National University (NU)

Syllabus for

Bachelor of Science (Hons) in

Textile Science & Technology (TST)

Session: 2018-2019

Detailed Syllabus

Year & Semester	**Total Credits**	**Theory (credits)**	**Practical (credits)**
1st Year: 1st Semester	21		
1st Year: 2nd Semester	21		
2nd Year: 3rd Semester			
2nd Year: 4th Semester			
3rd Year: 5th Semester			
3rd Year: 6th Semester			
4th Year: 7th Semester			
4th Year: 8th Semester			
Total credits			

National University (NU)
Syllabus for
B. Sc. (Hons) in Textile Science & Technology (TST)

Detailed Syllabus

1st Year 1st Semester:

Course Code	Course Title	Credit
510401	Textile Raw Materials-I	3
510402	Engineering Drawing- Lab	1
510403	Basic English	3
510405	Chemistry-I	3
510406	Chemistry-I Lab	1
510407	Physics-I	3
510408	Physics-I Lab	1
510409	Mathematics-I	3
511501	History of the Emergence of Independent Bangladesh	3
	Total =	**21**

1st Year 2nd Semester:

Course Code	Course Title	Credit
510411	Fundamentals of Polymer Science	3
510413	Mechanics of Materials	3
510414	Workshop Practice-Lab	1
510415	Business & Communicative English	3
510417	Physics-II	3
510418	Physics-II-Lab	1
510419	Chemistry-II	3
510420	Chemistry-II-Lab	1
510421	Mathematics-II	3
	Total =	**21**

B.Sc. in Textile Science & Technology (TST)
Detailed Course Content

First Year 1st Semester:

510401: Textile Raw Materials-I
Credit Value: 3 Credits

Introduction , definition and classification of textile fibres with examples.

Study of cellulosic fibres:

Cotton: Cultivation and Harvesting, Growth, Composition, Geographical distribution, Ginning, grading and classification, Physical and Chemical structure and properties, End uses.

Bast fibres: Cultivation and harvesting of different types of bast fibres with special reference to Jute and Flax, their growth, composition, Retting, Study of fibre ultimates, sorting, grading and classification, Physical and Chemical structure and properties, End uses.

Brief study of other types of cellulosic fibres such as leaf and fruit fibres.

Study of Protein fibres:

Wool: Growth, composition, Geographical distribution of main wool producing countries, Shearing, classing and sorting, Physical and Chemical structure and properties, End uses. Sources and types of other animal hair fibres.

Silk: Growth, composition, Sericulture and methods of production, Geographical distribution, Physical and Chemical structure and properties, End uses.

Reference book:

1. EPG Gohl& L.D. Vilensky (1999), Textile Science, 2nd Edition, CBS Publishers & Distributors.
2. Bernard P. Corbman (1983), Textiles Fiber to Fabric, 6th Edition.
3. Ashraful Islam (1998), Science of Textile Raw Materials, 1st Edition.

510402: Engineering Drawing-Lab

Credit Value: 3 Credits

Planning of drawing sheet, lettering, dimensioning, projection and its types,
Development of surfaces such as right circular cone, cylinder, prism, pyramid, cycloids, epi-cycloid, hypo-cycloids and involute of a circle.
Isometric projection of simple solids and its components, Pictorial projection in oblique and auxiliary plane.
First and third angle projection of elementary machine parts, Models or Pictorial.
Assembly drawing from orthographic projection and pictorial views, Sectional views.
Drawing of gear tooth profile, cam profile, Freehand drawing of different textile machinery parts, drawing of assemblies of textile machinery parts from given details.

510403: Basic English

Credit Value: 3 Credits

To provide the students with a detailed knowledge of English foundation enabling them to

- have further developed their practical English language skills and their knowledge about the language itself and how it is used
- have gained knowledge about cultures where English is the main language,
- and understand how English opens opportunities to develop communication between people, and create understanding and respect for other cultures
- have further developed their sociolinguistic and other communicative skills English, and which will also form the basis for their continued development as teachers
- use online resources and present and share information digitally

The foundation program is designed to give a comprehensive introduction to English as a second-level subject to students in their First year of teacher education, to students pursuing a Bachelor's degree, and to students who wish to study a single subject at this level.
This course is designed for the intermediate level students to improve all four language skills- listening, speaking, reading and writing. The course is divided into two parts, each dealing with one pair of skills- the speaking and listening is one pair and the reading and writing is the other. The students are introduced to strategies of each skill and are expected to use them in and beyond the course. They practice reading both fiction and non-fiction, writing in different genres, listening to tracks and presenting to audience.
The materials for the course are developed in line with the students' present knowledge and the level they are expected to achieve. Besides, active participation of the students in the class proceedings is encouraged and enforced to create better effect of learning.

Reference Books:

- Stephen Wilhoit, A Brief Guide to Writing from Readings, 5th edition.
- Lizbeth Bryant and Heather Clark, Essays on Writing.

510405: Chemistry-I

Credit Value: 3 Credits

General and Inorganic Chemistry:

Mass: Conversion of mass into energy, Mass number, Atomic mass unit, Mass defect. Decay of mass, Radioactivity. Half-life of radioactive elements, Binding energy.

Atomic Structure: Dalton's theory, Rutherford's atomic model, Bohr's atomic model, Quantum number, Pauli exclusion principle, Spectra.

Chemical Bond: Electronic theory of valency, Electrovalency, Co-valency, Co-ordinate Co-valency, Valence-bond theory, Molecular orbital theory, Co-ordination complexes, Chelate complexes.

Periodic Table: Periodic law, Classification of elements, Defects of periodic table, Application of periodic table, Oxidation number, Electro-negativity.

Metals and Non-metals: Difference between metals and non-metals, Principles of metallurgy, Methods for extraction of metals.

Acids, Bases and Salts: Modern theories of Acids and Bases, Bleaching powder, H_2O_2, HOCI, $NaClO_2$ SO_2, $_PH$, Buffer solution Indicators.

Chemical Reactions: Isomeric transformation, Condensation Polymerisation, Association, Dissociation, Decomposition, Synthesis, Methathesis, Neutralization, Hydrolysis, Aminolysis, Addition reaction, Pyrolysis, Chain reaction, Photo-chemical reaction, Exothermic reaction, Endothermic reaction, Electrophilic and nucleophilic reactions. Catalytic and induced reactions, Redox reactions.

Physical Chemistry:

Kinetic theory of gases: Vander Waal's forces and equation.

Thermodynamics: 1^{st} Law and 2^{nd} Law of Thermodynamics, Thermo-chemistry.

Chemistry of Dilute Solution: Osmotic pressure, Vant Hoff's theory of dilute solution, Raoult's law of vapour pressure lowering. Elevation of boiling point and depression of freezing point.

Homogeneous Equilibrium: Law of mass action, Thermodynamic derivation of law of mass action, Application of law of mass of action to chemical reactions. Heretogeneous equilibrium.

Chemical Kinetics: 1^{st} and 2^{nd} order of reactions, Mathematical formulation of the 1^{st} and 2^{nd} order of reactions. Methods of determination of the order of reaction.

Colloids: Classification, Preparation, Properties and Importance of colloids.

510406: Chemistry-I Lab

Credit Value: 3 Credits

Qualitative analysis of inorganic mixtures containing not less than three radicals including insoluble and interfering radicals:
Volumetric Analysis**:** (i) Acidimetry and Alkalimetry viz. Preparation of approximate $1M_2$ HCl. M/2 H_2SO_4 and 1M CH_3COOH solutions and their standardization, (ii) Preparation of standard alkali solution; analysis of oils and fats for (a) Acid value (b) Saponification value, (c) lodine value and flash point.

510407: Physics-I

Credit Value: 3 Credits

Properties of Matter: Friction-Laws of Friction, Co-efficient of Friction, Angle of Friction, Equilibrium of a body on an inclined surface due to friction.
Elasticity: Elastic and Plastic Bodies, Stress, Strain, Elastic Limit, Behaviors of a strained wire, Hooke's Law, Elastic constants, Experimental determination of Young's Modulus and Rigidity Modulus, Twisting of a cylinder, Torsional pendulum, Poisson's ratio, Limits of Poisson's ratio, Compressibility, Relation between elastic constants, Energy in a strained body, Variation of elasticity with temperature.
Moment of Inertia: Moment of inertia and its theorems, Moment of inertia of simple cases (Uniform rod, Solid cylinder, Sphere, Fly wheel), Determination of moment of inertia of a body.
Surface Tension: Molecular theory of surface tension, Demonstration of surface tension, Phenomena due to surface tension, Total surface energy, Surface energy in curved surfaces. Capillarity, Angle of contact, Determination of surface tension of water, Effect of temperature on surface tension.
Viscosity: Viscosity and its Co-efficient. Poiseuille's equation. Determination of the co-efficient of viscosity. Variation of viscosity with temperature. Relation between viscosity and friction, Importance of knowledge of viscosity.
Light: Wave theory, Huyghens's principle, Rectilinear propagation of light, Interpretation of laws of reflection and refraction by Huyghens's principle, Interference, Young's experiment, Determination of wave length of light by bi-prism, Newton's ring, Colours of thin films. Diffraction, Diffraction grating and its use. Zone plate, X-ray diffraction, Polarization, Polarization by reflection, Brewster's law, Double refraction, Nicol's prism, Polarimeter.

510408: Physics-I Lab
Credit Value: 3 Credits

Determination of: Elastic Constants by various methods, 'g' by Compound Pendulum, Moment of inertia of a wheel, Density of water at various temperature, Surface tension of water and mercury, Focal length of convex and concave lens by various methods, Refractive index of water by using plain mirror and convex lens, Angle of the prism by spectrometer, Wave length of light, Specific rotation of different solutions by means of polarimeter, Viscosity of water by capillary tube method.

510409: Mathematics-I
Credit Value: 3 Credits

Algebra: Determinants, Matrix, Rank of Matrix, Convergency and Divergency.
Trigonometry: Demoiver's Theorem, Deductions from Demoiver's Theorem, Complex Quantities, Gregory's Series, Summation of Series, Hyperbolic Functions.
Three Dimensional Geometry: Co-ordinates: Direction cosines, Projections, The Plane, The Straight Line, Sphere.
Differential Calculus: Functions, Limits, continuity, Simple Differentiation, Successive Differentiation, Expansion of Functions, Role's Theorem, Mean Value Theorem, Taylor's Series, Maclaurine's Series, Partial Differentiation, Indeterminant Forms, Maxima and Minima.

511501: History of Emergence of Independent Bangladesh
Credit Value: 3 Credits

This covers the history of Bangladesh.

First Year 2nd Semester :

510411: Fundamentals of Polymer Science
Credit Value: 3 Credits

Introduction and historical development of polymer chemistry, Basic concept of polymer science (Terms, definitions and scope), Classification of polymers and their description (Linear, branched, cross-linked, homo-polymers, co-polymers etc.), Raw materials (sources and their derivatives), Synthesis of Polymers (Mechanism of polymerization, Methods of

polymerization), Types of molecular weights (number average molecular weight, weight average molecular weight), distribution and measurements of molecular weights and study of molecular weight dependent properties (end-groups, viscosity etc.), Chemical and geometrical structure of polymer molecule (crystallization and melting of polymers, amorphous state-rheology, glass transition temperature, crosslinking, stereochemistry, transition, entropy elasticity etc.), Evaluation, characterization and analysis of polymers (chemical, spectroscopic, scattering, thermal, surface analyses etc.), Properties of polymers (mechanical, thermal, chemical, electrical, degradability etc.), Study of commonly used fiber forming polymeric materials, Depolymerization and Polymer recycling.

510413: Mechanics of Materials

Credit Value: 3 Credits

Definition of stress and strain. Various types of stresses and Strain - tensile, compressive, shear, Calculation of various stresses.
Hook's law of elasticity. Definition of modules of elasticity and rigidity. Analysis of typical stress strain curve for a ductile material showing yield points, breaking point, yield stress and ultimate stress; Poison's ratio.
Structure and properties of timber, metals and alloys (ferrous and non-ferrous), their properties and uses; Material in hostile environment (high temp. , sub-normal temp. and corrosion).
Mechanical properties of iron and steel; strain energy and resilience. breaking energy and toughness; hysteresis; Fatigue and endurance limit, time effect, creep and relaxation of stresses. hardness and its methods of measuring.
Plastic and rubber types, properties and uses.
Lubricant's Classification, properties and uses.

510414: Workshop Practice-Lab

Credit Value: 3 Credits

Identification and use of Hand tools and measuring instruments, Reamers, taps and dies, Bench Vice and Carpentry Tools, Makings of Models.

Identification, Use and Practices on Lathe, Drill, Grinder, Shaper, Planner, Circular saw and Milling Machine.
Sheet metal work– Cutting of sheet material to make some useful objects.
Metal joining processes – Soldering, Brazing, riveting, gas welding and electric arc welding.
Heat treatment of steel such as annealing, normalizing, quenching, tempering and surface hardening, sand moulds, core molding, pattern for casting, sand casting.

510415: Business & Communicative English

Credit Value: 3 Credits

This course attempts to develop the skill of students in exchanging message with the clients for development of mutual understanding need to enter into business deals. The course also focuses on the techniques of preparation of reports on business matters and the art of presenting it.

Introduction to Communication: Meaning-Nature- Scope-importance –Factors affecting Communication, Principles of Communication, Cultural Orientation in communication-Business and Social Communication-Barriers to Communication.

Methods of Communication: Written, Verbal-Nonverbal and electronic Communication.

Perspective of Communication: Downward, Upward, Horizontal, Diagonal , External , Internal , Formal , Informal/ Grapevine , Interpersonal, Personal , Organizational , group and Public Communication.

The Communication Process : Essential elements, One way versus Two- way Communication, different Models of the Communication process.

Communication Networks: Types, Selection of Networks, Characteristics and limitation.

Organizational Communication: Intra and Inter- organizational communication, tools of Internal Communication-memorandums, office Orders, Circulars: Inter-organizational communication- Business and Job letter, Writing and Application Letter, Preparing a CV/ Resume.

Non Verbal Communication: Symbols, gesture, Nods, Body Languages etc., Visual Aids in Communication.

Mass Communication: Importance, Media of Mass Communication- Mass Communication in the Business Enterprise of Bangladesh.

Effective Meeting: Meaning-Types of Meeting-Writing notice, agenda and minutes, Convening and Conducting meeting, Points of information, Points of order , Motions and Small Group communication.

Report Writing: Characteristics, Importance and Types of reports, Informal and Analytical Reports-Planning Business Reports-Preparatory Steps of writing Reports, Writing the Final Reports, Documentary Reports-Bibliography-Reference and Foot notes.

Common Business Abbreviations, Acronyms and Meaning and use of commercial terms. Short Essay writing on topics relating to business world and Comprehension and Precise writing.

Books Recommended:

1. Lesikar & Flatley : Basic Business Communication
2. Shirley Taylor : Communication for Business
3. Pal Rajendra & J.S. Korlahilli : Essentials of Business Communication

Md. Shibbir Ahammed 2005 2nd : Business Communication Manual.

510417: Physics-II
Credit Value: 3 Credits

Electricity and Magnetism:
Static Electricity: Electric Potential, Field, Intensity, Electrostatic induction, Gauss's theorem and its application, condensers and capacity of condensers.
Current Electricity: Growth and decay of the current, charging and discharge of the condenser. Equations of alternating current and voltage. Peak, R.M.S. and average value of alternating current and voltage. Power in A.C. Circuit. Flow of alternating current through inductance, Capacitance and resistance in series. Resonance in parallel circuit.
Magnetism: Intensity of Magnetization. Permeability, Susceptibility, Characteristics of diamagnetic, Paramagnetic and Ferromagnetic substances.
Heat and thermodynamics: Temperature and its measurements- Gas thermometers, Platinum resistance thermometer, Nature of heat. Specific heats of gases and their measurements. Kinetic theory of gases, Deviation of gas laws and Vander Waal's equation, Isothermal and adiabatic changes.
Heat and work: The first law of thermodynamics, Reversible and Irreversible Processes, enthalpy and heat capacity. The Carnot cycle, The Second Law of Thermodynamics, Entropy, Absolute temperature scale, Engines. Entropy and disorder. Clausius Clapeyron Equation, Refrigerator, Radiation and black body radiation and Compton's effect. Thermodynamic function, Helmholtz and Gibbs functions.

510418: Physics-II Lab
Credit Value: 3 Credits

Determination of (a) Co-efficient of linear expansion of solid, (b) Sp. Heat of solid and liquid (c) Thermal conductivity of metals, (d) Measurement of high temperature by thermocouple and Potentiometer.
Determination of (a) Resistance of a wire by P.O. Box (b) Specific resistance by meter bridge (c) Resistance of a galvanometer by half deflection method (d) E.C.E. of copper (e) Value of 'J' by electrical method.

510419: Chemistry-II
Credit Value: 3 Credits

Organic Chemistry:

Bonding Properties of Carbon: Tetra-covalency of Carbon, Hybridization of atomic orbitals of carbon.

Isomerism: Structural Isomerism, Chain isomerism, Positional isomerism, Functional group isomerism; Stereo-isomerism like geometrical isomerism and optical isomerism.

Aliphatic Hydrocarbons: Alkanes, Alkenes and Alkynes.

Derivatives of Aliphatic Hydrocarbons: General methods of preparation and important reactions of Alkylhalides. Mono-, Di-, and Tri-hydric Alcohols, Aldehydes, Ketones, Amines, Mono-Carboxylic acids and their Halides, Esters, Anhydrides and Amides.

Aromatic Hydrocarbons: Kekule's structure of Benzene, Orbital theory, Isomers and nomenclature, Orientation in Benzene derivatives, Electrophilic Aryl Substitution, Aromaticity.

Derivatives of Aromatic Hydro-Carbons: General methods of preparation and important reactions of Aromatic Amines and Amides, aromatic sulphonic acids, Aromatic Aldehydes, Ketones, Phenols, Carboxylic acids.

Carbohydrates: Mono-, Di-, and Polysaccharides.

Proteins**:** Classification and Properties of Amino acids.

510420: Chemistry-II Lab
Credit Value: 3 Credits

Detection of Elements: Carbon, Sulfur, Hydrogen, Nitrogen, Halogens, Oxygen in Organic compounds.

Identification of Organic compounds containing one functional group out of the following: Methyl Alcohol, Ethyl Alcohol, Isopropyl Alcohol, Tert. butyl Alcohol, Acetophenole, Acetaldehyde, Formaldehyde, Formic Acid, Acetic Acid, Oxalic Acid, Benzoic Acid, Acetone, Benzophenone, Aniline, Nitro-benzene, Chloro-benzene, Phenols, Picric Acid etc. (analysis should include the following: (i) Physical Examination, (ii) Physical Constants, (iii) Elemental Analysis of Detectable Elements, (iv) Solubility group with the following solvents only (a) Water, (b) 5% $NaHCO_3$ solution/NaOH, (c) Conc. H_2SO_4 (v) Classification Texts, (vi) Any specific tests for the above class of compounds.

Oxidation and Reduction Titration Involving: (a) Preparation and Standardization of $KMnO_4$ solution with Oxalic Acid or Sodium Oxalate, (b) Determination of Ferrous Iron with Standard $KMnO_4$ solution, (c) Preparation of standard $K_2Cr_2O_7$ solution and Determination of Ferrous Iron by using internal indicators, (d) Determination of available Chlorine in Bleaching Powder, (d) Determination of the Na_2CO_3 content of Washing Soda, (f) Determination of strength of H_20_2.

510421: Mathematics-II

Credit Value: 3 Credits

Integral Calculus: Methods of Integration, Integration by Parts, Integration of Rational Fraction, Special Types of Integration.

Differential Equations: Variables Separable, Homogeneous Equation, Exact Differential Equations, Linear Equations, Equations of First Order and First Degree, Eqn. Solvable for Y, Eqn. Solvable for X, Clairant's form, Linear Equation with Constant Coefficients, Inverse Operators. $F(D)Y=X$, $F(D)X=E^{ax}$, $F(D)Y=$ Sinax or Cosax. Particulars Integrals. Homogeneous Linear Equation, Orthogonal Trajectories.

Vector Analysis: Introduction of Vector Analysis, Scalar Product or Dot Product. Vector Product or Cross Product, Solution of Vector Equations. Applications of Vectors in Geometry.

Mathematical Methods: Fourier Series and Fourier Integral, Vector Calculus, Vector Function of Scalar Variables, Differentiation of Vector Function, Partial Derivatives of Vectors, Gradient, Divergence and Curl, Vector Integration, the Line Integral, The Surface Integral, The Volume Integral, Green "Theorem, Gauss" Divergence Theorem, Beta and Gamma Functions.