
PLO 2	X	X	X			
PLO 3	X	X	X			X
PLO 4	X	X	X			X
PLO 5	X	X	X			
PLO 6	X	X	X			

CLO-PLO-ILO Mapping

IT 105 - PC Office Applications

This course provides software skills used in business related applications. It will provide advanced word processing and spreadsheets and introduce database and presentation software.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Generate extensive and properly formatted Microsoft Word documents that include texts, graphics, tables, mathematical formulas, and other supported objects.			X				X	X	X			X
2. Plan and develop elaborate spreadsheets that utilize complex built-in functions and features of Microsoft Excel.			X				X	X	X			X
3. Plan, design, and develop relational databases using Microsoft Access that are flexible, expandable, and mitigate redundant information.			X				X	X	X			X
4. Plan, design, and generate Microsoft Access database queries that select, update, and display information accurately.			X				X	X	X			X
5. Create substantial or multiple presentations that integrates texts, graphics, animations, other Microsoft Office files, and various objects supported by Microsoft PowerPoint.			X				X	X	X			X

IT 110 - Introduction to Programming

This course introduces microcomputer programming, including problem solving procedures, flowcharts and program designs, debugging, and program documentation.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Plan, design, diagram, and generate a flowchart of a possible solution to a given computer-programming assignment.				X			X	X	X			X
2. Identify areas where decision structures are required and plan and develop a flowchart and pseudocode for the decision structures to produce the desired output.				X			X	X	X			X
3. Identify areas where LOOPING structures are required and plan and develop flowchart and pseudocode for the LOOPING structures to produce the desired output.				X			X	X	X			X
4. Plan and develop complete pseudocode based on the solution that consists of all the procedures and components necessary to make the program run and function correctly.				X			X	X	X			X

IT 125 - Visual Basic Programming I

This course utilizes Visual Basic to introduce program development for business applications. It will emphasize structured programming principles, including internal and external program documentation. Implementation of objects and event-driven code will also be emphasized.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Design and develop a computer program by identifying and defining all needed variables.				X			X	X	X			X
2. Design and develop a computer program by identifying areas where decision structures are necessary and developing the structures.				X			X	X	X			X
3. Design and develop a computer program by identifying areas where LOOPING structures are necessary and developing the structures.				X			X	X	X			X
4. Plan and design a computer program by identifying areas where other programming statements are necessary and developing the statements.				X			X	X	X			X
5. Develop a syntactically and functionally correct computer program by implementing the selected solution that consists of all the procedures and components necessary to make the program run and function correctly and accurately.				X			X	X	X			X

MA 111 - College Algebra

This course is the first part of the algebra and trigonometry precalculus sequence. This course covers algebraic functions including graphs of functions, algebraic operation and composition of functions, exponential and logarithmic functions, and inverse functions. It also covers the remainder and factor theorems, division of polynomials, rational and irrational roots of polynomials, linear and nonlinear system of equations, and matrix algebra.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Graph linear functions, write equations of lines, and solve linear equations and variation problems.						X	X		X			
2. Graph non-linear functions, perform operations on functions, and find compositions and inverses of functions.						X	X		X			
3. Graph exponential and logarithmic functions and solve application problems with exponential and logarithmic equations.						X	X		X			
4. Solve polynomial equations with rational and irrational solutions.						X	X		X			
5. Solve systems of equations with various methods, perform matrix operations, and solve matrices.						X	X		X			
6. Graph linear inequalities involving 2 variables.						X	X		X			

MA 112 - Trigonometry

This course is the second part of the algebra and trigonometry precalculus sequence. It covers the trigonometric functions and their values, trigonometric graphs, trigonometric identities and equations, inverse trigonometric functions, and applications of trigonometry.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Define and apply the six trigonometric functions to solve right triangles.					X		X		X			
2. Graph the six trigonometric functions.					X		X		X			
3. Verify trigonometric identities and solve trigonometric equations.					X		X		X			
4. Solve application problems involving oblique triangles and find areas of triangles.					X		X		X			
5. Add and multiply vectors, graph vectors, solve application problems with vectors, and solve equations involving complex numbers.					X		X		X			

MA 121 - Elementary Statistics

This course is designed to acquaint students with methodologies and techniques for the collection, presentation, analysis, and interpretation of quantitative data. Topics include basic statistics, summarizing univariate data, correlation and regression for bivariate data, concepts of probability, probability distributions, and sampling distributions. Some uses of statistical software will be incorporated in this course.

CLO Students will be able to:	PLO							ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6		ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Explain statistical terms, data collection, and types of sampling.					X			X		X			
2. Analyze and present descriptive statistics for a single-variable set of data.					X			X		X			
3. Analyze and present descriptive statistics for a two-variable set of data.					X			X		X			
4. Explain the rules of probability and use them in computing expected values.					X			X		X			
5. Construct a probability distribution and compute the mean and standard deviation for the distribution.					X			X		X			
6. Describe the normal distribution and solve problems using the normal distribution.					X			X		X			

MA 221 - Calculus I

This is the first course of a standard calculus course. Topics include a review of functions and their graphs, limits of functions, continuity, derivatives of algebraic and transcendental functions, implicit differentiation, applications of differentiation including rate of change and related rates problems, Newton's Method, and antiderivatives.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Evaluate and graph functions, determine the domain and range of functions, find the composition and the inverse of functions, and solve application problems.					X	X	X		X			
2. Evaluate the limit for functions presented in algebraic or graphical form and identify points of discontinuity or continuity for functions.					X	X	X		X			
3. Differentiate various types of functions using differentiation rules including implicit and logarithmic differentiation.					X	X	X		X			
4. Solve application problems including rate of change, related rates, and exponential growth and decay problems.					X	X	X		X			
5. Evaluate limits with indeterminate forms using L'hospital's rule, solve optimization problems using differentiation, approximate roots of equations using Newton's Method, and find antiderivative of simple functions.					X	X	X		X			

SC 160 - General Chemistry I

This course is the first part of a two-semester course that covers fundamental principles in chemistry. This course provides the beginning student with an adequate foundation in the fundamentals of chemistry. Topics include measurements, fundamental properties of matter, states of matter, chemical reactions, chemical stoichiometry, solutions, periodicity of elemental properties, atomic structure, chemical bonding, molecular structure, and an introduction to thermodynamics. Laboratory investigations are an integral part of this course and reinforce fundamental principles of general chemistry, introduction of the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. KNOWLEDGE IN GENERAL CHEMISTRY – Gain knowledge in the fundamental concepts and principles in chemistry including, but not limited to, classification of matter, formation of molecules and ions, nomenclature, stoichiometry, thermochemistry, electronic structure, bonding, and molecular geometry.	X	X					X	X	X			
2. SCIENTIFIC INQUIRY – Demonstrate the ability to incorporate the proper investigative protocols, select the most appropriate instruments to increase experimental data precision and accuracy, enforce safety regulations, and demonstrate professional affective skills when conducting scientific experiments or investigations to solve a problem or identify the best solution(s) to a problem.	X	X					X	X	X			
3. SCIENTIFIC REPORT WRITING – Demonstrate the ability to	X	X					X	X	X			

communicate findings of scientific investigations in formal written scientific reports.													
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SC 161 - General Chemistry II

This course is the second part of a two-semester course that covers fundamental principles in chemistry. This course provides the beginning student with an adequate foundation in the fundamentals of chemistry. Topics include, to some details, properties of gases, liquids, and solutions, chemical kinetics, chemical equilibria, descriptive inorganic chemistry, and an introduction to organic chemistry and biochemistry of the four major macromolecules in human body. Laboratory investigations are an integral part of this course and reinforce fundamental principles of general chemistry, introduction of the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports.

CLO Students will be able to:	PLO						ILO						
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6	
1. KNOWLEDGE IN GENERAL CHEMISTRY – Gain knowledge in the fundamental concepts and principles in chemistry including, but not limited to, properties of gas, liquid, and solid substances, intermolecular forces, solution formation and the energy involved in the dissolution process, determination of acids and bases, pH and pOH value calculations, entropy and free energy involved in spontaneous processes, chemical equilibrium and factors that influences the rate of chemical reaction, nomenclature of organic molecules, and chemical structure of living matter.	X	X					X	X	X				
2. SCIENTIFIC INQUIRY – Demonstrate the ability to incorporate the proper investigative protocols, select the	X	X					X	X	X				

most appropriate instruments to increase experimental data precision and accuracy, enforce safety regulations, and demonstrate professional affective skills when conducting scientific experiments or investigations to solve a problem or identify the best solution(s) to a problem.													
3. SCIENTIFIC REPORT WRITING – Demonstrate the ability to communicate findings of scientific investigations in formal written scientific reports.	X	X						X	X	X			

SC 205 - Physics I

This is the first semester of a two-semester calculus based physics course intended for students with a desire to continue to advanced studies of science and engineering. Topics covered in this course will be units and problem solving, kinematics in one and two dimensions, Newton’s laws, momentum, rotational and linear dynamics, work and energy, sound and light waves, fluid dynamics and thermal dynamics.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Apply dimensional analysis and convert units of physical quantities: use vectors to describe physical observations	X	X					X	X	X			
2. Perform and demonstrate detailed problem solving expertise: identify the meaning of space and time, and apply these abstractions to the physical world	X	X					X	X	X			
3. Derive formulas for kinematics: investigate the nature of space and time to develop calculus	X	X					X	X	X			

definitions of velocities and accelerations.													
4. Able to determine the motion of massive bodies in three dimensions: apply Newtons Laws of motion, and be able to resolve vector diagrams on static and dynamical systems	X	X						X	X	X			
5. Describe the physics of circular motion in a plane: define the scientific meaning of "Energy", "Work", and "Power"	X	X						X	X	X			
6. Differentiate between scalar and vector mathematics: describe Newtons laws via momentum	X	X						X	X	X			
7. Describe Momentum via calculus: define Mass, and contemplate its origin: apply Newtons laws to gravity, and use this information to describe orbital motion: resolve the motion of satellites: and describe Keplers Laws of planetary motion.	X	X						X	X	X			

SC 206 - Physics II

This is the second semester of a two-semester calculus based physics course intended for students with a desire to continue to advanced studies of science and engineering. Topics covered in this course will be static electricity, electrical fields, series and parallel circuits, magnetic fields, electromagnetic induction, Quantum theory, Bohr and modern atom, solid state electronics, nuclear physics, radiation, nuclear applications.

CLO Students will be able to:	PLO						ILO					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	ILO 1	ILO 2	ILO 3	ILO 4	ILO 5	ILO 6
1. Apply fundamentals of density, pressure, Pascal's Principle, buoyancy and Archimedes' Principle	X	X					X	X	X			
2. Apply the fundamental parameters of wave phenomena	X	X					X	X	X			
3. Describe interference and refraction phenomena	X	X					X	X	X			
4. Analyze electric fields and forces for simple arrangements of static charges using Gauss's Law and Coulomb's Law	X	X					X	X	X			
5. Analyze magnetic fields for simple arrangements of currents using Ampere's Law	X	X					X	X	X			
6. Analyze electric fields and magnetic fields for simple arrangements of changing electric and magnetic fields Faraday's Law and Ampere's Law	X	X					X	X	X			
7. Apply Maxwell's Equations in differential and integral form; and discuss the relationship of Maxwell's Equations to the phenomenon of light and electromagnetic radiation	X	X					X	X	X			