School of Engineering and Physical Sciences
Department of Mathematics and Physics

Course Name	Properties of Matter
Course Code	PHY 230
Course Credit Hours	3
Prerequisite	PHY 107
Course Objective	This course is designed to present a general view of the physical properties of macroscopic matter. By the end of this course, students would demonstrate the ability to analyze a variety of static and dynamic phenomena in real world.
Course Description	. Students apprehend the basics of elasticity, its constants and related energy expressions. They know about capillarity and surface tension as well as related applications. Students recognize the physics of diffusion phenomena through fluid and understand the basics of viscosity and flow through fluid and study different applications.
Method(s) of Instruction(s)	Interactive lectures, simulations

COURSE CONTENT BY TOPIC

Module #1	**Elasticity:** Hooke's Law, Elastic Constants of Isotropic Solids, Poisson's Ratio and Their Interrelations, Internal Elastic Potential Energy, Elastic Constants, Torsion of a Cylinder, Bending of Beams, Cantilever, Variation of Elasticity with Temperature
Module #2	**Surface Tension:** Surface Tension and Surface Energy, Adhesive and Cohesive Forces, Molecular Theory of Surface Tension, Pressure on a Curved Membrane of Uniform Tension, Soap Bubble, Capillarity, Angle of Contact, Surface Tension
Module #3	**Diffusion:** Kinetics, Diffusion, Brownian motion, Fick's law, Diffusion Coefficient (Diffusivity)
Module #4	**Viscosity:** Newton's Formula for Viscous Flow, Streamline and Turbulent Motion, Reynolds Number, Poiseuille's Formula, Coefficient of Viscosity, Capillary Flow Method, Stoke's Formula, Viscosity of Highly Viscous Liquids, Stoke's Method, Lubricants and its Application, Production and Measurement of Low Pressure, Rotary Pump, Knudsen Absolute Gauge, Application of Low Pressure
Module #5	**Fluid Dynamics:** General Concepts of Fluid Flow, Streamlines, Equation of Continuity, Bernoulli's Equation, Application of Bernoulli's Equation and Equation of Continuity, Coefficient of Viscosity, Critical Velocity, Poiseuille's Formula and its Correction
Actual contact hours: Lecture: 3 hours per week; 36 hours per semester	

TEXTBOOK REQUIREMENT

1. The Structure and Properties of Matter, Editors: Matsubara
2. Mechanics and Properties of Matter, R.C. Brown

ASSESSMENT STRATEGY AND GRADING SCHEME

NSU's grading and performance evaluation policies will be followed in assigning your grade. Please note that all final grades are subject to departmental review and approval. A guideline of course assessment is as follows-

Class Attendance	Assignments	Quiz	Midterm	Final
5%	10%	20%	30%	35%

MAPPING OF COURSE OUTCOMES

CLO-#	Outcome Types	Bloom's Taxonomy level (C- Cognitive, A-Affective, P-Psychomotor)	Delivery Method	Assessment Tools	
CLO#1	Analyze the deformation of a body due to tension, compression, pressure and shear.	C4, P3	Lecture, Demonstration and Discussion	Quiz, Assignment	Midterm Exam
CLO#2	Determine the surface tension in films separating liquid-liquid, liquid-gas or solid-liquid and relate different applications.	C2, P2	Lecture, Demonstration and Discussion	Quiz, Assignment	
CLO#3	Explain the molecular motion and interactions in liquid, interpret the result and its consequences.	C2, P2	Lecture, Demonstration and Discussion	Quiz, Assignment	
CLO#4	Apply the understanding of mechanics to interpret the fluid flow and describe different application.	C3, P3	Lecture, Demonstration and Discussion	Quiz, Assignment	Final Exam
CLO#5	Analyze different models used in fluid mechanics.	C4, P4	Lecture, Discussion	Quiz, Assignment	