04-56-113 – GENERAL PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	General Physics	**Course Number:**	04-56-113
Units:	3	**Hours:**	4 (Lect. : 2 Hours , Lab. : 2 Hours)
Prerequisites:	None		

COURSE DESCRIPTION

Introduction, system of units, conversion of units, motion with constant acceleration, free fall, Newton's laws of motion, work and energy, conservation of mechanical energy, density and specific gravity, Hooke's law, elasticity, Young's, shear and bulk modulus, heat and temperature, specific heat, thermal conductivity, thermal expansion, pressure in fluids, atmospheric and gauge pressure, buoyant force, Archimedes' principle, viscosity, direct current circuits, Ohm's law, resistors in series, resistors in parallel.

COURSE TEXTBOOK(S)

Physics. Principles With Applications., Douglas C. Giancoli, (Pearson Education Limited).

RECOMMENDED TEXTS & OTHER READINGS

Physics for Scientists and Engineers. Raymond A. Serway, John W. Jewett. (Brooks Cole. 9th edition, 2014).

PART II: COURSE OBJECTIVES

Upon completion of this course, the student should be able to do the following:

1. The student will demonstrate a good understanding of unit interpretation and manipulation.
2. The student will demonstrate an ability to manipulate and solve for the Kinematics Equations in one dimension.
3. The student will demonstrate an ability to apply Newton's laws of motion including their different applications.
4. The student will demonstrate the breakdown of a free-body diagram into specific forces.
5. The student will demonstrate a good understanding of the concepts of Work, Power and Energy.
6. The student will demonstrate a good understanding of conservative and non-conservative systems.
7. The student will distinguish between different mechanical properties of matter.
8. The student will demonstrate a good understanding of distinguishing between thermal absorption, conduction, and expansion of varying metals.
9. The student will learn the basics of hydrostatics and demonstrate a good understanding of determining the pressure at various depths.
10. The student will demonstrate an ability to apply Ohm's law

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction
2	Units and Dimensions
3	Kinematics in one Dimension
4	Kinematics in one Dimension
5	Newton's Laws of Motion
6	Newton's Laws of Motion
7	Work and Energy
8	Work and Energy
9	Mechanical Properties of Matter
10	Mechanical Properties of Matter
11	Thermal Properties of Matter
12	Thermal Properties of Matter
13	Hydrostatics
14	Direct Current Circuits, Ohm's Law

PART IV: OUTLINE OF LABORATORY EXPERIMENTS

Week #	Experiment
1	Introduction to the laboratory
2	Fine Measurements (Vernier Caliper, Micrometer Caliper)
3	Mass, Volume and Density
4	Archimedes Principle (Buoyancy and Specific Gravity)
5	Free Fall
6	Kinematics in one Dimension and Newton's laws (Air Track)
7	Conservation Of Mechanical Energy
8	Hooke's Law
9	Specific Heat of Water
10	Ohm's Law
11	Series and parallel Circuits
12	Revision
13	Final Exam

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PART V: GRADING

GRADING SCALE

Final grades in this course will be based on the following scale:

Final mark	Letter	Symbol	Final mark	Letter	Symbol
95-100	Distinction	A	**90-94**	Low Distinction	A-
87-89	High Very Good	B+	**83-86**	Very Good	B
80-82	Low Very Good	B-	**75-79**	High Good	C+
70-74	Good	C	**66-96**	Low Good	C-
63-65	High Satisfactory	D+	**60-62**	Low Satisfactory	D
0-59	Fail	F			

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04-75-110 – GENERAL CHEMISTRY

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	General Chemistry	**Course Number:**	04-75-110
Prerequisites:	None	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

This course covers those chemical concepts most needed in most areas of science, emphasizes the basic principles of physical, inorganic, and organic chemistry. Topics include: atomic structure, the periodic table, chemical bonding, the states of matter, solutions, chemical equilibrium, oxidation and reduction, electrochemistry, introductory organic chemistry.

COURSE TEXTBOOK(S)

Fundamentals Of Chemistry. 5th Edition, David E. Goldberg, (McGraw-Hill).

RECOMMENDED TEXTS & OTHER READINGS

1. Principles of General Chemistry. 3rd Edition, By Martin Silberberg, ISBN10: 0073402699, ISBN13: 9780073402697, McGraw-Hill International Edition Copyright: 2013.
2. Zumdahl. Chemistry. 6th Edition, Houghton Mifflin, 2003, ISBN 10: 0618442286 / ISBN 13: 9780618442287.

PART II: COURSE OBJECTIVES

Upon completion of this course, the student should be able to do the following:

1. Write formulae for ionic compounds and apply IUPAC rules to name compounds.
2. Perform mass calculations related to atoms and molecules
3. Employ stoichiometry to calculate solution concentrations in molarities and percentage by mass or volume
4. Be able to write formulas and name ionic compounds
5. Be able to write Lewis structures for simple molecules
6. Describe reactions using equations
7. Classify reactions and use equations for mass calculations in reactions.
8. Classify reactions as redox or non-redox and assign ON's to elements in formulas.

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PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Fundamental concepts
2	Atomic structure and periodic law
3	Chemical bonding
4	Intermolecular and inter-atomic forces
5	First Mid-Term exam - Chemical composition formulas
6	Chemical composition formulas
7	Chemical equations
8	Chemical equations
9	Chemical equations
10	Stoichiometry - Concentration of solutions
11	Stoichiometry - Concentration of solutions
12	Stoichiometry - Concentration of solutions
13	Revision - Second Mid-Term exam
14	Second Mid-Term exam

PART IV: OUTLINE OF LABORATORY EXPERIMENTS

Week #	Experiment
1	Safety
2	Experimental technique
3	Law of conservation of matter
4	Equivalent weight of metal
5	Essential water
6	Acidity and basicity (pH)
7	Preparation of standard solutions
8	Volumetric analysis
9	Acid-Base titration
10	Reduction of permenganate
11	Analysis of commercial products (Vinegar)
12	Empirical Formula of magnesium oxide
13	Final Exam

PART V: GRADING

GRADING SCALE

Final grades in this course will be based on the following scale:

Final mark	Letter	Symbol	Final mark	Letter	Symbol
95-100	Distinction	A	**90-94**	Low Distinction	A-
87-89	High Very Good	B+	**83-86**	Very Good	B
80-82	Low Very Good	B-	**75-79**	High Good	C+
70-74	Good	C	**66-96**	Low Good	C-
63-65	High Satisfactory	D+	**60-62**	Low Satisfactory	D
0-59	Fail	F			

04-76-105 – MATHEMATICS (1)

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Mathematics (1)	**Course Number:**	04-76-105
Prerequisites:	**None**	**Units / Hours:**	3 / 3

COURSE DESCRIPTION

This course prepares the students for the use of calculus. It emphasizes techniques of problem solving using algebraic concepts. The major topics include: fundamental concepts of algebra and analytic trigonometry; solving equations and inequalities; the graphs of basic functions of one variable and their inverses; solving systems of linear equations using Cramer's rule.

COURSE TEXTBOOK(S)

Precalculus, John W. Coburn, (McGraw-Hill).

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

Upon completion of this course, the student should be able to do the following:

1. Simplify expressions involving exponents and perform basic operations with radical expressions. Convert between radical and exponential forms.
2. Solve linear equations as well as absolute value equations. Find the solutions of the inequalities and write it in interval notation. Solve quadratic equations using the quadratic formula. Perform basic operations with polynomials and factor completely.
3. Use long division to divide polynomials and understand the Factor and Remainder theorems.
4. Analyze and interpret the behavior and characteristics of functions, including polynomial, exponential, logarithmic, trigonometric, inverse trigonometric.
5. Evaluate logarithms, simplify logarithmic expressions, and use the properties of logarithms to solve logarithmic equations.
6. Graph quadratic functions identifying the vertex, intercepts, axis of symmetry, and can use the graph for solving quadratic equations.
7. Understand the concept of a relation and a function and the meaning of their domain and range. Identify the algebra of functions, composite functions, and inverse functions.
8. Calculate the value of trigonometric functions and solve the triangles using the laws of sines and cosines.
9. Add and multiply matrices. Expand determinants and solve systems of linear Equations, Using Cramer's Rule.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Algebra - Real Numbers - Coordinate Lines - Exponents and Radicals
2	Polynomials and Algebraic Expressions - Manipulation of Algebraic Expressions - Complex Numbers
3	Linear Equations
4	Quadratic Equations
5	Linear Inequalities - Exam 1
6	Definition of functions - Graphs of Functions
7	Composite and Inverse Functions - Quadratic Functions
8	Exponential Functions - Logarithmic Functions
9	Fundamental Trigonometric Identities- Inverse Trigonometric Functions
10	Trigonometric Equations- Trigonometric Equations
11	The Law of Sines - The Law of Cosines
12	Systems of Linear Equations- Matrices
13	The Algebra of Matrices- Some Special Matrices- Determinants
14	Solving Systems of linear Equations, Using Cramer's Rule- Exam 2

PART IV: GRADING

GRADING SCALE

Final grades in this course will be based on the following scale:

Final mark	Letter	Symbol	Final mark	Letter	Symbol
95-100	Distinction	A	90-94	Low Distinction	A-
87-89	High Very Good	B+	83-86	Very Good	B
80-82	Low Very Good	B-	75-79	High Good	C+
70-74	Good	C	66-96	Low Good	C-
63-65	High Satisfactory	D+	60-62	Low Satisfactory	D
0-59	Fail	F			

04-76-106 – MATHEMATICS (2)

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Mathematics (2)	**Course Number:**	04-76-106
Prerequisites:	04-76-106 Mathematics (1)	**Units / Hours:**	3 / 3

COURSE DESCRIPTION

This course emphasizes the study of calculus with analytic geometry. It covers the following topics: three-dimensional coordinate systems, vectors, dot and cross products; limits and continuity; basic rules for differentiating functions; indefinite and definite integrals of functions; numerical integration. Applications include simple maximum and minimum problems, area between curves and work done by a force.

COURSE TEXTBOOK(S)

Technical Calculus With Analytic Geometry, by Peter Kuhfittig, (Brooks/Cole).

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

Upon completion of this course, the student should be able to do the following:

1. Knowledge of the analytical geometry in two and three dimensions and its applications.
2. Apply distance and midpoint formulas for solving geometric problems algebraically.
3. Evaluate the dot and cross product of two vectors, equation of lines in space and planes.
4. Recognize and graph equations of circles and can identify the center and radius of a circle given the standard equation or the general equation of a circle.
5. Compute the average rate of change of a function between two points. Perform limits by way of tables and graphs.
6. Evaluate limits algebraically by means of substitution, factoring. Determine the existence of limits at real numbers.
7. Use rules of limits to determine whether a function is continuous at a point.
8. Find the total derivatives of functions. Apply the chain rule to find derivatives of functions raised to a power, exponential functions, and logarithmic functions.
9. Identify maximum or minimum values of a function and find local extrema.
10. Write the equation of the tangent line at a given point. Solve applied problems involving derivatives.
11. Knowledge of basic rules and laws and integration properties.
12. Perform definite and indefinite integrals using techniques including change of variables, integration by parts, and the Integral Table.

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13. Use integrals to formulate and solve application problems in science and engineering.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Three-Dimensional Coordinate Systems - Distance Formula and Segment Midpoint - Vectors
2	The Dot Product - The Cross Product
3	Lines and Half Planes - Circles and Ellipses - Plane Curves and Parametric Equations
4	Average Rate of Change - Instantaneous Rate of Change
5	The Concept of Limit - Limits of Functions - Properties of Limits - Computation of Limits
6	Limits Involving Infinity- Continuity -Exam1
7	The Derivative of a Function - Derivatives of Basic Functions
8	Rules of Differentiation - Implicit Differentiation
9	The Mean Value Theorem - Root Finding (Newton's Method)
10	Higher Order Derivatives- Minimum and Maximum Values of a Function
11	Antiderivatives (The Indefinite Integral)
12	Integrals of Basic Functions - Rules of Integration
13	The Definite Integral - The Fundamental Theorem of Calculus
14	Applications (Area between Curves, and Work Done by a Force) - Numerical Integration (Simpson's Rule) - Exam2

PART IV: GRADING

GRADING SCALE

Final grades in this course will be based on the following scale:

Final mark	Letter	Symbol	Final mark	Letter	Symbol
95-100	Distinction	A	90-94	Low Distinction	A-
87-89	High Very Good	B+	83-86	Very Good	B
80-82	Low Very Good	B-	75-79	High Good	C+
70-74	Good	C	66-96	Low Good	C-
63-65	High Satisfactory	D+	60-62	Low Satisfactory	D
0-59	Fail	F			

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04-75-142 – BASIC CHEMISTRY

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Basic Chemistry	**Course Number:**	04-75-142
Prerequisites:	None	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Theoretical:
This course covers those chemical concepts most needed in most areas of science, emphasizes the basic principles of physical and inorganic chemistry . Topics include: atomic structure, the periodic table, chemical bonding, the states of matter, solutions, chemical equilibrium, oxidation and reduction, electrochemistry.

COURSE TEXTBOOK(S)

Fundamentals Of Chemistry, David E. Goldberg, (McGraw-Hill).

RECOMMENDED TEXTS & OTHER READINGS

1. Principles of General Chemistry. 3rd Edition, By Martin Silberberg, ISBN10: 0073402699, ISBN13: 9780073402697, McGraw-Hill International Edition Copyright: 2013.
2. Zumdahl. Chemistry. 6th Edition, Houghton Mifflin, 2003, ISBN 10: 0618442286 / ISBN 13: 9780618442287.

PART II: COURSE OBJECTIVES

Upon completion of this course, the student should be able to do the following:

1. Write formulae for ionic compounds and apply IUPAC rules to name compounds.
2. Perform mass calculations related to atoms and molecules.
3. Employ stoichiometry to calculate solution concentrations in molarities and percentage by mass or volume.
4. Be able to write formulas and name ionic compounds.
5. Be able to write Lewis structures for simple molecules.
6. Describe reactions using equations.
7. Classify reactions and use equations for mass calculations in reactions.
8. Classify reactions as redox or non-redox and assign ON's to elements in formulas.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Fundamental concepts
2	Atomic structure and periodic law
3	Chemical bonding
4	Intermolecular and inter-atomic forces
5	First Mid-Term exam - Chemical composition formulas
6	Chemical composition formulas
7	Chemical equations
8	Chemical equations
9	Chemical equations
10	Stoichiometry - Concentration of solutions
11	Stoichiometry - Concentration of solutions
12	Stoichiometry - Concentration of solutions
13	Revision - Second Mid-Term exam
14	Revision - Second Mid-Term exam

PART IV: GRADING

GRADING SCALE

Final grades in this course will be based on the following scale:

Final mark	Letter	Symbol	Final mark	Letter	Symbol
95-100	Distinction	A	90-94	Low Distinction	A-
87-89	High Very Good	B+	83-86	Very Good	B
80-82	Low Very Good	B-	75-79	High Good	C+
70-74	Good	C	66-96	Low Good	C-
63-65	High Satisfactory	D+	60-62	Low Satisfactory	D
0-59	Fail	F			