



2 nd Year, 1 st Term					
Course Code	Course Title	L	T	P	C
Theory					
Hum 2127	Accounting and Economics	3	0	0	3
Math 2127	Vector Analysis and Linear Algebra	3	0	0	3
ME 2127	Solid Mechanics	3	0	0	3
MSE 2101	Crystallography	3	0	0	3
MSE 2103	Thermodynamics of Materials	3	0	0	3
Sessional					
ME 2120	Computer Aided Drawing	0	0	3	1.5
ME 2110	Machine shop	0	0	3/2	0.75
MSE 2102	Sessional on Crystallography	0	0	3/2	0.75
MSE 2108	Technical Writing and Presentation skill Sessional	0	0	3	1.5
Total					19.5

Distribution of Marks

i. Theory Courses:

Class participation, attendance and assignments	10 %
Class tests, Quizzes, Spot tests etc.	20%
Term Final Examination	70%
Total	100%

N.B. Students fail to attend 60% of the class will not allow to sit in the final exam in any circumstance.

ii. Independent laboratory/design/field work courses:

Class participation and attendance	10 %
Quizzes, Viva-Voce conducted in lab class	20%
Viva-Voce conducted centrally	20%
Performance and reports	50%
Total	100%

iii. Project/thesis (Continued for two terms):

a) At the end of 4th year 1st Term: 30% of the total marks to be evaluated as follows:

Presentation and (Viva-Voce conducted by a Viva-Voce committee)	10%
Supervisor	20%
Total	30%

b) At the end of 4th year 2nd Term: 70% of the total marks to be evaluated as follows:

Presentation and Viva-Voce (conducted by a Viva-Voce committee)	20%
Supervisor	40%
External examiner (any other teacher of the department/ a member of examination committee)	10%
Total	70%



2nd Year, 1st Term

Hum 2127 Accounting and Economics

Credit: 3.00

Contact hour: 3 hrs/wk

Referred textbooks:

- "Accounting and Finance for Non-specialists", by McLaney, E, Attrill, P.
- "Corporate Finance and Investment: Decisions and Strategies", by R. Pike and B. Neale
- "Economics", by Samuelson Nordhaus.
- "Principle of Economics" by K.K. Dewett.
- "Contemporary Engineering Economics" by Park, C.S.
- "Engineering Economics and Analysis" by Newman, D.G. and Lavelle, J.P.
- "Principles of Engineering Economy" by Grant, E.L.

Contents:

Accounting:-

Introduction to Accounting: Definition; Business Environment; Forms of business organization; Introduction to accounting; information systems; the use of the Accounting Equation; Accounting conventions and their use in the preparation of financial statements; Accounting equation; Business data processing Transaction; Double entry system of book-keeping.

Accounting Cycle: Journal; Ledger; Trial balance; Preparation of financial statement; financial statement analysis; Short-term and Long-term finance; Capital budgeting.

Taxation: Definition of tax; types of tax; Cannons of tax; Tax administration in Bangladesh; Tax holiday; Capital allowance; corporation tax; Tax credit; Depreciation of fixed asset, methods.

Cost account: Payroll account, material cost/inventory valuation.

Economics:-

Definition scope and methods; Demand supply and their elasticity's; Equilibrium analysis-partial and general; Consumer behavior; marginal utility; indifference curve consumer's surplus; Producer behavior; Iso-quant, iso-cost line; Factors of production function; Production possibility curve; Fixed cost and variable cost; Short run and long run costs, total average and marginal cost; Laws of return; Internal and external economics and diseconomies; Market and forms; Perfect and imperfect competition; Price output determination; National income analysis; Inflation.

Math 2127 Vector Analysis and Linear Algebra

Credit: 3.00

Contact hour: 3 hrs/wk

Referred textbooks:

- "Vector Analysis" by Murray P. Spiegel, Seymour Lipschutz, Dennis Spellman
- "Linear and Geometric Algebra" by Alan Macdonald
- "Vector and Geometric Calculus" by Alan Macdonald
- "Elementary Linear Algebra", by Ron Larson, David C. Falvo.

Contents:

Vectors: Review of Vector Differentiation; Vector Differential Operator, Gradient, Divergence, Curl and their elementary applications; Vector Integration: Line, surface and volume integrals; Integral theorem: Green's, Gauss's and Stoke's theorem; Curvilinear co-ordinates: Orthogonal coordinates, Spherical and cylindrical polar co-ordinates, Differential operations in orthogonal coordinates.

Linear Algebra: Review of Matrix algebra, Elementary Transformation: Rank of a matrix, elementary, Normal, Echelon and canonical forms of matrices, Inverse by elementary transformation; Solution of linear equations: homogeneous and non homogenous systems; Vector space and coordinate transformation; Null space; Quadratic forms; Matrix polynomials; Eigen values, eigenvectors and its properties, Caley-Hamilton theorem.



ME 2127 Solid Mechanics

Credit: 3.00

Contact hour: 3 hrs/wk

Referred textbooks:

- "Strength of Material" by Andrew Pytel and Ferdinand L. Singer.
- "Strength of Materials" by Nash, W. A. 3d ed. Schaum's Outline Series, McGraw-Hill
- "Strength of materials" by Gere and Timoshenko.
- "Mechanics of Materials" by BC Punmia
- "Mechanics of Materials" by R. C. Hibbeler.
- "Engineering Mechanics" by Popov.

Contents:

Structural Analysis: Simple trusses; the method of joints; Zero-Force members; the method of sections; Frames and Machines.

Center of Gravity and Centroid: Center of gravity; Centroid of area and volume; Composite bodies; Theorems of Pappus and Guldinus.

Moments of Inertia: Definition of moments of inertia for areas; Parallel axis theorem for an area; Radius of gyration of an area; Moment of inertia for composite areas.

Stress and Strain: Introduction; Analysis of internal forces; Tensile, compressive, bearing and shearing stresses; Stresses in thin and thick walled cylinders and spheres due to internal pressure circumferential and longitudinal stresses; Stress-strain diagram.

Statically Determinate Beams: Different types of loading and supports; Shear force and bending moment diagrams; Stresses in beams; flexure formula; economic sections; shear stresses in beams; general shear formula; variation of shear stresses in beams; Deflection of beams, double integration, area-moment methods.

Introduction to combined stress (principal stress; Mohr's circle)

Columns: Introduction; Critical load, slenderness ratio and classification of columns; Euler's formula, empirical formulas and secant formula.

Torsion: Introduction; Torsion formula; Angle of twist; modulus of rupture; Shaft couplings and helical springs; Analysis and design of solid and hollow shaft.

Riveted, bolted and welded connections.

MSE 2101 Crystallography

Credit: 3.00

Contact hour: 3 hrs/wk

Referred textbooks:

- "The Basics of Crystallography and Diffraction" by Hammond, Oxford University Press
- "Introduction to Crystallography" by Sands, Dover Publications
- "Structure and Bonding in Crystalline Materials" by Rohrer, Cambridge University Press

Contents:

Crystal structure and bonding: Crystals and construction of crystal structure; Voids in crystal; Types of bonding; Relationship between structure and position of an element in the periodic table; Ceramics structure spinel and inverse spinel; Example of few common crystal structures.

Symmetry and Crystal system: Crystal symmetry—two and three dimensional patterns and lattices, rotational symmetry, mirror symmetry, the symmetry of the fourteen Bravais lattices; Crystal system— Space/ Bravais lattice, Unit cell, Common unit cells, Packing density, Nearest neighbor calculation.

Describing lattice planes and directions in crystals: Miller indices of crystallographic planes; Indices of direction; Linear density; Identification of planes; Planar direction and density calculation; Angle between two planes.

The reciprocal lattice: Reciprocal lattice vector; Reciprocal lattice unit cell; Reciprocal lattice for cubic crystal; Brillouin zone.



Determination of crystal structure: Diffraction of light, The diffraction of X-Ray, Bragg's analysis of X-Ray; Bragg's law; X-Ray diffraction from single crystal and polycrystalline materials; The X-Ray diffractometer, Analysis of X-Ray results; The insight of X-Ray technique— X-Ray source, Recording technique, Peak broadening, Experimental sample; Neutron and Electron diffraction.

The stereographic projection: Construction of stereographic projection of a cubic crystal; Manipulation of stereographic projection—Wulff Net, Measurement of angles, Representation of symmetry on the stereographic projection; application of stereographic projection.

MSE 2103 Thermodynamics of Materials

Credit: 3.00

Contact hour: 3 hrs/wk

Referred textbooks:

- "Thermodynamics in Materials Science" by DeHoff CRC Press
- "Introduction to the Thermodynamics of Materials" by D. R. Gaskell, Taylor and Francis
- "Thermodynamics: An Engineering Approach" by Cengel and Boles, McGraw Hill

Contents:

Introduction: Importance of thermodynamics study; The concepts of state; Simple equilibrium; The equation of state of an ideal gas; Extensive and intensive properties; Phase diagram and thermodynamic components.

The structure of thermodynamics: Classification of thermodynamic systems and variables; classification of relationships; Criterion for equilibrium.

The laws of thermodynamics: First law of thermodynamics; Second law of thermodynamics; Combination statement of first and second laws; The third law of thermodynamics; Relationship between entropy transfer and heat absorbed.

Thermodynamics variables and relationships: Classification of thermodynamic relationship; Defining thermodynamics—Enthalpy, Helmholtz free energy, Coefficient relations; Maxwell relations; General strategy for deriving thermodynamic relations.

Equilibrium in thermodynamic systems: Thermodynamic formulation of a general criterion for equilibrium; Mathematical formulation of the general conditions for equilibrium; Findings equilibrium conditions for a unary two-phase thermodynamic system.

Unary heterogeneous systems: Structure of the unary phase diagrams in (P, T) space; Clausius-Clapeyron equation; Integration of Clausius-Clapeyron equation; Triple points.

Multicomponent homogeneous non-reacting systems (Solutions): Partial molar properties; Evaluation of partial molar properties; Relationships among partial molar properties; Chemical potential in multicomponent systems; Fugacities, activities, and activity coefficients, Behavior of dilute solutions.

Phase equilibrium in multicomponent heterogeneous system: Conditions for equilibrium in a multicomponent non-reacting heterogeneous system; Gibbs phase rules; The structure of phase diagrams; The interpretation of phase diagram; Application of phase diagram in materials science.

Thermodynamics of phase diagram: Gibbs free energy and thermodynamic activity; Free energy-composition (G-X) diagram; Construction of binary phase diagram; Three phase equilibria; Intermediate phases; Familiar with computer calculations of phase diagrams.

Multicomponent Multiphase reacting system: Reactions in a multiphase system; Richardson-Ellingham charts for oxidation; Oxidation in CO/CO₂ and H₂/H₂O mixtures; Predominance diagrams; Interpretation of predominance diagram.

ME 2110 Machine Shop Sessional

Credit: 0.75

Contact hour: 1.5 hrs/wk

Contents:

Practice of different operations on Lathe machine, Drilling machine, Milling machine, Shaper machine, Grinding machine etc. and acquaintance with hand and machine tools used in carpentry shop.



ME 2120 Computer Aided Drawing

Credit: 1.5

Contact hour: 3 hrs/wk

Contents:

Working drawing of machine elements using AutoCAD and Solidworks.

MSE 2102 Sessional on Crystallography

Credit: 0.75

Contact hour: 1.5 hrs/wk

Contents:

Experiments based on the course MSE 2101

MSE 2108 Technical Writing and Presentation Skill Sessional

Credit: 1.5

Contact hour: 3 hrs/wk

Contents:

Effective use of office tools in technical report writing, data interpretation and analysis, and presentation of the experimental results; Structure of the laboratory report; Oral presenting of experimental results in stipulated time; Plagiarism and bibliographic references.

MSE, KHULNA