04-56-113 – GENERAL PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	General Physics	**Course Number:**	04-56-113
Prerequisites:	None	**Units / Hours:**	3 / 4

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: 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			

04-56-152 – SOLID STATE PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Solid State Physics	**Course Number:**	04-56-152
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	2 / 2

COURSE DESCRIPTION

Atomic binding and crystal binding, crystal defects, tools for studying structure of solids x-ray diffraction, electron diffraction, electrical properties of solids, free electron model, band structure model, thermal properties of solids, thermal conductivity, thermal expansion, thermal electric power, optical processes in solids, optical materials, magnetic solids, and super conductors.

COURSE TEXTBOOK(S)

Introduction To Solid State Physics, Charles Kittel, (Wiley).

RECOMMENDED TEXTS & OTHER READINGS

Solid State Physics. Neil W. Ashcroft, N. David Mermin. Brooks Cole. 1st edition (1976).

PART II: COURSE OBJECTIVES

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

1. The student will be able to have good understanding the concepts of solid state physics.
2. The student will be able to manipulate and differentiate the types of atomic bonding and its controlling the types of solids.
3. The student will be able to understand the different crystalline structures and crystal systems.
4. The student will be able to good understanding of how to calculate Miller indices and find the d-spacing of the crystal lattice.
5. The student will be able to manipulate and solve for structure of solids.
6. The student will be able to manipulate the reciprocal lattice and its concept.
7. The student will be able to extract the crystalline system and the d-spacing of a solid.
8. The student will be able to understand the importance of Bragg's diffraction law for solving the structure of a solid.
9. The student will be able to differentiate between crystalline and non-crystalline structures and their applications.
10. The student will be able to understand the function of electron microscope as a sensitive and accurate tool for investigating solids.
11. The student will be able to differentiate between free electron model of metals and bad energy model for semi-conductors.
12. The student will be able to know brief notes on different properties of solids and its applications.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction
2	Atomic bonding and binding energy. I
3	Atomic bonding and binding energy. II
4	Crystal structure, crystal systems and crystal lattice,
5	Miller indices and reciprocal lattice
6	Crystal defects and imperfections
7	Crystalline materials, Non-crystalline materials & Nanocrystals.
8	Tools for studying structure of solids
9	X-ray diffraction, Electron diffraction, Neutron diffraction & Electron microscope
10	Conduction in Solids. (Free electron model -metals)
11	Band structure model (semiconductors)
12	Optoelectronic processes in solids & optical materials
13	Magnetic solids
14	Superconductors

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			

04-56-160 – ELECTRICITY AND MAGNETISM

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Elecricity and Magnetism	**Course Number:**	04-56-160
Prerequisites:	None	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Electric Charge, insulators and conductors, electroscope, Coulombs law, the electric field, electric flux, Gauss's law, electric potential, potential difference, potential energy, electric current, Ohm's law, resistance, resistivity, resistors in series, resistors in parallel, electric power, Kirchhoff's laws, capacitors, emf, potentiometer, magnets and magnetic field, magnetic force on electrical charge, magnetic force on wire carrying current, force between two parallel wires, ampere's law.

COURSE TEXTBOOK(S)

Fundamentals Of Physics, David Halliday, Robert Resnic.

RECOMMENDED TEXTS & OTHER READINGS

FUNDAMENTALS OF ELECTRICITY AND MAGNETISM. MCGRAW-HILL SERIES.

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 electrostatic and electric current.
2. The student will demonstrate an ability to manipulate and solve the electric force equation and its application.
3. The student will demonstrate an ability to apply Coulomb's law and Gauss's law including their different applications.
4. The student will demonstrate a good understanding of the concept of electric potential difference and potential energy.
5. The student will demonstrate a good understanding of electric current, Ohm's law, and Kirchhoff's law.
6. The student will distinguish between resistors in series and parallel.
7. The student will be able to distinguish between resistors and capacitors in electrical circuits.
8. The student will learn the basic of magnetism and demonstrate a good understanding of magnetic force on a current.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Electric charge, insulators, conductors
2	Electroscope, coulombs law
3	Electric field and Electric flux
4	Electric potential
5	Potential difference
6	Electric current, Ohms law
7	Resistance in series and parallel
8	Electric power
9	Kirchhoff's laws
10	Capacitors
11	Electromotive force (emf)
12	Magnets and magnetic field
13	Magnetic force on electric charge
14	Magnetic force on wire ccarrying current

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			

04-56-165 – THERMAL PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Thermal Physics	**Course Number:**	04-56-165
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Temperature and thermometers, temperature scales, temperature measurements, thermocouples, thermal expansion of solids and liquids, kinetic theory of gases, the gas law and absolute temperature scale, heat and internal energy, heat capacity and specific heat, heat latent, mechanical equivalent of heat, heat transfer by conduction, convection and radiation, Stefan-Boltzmann law, the first law of thermodynamics, second law of thermodynamics, reversible and irreversible processes, entropy.

COURSE TEXTBOOK(S)

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

RECOMMENDED TEXTS & OTHER READINGS

Thermal Physics: Thermodynamics and Statistic. Robert Floyd Sekerka (Elsevier Inc., 2015).

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 conversion between temperature scales.
2. The student will learn different method of temperature measurements.
3. The student will demonstrate a good understanding in solid and liquid expansion.
4. The student will learn the kinetic theory of gases.
5. The student will demonstrate a good understanding in heat and internal energy.
6. The student will demonstrate a good understanding in heat capacity, specific heat, latent heat and mechanical equivalent of heat.
7. The student will learn about heat transfer by conduction, convection and radiation.
8. The student will demonstrate an ability to apply the first law of thermodynamics.
9. The student will demonstrate an ability to apply the second law of thermodynamics.

04-56-166 – OPTICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Optics	**Course Number:**	04-56-166
Prerequisites:	None	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Properties of light, geometrical optics, spherical mirrors, thin lenses, thick lenses, physical optics, interference, diffraction and polarization of light, applications.

COURSE TEXTBOOK(S)

Physics: Principles With Applications, Douglas C. Giancoli, (Douglas C. Giancoli).

RECOMMENDED TEXTS & OTHER READINGS

College physics, Raymond A. Serway/Chris Vuille.

PART II: COURSE OBJECTIVES

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

1. Solve problems involving geometrical and physical optics.
2. Formulate laws of geometrical optics by means of formulae and describes them.
3. Explain how the images arise in lenses, mirrors, prisms and simple optical systems.
4. Propose and perform a simple experiment in geometrical optics and to interpret its results.
5. Apply the laws of reflection and refraction to plane and spherical surfaces and discuss the principles of various optical instruments.
6. Explain wave propagation of light, interference, diffraction, and polarization of light waves, and the electromagnetic nature of light.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Reflection law (Plane mirrors)
2	Spherical mirrors (Main equation)
3	Refraction law (Snell's law)
4	The index of refraction
5	Critical angle and the total internal reflection
6	Thin lenses (Lens formula)
7	The lens maker's equation
8	Image produced by a system of two thin lenses
9	Wave nature of light (Huygen's principle)
10	The law of refraction (Use Huygen's principle)
11	Interference (Double – slits)
12	Diffraction (single slit)
13	Diffraction grating
14	Polarization (Malus's law and Brewster's law)

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			

04-56-167 – PROPERTIES OF MATTER

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Properties of Matter	**Course Number:**	04-56-167
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Introduction, meaning of structure and property concept (other properties of materials such as electrical, optical, magnetic and thermal properties of materials). classification of basic materials and comparison of their main physical properties, classification of advanced and smart materials with examples of its main properties, rotational motion of rigid bodies and center of mass concept, conservation of angular momentum, Newton's law of gravity. Moment of inertia of rigid body regular shapes and parallel axis theorem, rolling motion, velocity and acceleration of center of mass of rolling regular shapes, mechanical properties of materials, Young's, Shear, and Bulk moduli, Poisson's ratio, Stress – Strain curve, Hooke's law and deformation energy for ductile and brittle materials, how to calculate the stiffness, ductility and other mechanical parameters from stress- strain curve. Viscosity and viscous fluids, kinematics viscosity, applications of viscosity, surface tension, capillary tubes.

COURSE TEXTBOOK(S)

Materials Science And Engineering: An Introduction, William D. Callister Jr., David G. Rethwisch, (John Wiley and Sons).

RECOMMENDED TEXTS & OTHER READINGS

Foundation of Materials Science and Engineering. William F. Smith, Javad Hashemi. McGraw-Hill, Fifth edition (2009).

PART II: COURSE OBJECTIVES

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

1. Have a good understanding of the concepts of materials science and materials engineering.
2. Understand the electrical, thermal, optical and magnetic properties of materials.
3. Manipulate and differentiate the structures level of matter.
4. Understanding the different physical properties of matter.
5. Have a good understanding of rotational motion concept and its relation to the moment of inertia.
6. Manipulate and solve for center of mass equation and moment of inertia.
7. Understand stress-strain curve for mechanical properties of ductile and brittle materials.
8. Extract mechanical parameters of matter from stress-strain curve.
9. Understand the concept of deformation energy and stored energy.
10. Understand the concept viscosity and viscous fluids.
11. Understand and calculate the surface tension force for different fluids.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction (concept of material structure & material property)
2	Types of material structure
3	Crystalline structure (types & properties) I
4	Crystalline structure (types & properties) II
5	Electrical properties of Conductor materials & Applications
6	Electrical properties of Dielectrics materials (insulators) & Applications
7	Optical properties of materials (Absorption, Reflection, Transmission) & Applications
8	Thermal properties of materials (Thermal parameters characterizing)
9	Magnetic properties & magnetic materials I (Types of magnetic parameters)
10	Magnetic properties & magnetic materials II (types of magnetic materials & Applications)
11	Mechanical properties of materials I (Hooke's law of Elasticity & stress-strain curve)
12	Mechanical parameters of solid materials II. (Ductility, Stiffness & deformation energy)
13	Moment of Inertia, Center of Mass and Rotational motion
14	Viscosity, Viscous fluid & surface tension of a liquid

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			

04-56-168 – INSTRUMENTATION

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Instrumentation	**Course Number:**	04-56-168
Prerequisites:	04-76-105 Mathematics (1)	**Units / Hours:**	3/ 5

COURSE DESCRIPTION

Measurement system, dimensional analysis, error analysis, systematic and random errors, graphical presentation of experimental data, curve fitting and regression analysis, fine measurements (Vernier caliber, micrometer, spherometer), ammeter, voltmeter, galvanometer, capacitors, solar cells, potentiometer applications, Wheatstone bridge, electrical resistivity, oscilloscope, electrical thermometers, different methods of temperature measurements, calibration methods, devices calibration.

COURSE TEXTBOOK(S)

Measurement And Instrumentation Principles, Alan S Morris, (Butterworth-Heinemann Publisher).

RECOMMENDED TEXTS & OTHER READINGS

Measurement and Instrumentation. U. A. Bakshi, A. V. Bakshi. Technical Publications Pune. First edition (2009).

PART II: COURSE OBJECTIVES

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

1. Demonstrate a good understanding of the concepts of dimensional analysis.
2. Demonstrate an ability to apply the conversion methods for units of different physical quantities.
3. Be able to carry out error analysis as well as regression analysis.
4. Demonstrate an ability to distinguish between random errors and systematic errors.
5. Learn the basics of graphical presentation of experimental data and curve fitting.
6. Learn how to use fine measurements (Vernier caliber, micrometer, spherometer).
7. Demonstrate a good understanding of the concepts of Electrical devices functions (ammeter, voltmeter, galvanometer, potentiometer).
8. Demonstrate an ability to determine the electrical resistivity for different materials.
9. Learn how to use different methods of temperature measurements.
10. Demonstrate a good understanding of the concepts of calibration of different devices.
11. Learn how to calibrate different devices.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Measurement system and change units from one system to another
2	Introduction of Dimensional Analysis and dimensional homogeneity
3	Derive relation between physical quantities in physical phenomena
4	Error analysis , types of errors and sources of errors
5	Statistical analysis of random errors
6	Aggregation of measurement system errors and Propagation of errors
7	Graphical presentation of experimental data
8	Curve fitting and regression analysis
9	Fine measurements (Vernier caliber, micrometer, spherometer)
10	Electrical instruments and applications
11	Electrical resistivity and applications of oscilloscopes
12	Thermometers, different methods of temperature measurements
13	Calibration methods
14	Calibration methods

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			

04-56-169 – RADIATION PHYSICS (1)

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Radiation Physics (1)	**Course Number:**	04-56-169
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	3/ 4

COURSE DESCRIPTION

Introduction to nuclear physics, natural radioactivity and emission of charged particles, radioactive decay series, interaction of radiation with matter, nuclear fission & nuclear fusion.

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 (2013).

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 different radiation in nature.
2. The student will distinguish the difference between Ionizing and nonionizing radiation.
3. The student will learn the basics of the Atomic Structure and Property.
4. The student will learn the basics of different Force in nature.
5. The student will demonstrate an ability to apply the binding energy equation in different Radiation Unites.
6. The student will distinguish between different Radiation Alpha, Beta and Gamma decay series.
7. The student will demonstrate an ability to apply the Half-life of different material.
8. The student will demonstrate the breakdown of different radioactive decay.
9. The student will demonstrate a good understanding of Nuclear Energy.
10. The student will distinguish between different Radiation detection methods.
11. The student will demonstrate a good understanding of Nuclear Fission and Fusion systems.
12. The student will distinguish between different Nuclear Reaction and Electron transmission system.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Different type of Radiation
2	Ionization and non ionization radiation
3	Structure and property of Atom, Proton. Neutron , Electron
4	Isotopes
5	Binding Energy and nuclear force
6	Alpha decay
7	Beta decay
8	Gamma decay
9	Half life and rate of decay
10	Radiation detection methods
11	Nuclear Reactions And Electron transmutation
12	Nuclear fission
13	Nuclear fusion
14	Different type of Radiation

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			

04-56-202 – PHYSICAL ELECTRONICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Physical Electronics	**Course Number:**	04-56-202
Prerequisites:	04-56-160 Electricity and Magnetism	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Introduction to electronics (atom, materials used in electronics, current in semiconductors, N-type and P-type of semiconductors, PN junction, FW biasing and R biasing, diode operation, voltage cur devices rent characteristics, diode models, half wave rectification and rectifiers, full wave rectification and rectifiers, power supply filters and regulators, diode limiters and clampers, voltage multipliers, diode data sheet, zener diode, zener diode application, optical and other types of diode, BJT structure and operation, BJT characteristics and parameters, BJT as an amplifiers, BJT as a switch, Transistors categories and packaging.

COURSE TEXTBOOK(S)

Electronic Devices, Thomas. L . Floyd, (PEARSON).

RECOMMENDED TEXTS & OTHER READINGS

Electronic Devices and Circuit Theory, Robert Boylestad and Louis Nashelsky (Prentic Hall international).

PART II: COURSE OBJECTIVES

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

1. The student will demonstrate the ability to define valence electron.
2. The student will demonstrate the ability to define insulators, conductors and semiconductors.
3. The student will be able to define the band gap, conduction band and valence band.
4. The student will demonstrate the ability to describe how current is produced in a semiconductor.
5. The student will be able to describe the properties of n-type, p-type semiconductor.
6. The student will demonstrate the ability to describe how a PN junction is formed.
7. The student will be able to define barrier potential and its value in silicon and germanium.
8. The student will demonstrate the ability to define forward bias.
9. The student will demonstrate the ability to explain and analyze the 1/2 wave rectifiers.
10. The student will demonstrate the ability to analyze the operation of a full wave rectifier.
11. The student will demonstrate the ability to explain the operation of limiters clampers.
12. The student will demonstrate the ability to explain zener diode operation and regulation.
13. The student will demonstrate the ability to describe the basic characteristics and application of LED diode and photodiodes.
14. The student will be able to analyze BJT circuits and how a BJT is used as a voltage amplifier.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction to semiconductors.(Atom, energy levels, band energy)
2	N-type, P-type and PN junction (Barrier potential, biasing of PN-junction)
3	Models of diode
4	Zener diode
5	½ wave rectification
6	Full wave rectification
7	limiters
8	Load and line regulation of voltage
9	RC filter and clampers
10	Voltage multipliers circuits
11	Different types of diodes
12	BJT structure
13	Equivalent circuit of BJT, load line analysis, PDmax.
14	Amplification Using a BJT

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			

04-56-203 – MODERN PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Modern Physics	**Course Number:**	04-56-203
Prerequisites:	04-56-166 Optics	**Units / Hours:**	3/ 4

COURSE DESCRIPTION

This course is an introduction to a broad range of topics in Modern Physics. The course covers the special theory of relativity, properties of the electron, Planck's quantum hypothesis, black body radiation, photon theory of light and photoelectric effect, energy, mass and momentum of a photon, Compton effect, photon interactions; pair production, wave particle duality; wave nature of matter, early models of the atom, atomic spectra, Bohr model, quantum mechanical view of atoms, quantum numbers for atoms, X-ray spectra and atomic number, fluorescence, phosphorescence, lasers, molecular spectra, rotational and vibrational energy levels in molecules.

COURSE TEXTBOOK(S)

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

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

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

1. Demonstrate understanding of the scientific method of work and the evolution of physics from the classical to its modern era.
2. Demonstrate an understanding of the basic principles of the special theory of relativity.
3. Demonstrate knowledge and understanding of electric and magnetic phenomena in everyday life.
4. Discuss the nature of light and the electromagnetic spectrum and outline practical applications.
5. Demonstrate the ability to define the discrete spectra and continuous spectra.
6. Conduct angular momentum operation and summation for orbital angular momentum and spin.
7. Demonstrate the ability to explain the difference between an energy level of a single isolated atom and energy levels of a molecule.
8. Demonstrate the ability to know that vibration of a molecule creates rotational energy levels.
9. Qualitatively describe the bonding scheme and its general physical properties and applications.
10. Will be able to competently solve appropriate problems in upper-level physics courses using increasingly important computational and mathematical tools, such as Excel.
11. Will demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Postulates of the Special Theory of Relativity
2	Time Dilation and Length Contraction
3	Mass and Energy
4	Blackbody Radiation
5	Compton Effect and Pair Production
6	Atomic Spectra and Bohr Model
7	De Broglie's Hypothesis
8	Quantum Mechanics of the Hydrogen Atom: Quantum Number
9	The Periodic Table of Elements
10	X-Ray Spectra and Lasers
11	Band Theory of Solids
12	Structure and Properties of the Nucleus
13	Molecular Spectra
14	Revisions

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			

04-56-205 – BIOPHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Biophysics	**Course Number:**	04-56-205
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Applications of physics laws and physical phenomena in the human body. Stability & Equilibrium in the human body. Levers and its applications on the muscles. Principles of Waves and Sound. Production and pressure variation of the human voice. Model of human voice production. Physics of the human ear. Electrical potential of muscle and nerve cells. Membrane potential of the cell. Equivalent of the electric circuit of the human cell. Osmotic pressure and fluid mechanics. Viscosity and surface tension in the human body. Physics of the human eye. Defects of vision and its treatment.

COURSE TEXTBOOK(S)

Physics In Biology And Medicine, Paul Davidovits., (Academic Press).

RECOMMENDED TEXTS & OTHER READINGS

None.

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 different types of forces in nature.
2. The student will distinguish the difference between three different type of levers and its examples in our body.
3. The student will learn the basics of the human body structure from the physics view.
4. The student will learn how to distinguish the physical systems in the human body (e.g. sound sys., vision sys., muscles sys., mechanical and lever sys, nerve sys., pressure sys)
5. The student will demonstrate an ability to apply different lever system to different parts of human body.
6. The student will distinguish between force, work, and pressure in the human body.
7. The student will demonstrate a good understanding of the human anatomy and how it functions.
8. The student will demonstrate a good understanding of vision system, hearing system and cardiovascular system.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction to biophysics
2	Stability & Equilibrium in human body.
3	Levers and its applications on muscles.
4	Principles of Waves and Sound.
5	Production and pressure variation of human voice.
6	Model of human voice production.
7	Physics of the human ear.
8	Electrical potential of muscle and nerve cells.
9	Membrane potential of the cell.
10	Equivalent of the electric circuit of the human cell.
11	Osmotic pressure and fluid mechanics.
12	Viscosity and surface tension in the human body.
13	Physics of the human eye.
14	Defects of vision and its treatment.

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			

04-56-206 – COMPUTER APPLICATIONS IN PHYSICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Computer Applications In Physics	**Course Number:**	04-56-206
Prerequisites:	04-56-113 General Physics	**Units / Hours:**	3 / 5

COURSE DESCRIPTION

Importance of computers in physics, statistical analysis of data, regression analysis, teaching physics using computer, software packages to solve physics problems, computer applications in heat, waves, optics, electricity and magnetism, electronics, modern and nuclear physics, data acquisition systems.

COURSE TEXTBOOK(S)

1. An Introduction To Computer Simulation Methods: Applications to Physical Systems., Harvey Gould, Jan Tobochnik, Wolfgang Christian. CreateSpace Independent Publishing Platform. 3rd Edition (2017).
2. Java: A Beginner's Guide. Herbert Schildt. McGraw-Hill Education; 8th Edition (2018).

RECOMMENDED TEXTS & OTHER READINGS

Fundamentals of Java Programming. Mitsunori Ogihara. Springer Nature Switzerland AG (2018).

PART II: COURSE OBJECTIVES

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

1. The student will learn about the importance of computers in physics.
2. The student will be able to apply software package (Java).
3. The student will demonstrate a good understanding of Statistical analysis of data and regression analysis.
4. The student will be able to apply software package (Java) in solving heat problems.
5. The student will be able to apply software package (Java) in solving waves and optics problems.
6. The student will be able to apply software package (Java) in solving electricity and magnetism problems.
7. The student will be able to apply software package (Java) in solving modern and nuclear physics problems.
8. The student will demonstrate a good understanding of the structure and function of data acquisition systems.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction to Computers
2	Importance of Computers in Physics
3	Software Packages
4	Java Programming
5	Object-Oriented Programming
6	Java Applets
7	Statistical Analysis of Data
8	Graphical Presentation of Data
9	Electricity and Magnetism Problems
10	Heat and Thermodynamics Problems
11	Waves and Optics Problems
12	Modern and Nuclear Physics Problems
13	Structure of Data Acquisition Systems
14	Function of Data Acquisition Systems

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			

04-56-208 – WAVES AND SOUND

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Waves and Sound	**Course Number:**	04-56-208
Prerequisites:	04-76-106 Mathematics (2)	**Units / Hours:**	3 / 4

COURSE DESCRIPTION

Wave terminology, waves characteristics, energy transmission, superposition, reflection of waves, standing waves (applications), sound waves, speed of sound, quality of sound, interference of sound waves, beats (applications), shockwaves and sonic boom, production and reception of human sound, ultrasonic applications.

COURSE TEXTBOOK(S)

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

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

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

1. The student will be able to demonstrate concepts of formation of waves.
2. The student will be able to assess concepts of superposition, reflection, diffraction and refraction.
3. The student will be able to solve problems involving standing waves.
4. The student will be able to analyze the characteristics of sound
5. The student will be able to determine the velocity of sound in air and liquid.
6. The student will be able to correlate Decibels to intensity.
7. The student will be able to identify the sources of musical sound.
8. The student will be able to employ interference of sound waves to explain Beats.
9. The student will be able to apply Doppler Effect.
10. The student will be able to clarify how shock waves and sonic boom are produced.
11. The student will be able to analyze ultrasonic application.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Mathematics Review
2	Wave Motion
3	Types of Waves: Transverse and Longitudinal
4	Energy Transported by Waves
5	Intensity Related to Amplitude and Frequency
6	Reflection and Interference of Waves
7	Standing Waves; Resonance
8	Refraction and Diffraction
9	Characteristics of Sound
10	Intensity of Sound
11	Sources of Sound
12	Doppler Effect
13	Shock Waves and the Sonic Boom
14	Revision

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			

04-56-260 – OPTICAL INSTRUMENTS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Optical Instruments	**Course Number:**	04-56-260
Prerequisites:	04-56-166 Optics	**Units / Hours:**	3 / 5

COURSE DESCRIPTION

Introduction, optics of the eye, short and long sights, astigmatism, optical chart, wavelengths respond to the eye, common optical instruments, grating and prism spectrometer, the resolution in grating and prism spectrometer, Biots polariscope, the polarimeter, Michelson interferometer, the magnifiers, types of objectives, types of eyepieces, optical microscope, total magnification, types of microscopes, resolution in optical microscope, improvements in resolution, construction and operation of the electron microscope, types of electron microscopy.

COURSE TEXTBOOK(S)

Fundamentals Of Physics, David Halliday, Robert Resnick, Jearl Walker, (John Wiley & Sons, Inc.)

RECOMMENDED TEXTS & OTHER READINGS

Physics. Principles with Applications. Douglas C. Giancoli. Pearson Education Limited.

PART II: COURSE OBJECTIVES

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

1. The student will be able to understand the concept of defects of vision and solve problems for this section.
2. The student will demonstrate some common optical instruments.
3. The student will be able to understand the concept of resolution in prism and grating spectrometer.
4. The student will be able to distinguish between the different types of magnifiers, objectives and eyepieces.
5. The student will distinguish between the optical and electron microscopes.
6. The student will be able to calculate the total magnification in the optical microscope.
7. The student will be able to understand the concept of resolution in the optical and electron microscopes.
8. The student will demonstrate a good understanding of the concepts of the operation of electron microscopes.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction, optics of the eye.
2	short and long sights, astigmatism, solved problems.
3	Optical chart, wavelengths respond to the eye.
4	Common optical instruments.
5	Grating and prism spectrometer, solved problems.
6	Biots polariscope, the polarimeter.
7	Michelson interferometer, solved problems.
8	The magnifiers.
9	types of objectives, types of eyepieces.
10	Optical microscope, total magnification.
11	Types of microscopes.
12	Resolution in the optical microscope, improvements in resolution.
13	Types of electron microscopy, resolution in the electron microscope.
14	Construction and operation of the electron microscope.

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			

04-56-270 – RADIATION PHYSICS (2)

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Radiation Physics (2)	**Course Number:**	04-56-270
Prerequisites:	04-56-169 Radiation Physics (1)	**Units / Hours:**	2 / 3

COURSE DESCRIPTION

Sources of natural and artificial radiation. Application of ionizing radiation and radioisotopes in different fields in life, such as industrial and medical. Generation of energy using radiation and nuclear technology, types of nuclear reactors, radioactive environmental pollution, role of the radiation protection authority.

COURSE TEXTBOOK(S)

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

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

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

1. Be aware of the different applications of ionizing radiation in different fields.
2. Understand the application of nuclear power for the generation of energy.
3. Know the difference between radiation and nuclear energies for the generation of electricity for large and small scales.
4. Distinguish between different types of nuclear reactors.
5. Understand the effect of nuclear pollution and the role of the radiation protection authority.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction to Radiation with Emphasis on Ionizing Radiation
2	Sources of Natural and Artificial Radiation
3	Industrial Applications of Ionizing Radiation
4	Medical Applications of Ionizing Radiation
5	Diagnosis Radiology
6	Digital Radiology
7	Nuclear Medicine
8	Radiotherapy
9	Brachytherapy
10	Generation of Power Using Radiation Technology
11	Generation of Power Using Nuclear Technology
12	Nuclear Accidents
13	Radioactivity in Food and Other Stuff
14	Radiation Protection

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			

04-56-399 – FIELD TRAINING

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Field Training	**Course Number:**	04-56-399
Prerequisites:	04-56-169 Radiation Physics (1)	**Units / Hours:**	4 / 16

COURSE DESCRIPTION

Students are trained and they participate in the operations, repair and maintenance of the instruments concerned with the physical methods of analysis, for a period of fifty-six days (5 hrs/day). At the end of training the student submits a technical report, accompanied by a presentation, describing all details about the tests performed and technical information acquired.

COURSE TEXTBOOK(S)

None.

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

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

1. The student will be able to work in laboratories outside the college.
2. The student will apply what he learned in a real work environment.
3. The student will improve his skills in analyzing and interpreting data.
4. The student will improve his teamwork skills.
5. The student will apply safety standards set out by the work environment.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Introduction to course
2	On-Site Training
3	On-Site Training
4	On-Site Training
5	On-Site Training
6	On-Site Training
7	On-Site Training
8	On-Site Training
9	On-Site Training
10	On-Site Training
11	On-Site Training
12	On-Site Training
13	On-Site Training
14	Submission of Final Report and Group Presentations

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			

04-76-105 – 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.

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			

04-76-151 – PRINCIPLES OF PROBABILITY AND STATISTICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Principles Of Probability And Statistics	**Course Number:**	04-76-151
Prerequisites:	04-76-105 Mathematics (1)	**Units / Hours:**	2 / 2

COURSE DESCRIPTION

This course covers basic concepts of probability and descriptive statistics. Population, sampling, general frequency, measures of central tendency, and measures of dispersion are explored. Other topics covered include classical probability, empirical probability, probability distributions, Poisson approximation to the binomial distribution and normal approximation to the binomial distribution.

COURSE TEXTBOOK(S)

Introduction To Statistics, David Lane, Rice University, (David Lane).

RECOMMENDED TEXTS & OTHER READINGS

None.

PART II: COURSE OBJECTIVES

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

1. Use graphical and numerical techniques to study patterns.
2. Interpret information from graphical and numerical displays.
3. Simulate probability distributions including binomial and geometric.
4. Simulate sampling distributions.
5. Use the normal probability distribution to solve problems.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Population - Sampling - General Frequency - Distributions.
2	Histograms - Polygons - Pie Charts
3	Frequency Curves - Cumulative Frequency Distributions
4	Measures of Central Tendency: Mean, Median and Mode
5	Measures of Dispersion: Variance and Standard Deviation
6	Review Problems and Exam 1
7	Events - Mutually Exclusive Events - Classical Probability
8	Empirical Probability
9	The Addition Law - Independent Events
10	Conditional Probability
11	Probability Distributions: Binomial - Poisson - Normal
12	Poisson Approximation to the Binomial Distribution
13	Normal Approximation to the Binomial Distribution
14	Review Problems and 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			

04-76-156 – ADVANCED MATHEMATICS

PART I: COURSE INFORMATION

College:	Technological Studies	**Department:**	Laboratory Technology
Course Title:	Advanced Mathematics	**Course Number:**	04-76-156
Prerequisites:	04-76-106 Mathematics (1)	**Units / Hours:**	3 / 3

COURSE DESCRIPTION

This course prepares the students for the use of calculus. It covers the following topics: complex algebra, power and roots of complex numbers, functions of several variables, partial differentiation, vectors operations and properties, solutions of differential equations, including homogenous differential equations and first order linear differential equations, second order linear homogenous differential equation, initial value and boundary value problem.

COURSE TEXTBOOK(S)

Calculus: Early Transcendentals, Eighth Edition, James Stewart, (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. Perform the graphical representation of the complex numbers, Evaluate the powers and roots of complex numbers.
2. Recognize functions of several variables, Identify the partial differentiation of several variable functions.
3. Understand the concept of vectors, and vectors field, Perform vector operation.
4. Knowledge the definitions of differential equations, Evaluate the solution of differential equations using the separation of variables, calculate the solution of first-order differential equations.
5. use the general solution together with a pair of initial or boundary conditions to obtain, when possible, a particular solution of a linear constant-coefficient second-order differential equation.

PART III: OUTLINE OF TOPICS AND SEQUENCE

Week #	Topic
1	Definition of complex numbers-Graphical representation
2	Polar form
3	Powers and roots of complex number
4	Review Problems and Exam 1
5	Functions of several variable-Partial derivatives
6	Increments and differentials
7	Vectors operations and properties
8	Vector Field
9	Definition and solution of differential equations
10	Separable differential equations-Homogenous differential equations
11	Exact differential equations-First order linear differential equations
12	Review Problems and Exam 2
13	Second Order Linear Homogenous Differential Equation
14	Initial Value and Boundary Value Problem

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			