Undergraduate Course Descriptions for students of Textile Engineering

1914101 Calculus (I) 3 Cr. Sequences and series of real numbers, convergence tests, power series and radius of convergence, exponential and logarithmic functions, limits, limits at infinity, left and right limits, continuity, derivative, the differentiation rules, inverse function and its derivative, the derivative of non-algebraic functions, the derivative of trigonometric functions and their inverses, higher order derivatives, rolle's theorem, mean value theorem, cauchy mean value theorem, Taylor expansion, L'Hopital's rule, monotonic functions, extrema of functions, definite integrals, first properties, fundamental theorems of calculus, indefinite integral, techniques of integration, improper integrals, complex numbers.
2010115 Physics (I) 3 Cr. vectors, motion in one and two dimensions, dynamics of a particle, work, energy, conservative and non conservative forces, conservation of mechanical energy, centre of mass, conservation of linear momentum, collisions, rotational kinematics and dynamics, conservation of angular momentum, heat and first law of thermodynamics, heat transfer, kinetic theory of gases, entropy and second law of thermodynamics
2010116 Physics Laboratory (I) 1 Cr. Measurement methods, free fall, one Joul of energy, laws of motion in one dime ion, heat conduction, measurement of density, effective atomic number of air, longitudinal expansion, circular inertia, circular motion, compound pendulum, Saturated vapor pressure
2110103 General Chemistry 3 Cr. Stoichiometry, gases thermochemistry, atomic structure, solutions of acids and bases, electrochemistry, chemical kinetics.
2110104 Laboratory of General Chemistry 1 Cr. Independent laboratory work under the supervision of a facility member of the chemistry department.
1914107 Calculus (II) 3 Cr. Functions of several variables, graph and level set, cylindrical surfaces and surfaces of revolution, quadratic surfaces, limit and continuity of functions of several variables, partial derivatives, differentiability, the chain rule and implicit differentiation, the directional derivative, parametric curves and tangaent vector to a curve, tangent plane and normal line to a surface, extrema of functions of several variables, local and absolute extema, lagrange multipliers, double integrals, different types of domains in plane, change of variables in double integrals, double integral in polar coordinates, triple integrals, triple integrals on different types of domains in space, change of variables in triple integrals, triple integrals in cylindrical and spherical coordinates, line integrals, gradient field, green's theorem, surface integrals, the divergence theorem, Stock's theorem
2010125 Physics (II) 3 Cr. Coulomb's Law, Electric Field, Gauss's Law, Electric Potential, Capacitors, DC Electric Circuits, Magnetic Field, Ampere's Law, Faraday's Law, Inductance and RL Circuits, Maxwell's Equations, Electromagnetic waves.
1610102 Static 3 Cr. Static principles, Definitions, Newton's rules, Force complex (force, moment of a force, couple of forces), Forces equilibrium, Reactions in supports and structural connections in the conditio of two and three dimensions, Drawing free diagram in two and three dimensional systems, Equilibrium conditions in two and three dimensional structures, Constraints sufficiency, Analysis of different types of structures, Two dimensional trusses, Space trusses, Fames and machines, Distributed loads, Mass center and geometrical center, Geometrical centers of line, surface and volume, Pappus theorem, Beams under concentrated and distributed loads, Drawing diagrams of shear force and bending moment in beams, Moment of inertia of surfaces, Moment of inertia of composite surfaces, Product moment of inertia and rotation of axis, Using Mohr's circle, Cables, Cables under concentrated loads, Cables under distributed loads on horizontal line, Cables under distributed load due to cable weight.
2112063 Organic Chemistry 3 Cr. Structure and bonding, alkenes, alkenes, reactions and mechanisms, alkyl halides, stereochemistry, alkynes.
3412112 Polymer and Fiber Science 3 Cr. basic definitions about polymer and fiber science, classification of fibers according to the origin of production, use and length of fibers - basic concepts of polymers including: nomenclature of polymers, functional groups of polymers, inter -polymer forces of attraction polymer chains, degree of polymerization , polymerization processes and their classification, molecular weight and distribution of polymer molecular weight - requirements of fiber forming polymers including: hydrophilic, long, linear, orientatin, thermal properties (glass transition and melting temperature), crystalline and amorphous structure of polymer, mechanical properties - introduction of natural fibers (cotton, linen, wool and silk) and man-made (recycled cellulose, cellulose acetate, nylon, acrylic, polyester and elastomer) including how to produce fibers, chemical and physical structure of fibers, properties of fibers and application of fibers

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3414227 Fiber Science Laboratory 1 Cr. Fiber behavior under acidic conditions, fiber behavior under basic conditions, melting point of fibers and burning test, identification of chemical elements, microscopic identification of fiber, separation of dyes by chromatograph, staining tests with identifiers (Neocarmine W), solubility of fibers, quality analysis of fibers blend by solvents, quantitative analysis of blend fabrics by solvents.

1914251 Differential Equations 3 Cr. Introduction to differential equations, differential equations and mathematical modeling, classification of differential equations, first order differential equations, eparable and exact differential equations, integrating factor, linear equations, substitution in differential equations, Bernoulli equation, homogeneous equations, differential equations that can be converted to homogeneous equations, Riccati equations, Orthogonal trajectories, existence and uniqueness theorems of solutions of differential equations, second order differential equations, the theory of existence of solutions of second order linear equations, the method of reduction of order, second order linear equations with constant coefficients, Euler equation, second order non-homogeneous linear equations, the method of variation of parameters, the method of undetermined coefficients, linear equations of higher order, Laplace transform, Gamma function, inverse Laplace transform, applications of Laplace transform in solving linear differential equations, convolution integral, review of power series, power series method in solving differential equations, ordinary points, solutions for power series about ordinary points, Legender equation and properties of its solutions, regular singular points, Frobenius method, General solutions of linear equations about regular singular points in various cases, Bessel equation, system of differential equations, elimination method for solving linear systems of equations, eigenvalues-eigenvectors method in solving systems of equations

1612220 Strength of Materials (I) 3 Cr. General concepts of tensile and compressor stress-strain, safety concepts, axial loading generalized Hooke's law, torsion of circular & non-circular members, pure bending, bending with axial forces and shear stress in beams.

3412308 Applied Thermodynamic 3 Cr. Some concepts and definitions (A thermodynamic system and the control volume, Properties and state of a substance, Units (for mass, length, time and force), Energy, Specific volume and density, Pressure, Equality of temperature, The Zeroth law of thermodynamics), Properties of a pure substance (The pure substance, Vapor-liquid-solid-phase equilibrium in a pure substance, Independent properties of a pure substance, Tables of thermodynamic properties, Thermodynamic surfaces, The P-V-T behavior of Low-and Moderate-Density gases), Work and Heat (Definition of work, Work done at the moving boundary of a simple compressible system, Other systems that involve work, Definition of Heat, Heat transfer modes, Comparison of heat and work), The first law of thermodynamics (The first law of thermodynamic for a control mass undergoing a cycle, The first law of thermodynamics for a change in state of a control mass, Internal energy-A thermodynamic property, Enthalpy-A thermodynamic property, The constant-volume and constant-pressure specific heats, The internal energy, enthalpy and specific heat of ideal gases), The second law for thermodynamics (Heat engines and refrigerators, The second law of thermodynamics, The reversible process, Factors that render processes irreversible, The Carnot cycle), Entropy (The inequality of Clausius, Entropy-A property of a system, The entropy of a pure substance, Entropy change in reversible processes, Entropy generation, Principles of the increase of Entropy, Entropy change of a solid or liquid, Entropy change of ideal gases), Estimation of pure component properties (Critical data (including temperatures, pressures and volumes), Normal boiling point, Melting point and enthalpy of fusion, Standard enthalpy and standard Gi energy of formation, Vapor pressure, Liquid density, Enthalpy of vaporization, Ideal gas heat capacity, Liquid heat capacity, Liquid viscosity, Surface tension, Diffusion coefficients), Principles of solution thermodynamics: Theory and Application (Fundamentals property relation, The chemical potential and phase equilibria, Partial properties, Fugacity and Fugacity coefficient: Species in solution, The ideal solution model, Excess properties, Models for the excess Gi energy, Property change of mixing).

3412332 Fluid Mechanics 3 Cr. Fluids and their properties, pressure and head, Static forces on surfaces, buoyancy, motion of fluid particles and streams, momentum, energy equation and applications, two-dimensional ideal flow, behavior of real fluids, steady flow in pipelines and open channels, fluid machinery, dimensional analysis and similarity.

3412229 Technology of Fibers Production 2 Cr. Introduction of man-made fibers, primary and secondary properties of fibers, production trends of man-made fibers, polymer characteristics for fibers production, basic principles of fluid flow during fiber spinning, spin ability and flow instabilities, introduction of melt and solution spinning processes, melt-spinning plants, spin extruders, spinning pumps, spin packs for fiber spinning, quench cabinets, melt-spinning variables and conditions for continuous spinning, structure formation during melt-spinning, spin finishes for manufactured fibers, spin finish application techniques, spinning take-up machines, drawing of melt-spun fibers, high speed spinning and the spin-draw process, heat-setting of thermoplastic fibers, dynamic modeling of melt-spinning process, fundamental of solution-spinning, dry-spinning plants, solution wet-spinning plants, the process variables for solution-spinning, development of structure and morphology during solution-spinning

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2010126 Physics of Electricity Laboratory 1 Cr. Measurement of resistivity, Ohm's law, Kirchhoff's circuit laws, capacitors, oscilloscopes, Biot-Savart law, field lines and equipotential surfaces, effect of temperature on resistance, Lorentz force, Lenz's law, transformator, diode
1912291 Probability and Statistics For Engineers 3 Cr. Sample space, events, probability of an event, probability properties, conditional probability and independence, Bayes's rule, random variable, random vector, discrete and continuous probability distributions, joint probability distributions, moments, mean of a random variable, variance, covariance and correlation of two random variables, distribution of functions of random variables or random vectors, binomial and multinomial, hyper-geometric, negative binomial, geometric and Poisson distributions, uniform, Gamma, exponential, Chi-square, normal, Beta, lognormal, Weibull, t and F distributions, central limit theorem, point estimation, confidence intervals, statistical hypothesis, Chi-square test
1610206 Dynamic 3 Cr. Introduction of absolute and relative motion of particles in straight and curve lines, Introduction of Kinetics of particles including Newton's law, linear and angular momentum, motion relations, dynamic equilibrium, motion equations in rectangular, tangent and perpendicular of pass and polar systems, work, kinetic and potential energy equations, impact equations, Investigation of motion of rigid bodies in plane and space, Introduction of kinetics of rigid bodies, Introduction of mechanical vibration in free and forced vibration with or without damping
- **Textile Physical Chemistry 2 Cr.** Thermodynamics laws, solutions - kinetics, quantum chemistry, macromolecule physical chemistry.
- **Dyeing Process 2 Cr.** Definitions of colour and colorants and dye and pigment, classification of dyes, molecular structure of fiber and its effect on dye sorption, interaction between dyes and fibers, thermodynamic of dyeing, effect of temperature, equilibrium, activation energy, diffusion, chemical potential, standard affinity, standard heat and standard entropy of dyeing, dyeing theories, Donnan membrane model, electrical double layer, adsorption isotherms, Nernst, Langmuir, Freundlich, dyeing mechanisms, Beer-Lambert's law, Kinetics of dyeing, dyeing steps, Fick's law, Hill's diffusion equation, time of half dyeing, dye diffusion and aggregation, factors affecting colour fastness, colour fastness tests, blue and grey scales, depth of shade.
3412330 Fibers Physics 2 Cr. Sampling, molecular structure, fiber dimension (length and fineness), density, moisture content, moisture regain, swelling, mechanical properties, tensile strength, tensile modules, stress relaxation and creep.
3412331 Fibers Physics Laboratory 1 Cr. Introduction to molecular structure. Fiber dimensions, fiber density, moisture content, moisture regain, swelling, mechanical properties, tensile strength, tensile modules, stress relaxation, creep, thermal behavior.
1510158 Engineering Drawing I 2 Cr. Projection concepts. Drawing standards. Volume and surface analysis for drawing the third multiview projection. Isometric and demetric (oblique & nonoblique) projections. Types of sectional views. Industrial (Assembly and workshop) drawings. Dimensioning.
1710250 Electrical Engineering Fundamentals 3 Cr. Resistive circuit, transient circuit, sinusoidal analysis, the fuzzy concept, the sinusoidal steady-state response, Fourier transform analysis, DC and AC transformers, transformer concept, DC Machine, AC Machine and synchronous machine.
1730150 Computer Programming 3 Cr. Introduction to computer, algorithm and flow chart, C language including arithmetic and logic expressions, data types, Input output statements, control statements, pointers, functions and recursive functions, arrays, subprograms, strings, records and files.
1914252 Engineering Mathematics 3 Cr. Partial differential equations, boundary value problems, Fourier series, Fourier integrals, Fourier transform, Persevall's identities, introduction to Sturm-Lioville theory, generalized Fourier series, second order linear partial differential equations, Heat, wave and Laplace equations, homogeneous and non-homogeneous boundary value problems, field of complex numbers, elementary and generalized complex functions, limit, continuity and differentiability of complex functions, analytic functions, complex line and indefinite integrals, Laurent and Taylor series, residue theorem and its application, conformal mapping and its applications, some applications in engineering and sciences.
3414228 Spinning (I) 2 Cr. Concept of fiber fineness, yarn count, twist multiplier and yarn contraction. Spinning limit, spinning lines in carded and combed systems. Operating principles, theories and new developments in blowing machineries, carding and drawing
3414229 Spinning Workshop (I) 1 Cr. Concept of fiber fineness, yarn count, twist multiplier and yarn contraction. Spinning limit, spinning lines in carded and combed systems. Operating principles, theories and new developments in blowing machineries, carding and drawing
3414312 Weaving Preparation 2 Cr. Principles of winding technology, sizing, beaming, cone winding, bobbin winding, heat setting of twist.
3414313 Weaving Preparation Workshop 1 Cr. Principles of winding technology, sizing, beaming, cone winding, bobbin winding, heat setting of twist.

- Dyeing Process Laboratory 1 Cr. Dyeing methods of different dyes on different fibers, Physical chemistry of dyeing, dyeing methods, comparison between dyeing wool and nylon fibers by acid dyes, dyeing with mordant dyes on wool, comparison of dyeing cotton fibers with direct and reactive dyes, effect of different after treatments on wash fastness of cotton fibers, determination of direct dyes classes on cotton fibers, dyeing with sulphur dyes on cotton fibers, dyeing with solubilized vat dyes, effect of electrolytes on the dye absorptions on cellulose textiles, dyeing of vat dyes on cotton fibers, two- minute exhaustion, strike dyeing, effect of temperature and leveling agent, dyeing of wool and cotton fibers with indigo, test of migration and the test of wash fastness for the acid dyes on wool and nylon fibers and/or direct and reactive dyes on cotton fibers, Investigation into the compatibility of acid dyes on nylon fibers, comparison between the dyeing of synthetic fibers with disperse dyes, effect of retarders and dyeing temperature on the dyeing of acrylic fibers with cationic dyes, Physical chemistry of dyeing, determination of the apparent diffuse coefficient of a disperse dye on nylon 66 fibers, affinity and heat of dyeing of disperse dyes on a fiber, kinetics and dye absorption of acid dyes on wool fibers, determination of adsorption isotherms of direct dyes on cotton fibers and/or acid dyes on wool fibers, determination of the rate of dyeing of disperse dyes on polyester fibers, Dip-test in the dyeing of acrylic fibers with cationic dyes, investigation into the effect of salt and temperature on the rate of dyeing of direct dyes on cotton fibers, determination of the exhaustion and fixation of reactive dyes on cotton fibers, effect of acid on the wool dyeing with acid dyes.
3414310 Spinning (II) 3 Cr. Equalizing methods, ideal draft, blending (theory principles). Design features and operating principles of combing, roving and yarn manufacturing. Mechanics of twist insertion and Winding. New developments.
3414311 Spinning Workshop (II) 1 Cr. Equalizing methods, ideal draft, blending (theory principles). Design features and operating principles of combing, roving and yarn manufacturing. Mechanics of twist insertion and Winding. New developments.
- Knitting (I) 2 Cr. The Structure of weft knits, machine classification, the knitting elements, the mechanism of loop formation, loop varieties, basic knitted structures, fabric notation. Machine Elements, some aspects of fabric geometry and related factors.
3414335 Knitting Workshop (I) 1 Cr. The Structure of weft knits, machine classification, the knitting elements, the mechanism of loop formation, loop varieties, basic knitted structures, fabric notation. Machine Elements, some aspects of fabric geometry and related factors.
3418202 Mechatronics 2 Cr. Automation principles, control systems, sensors, functional parts, control and automation, error control, clothing mechateronic systems, examples
3414336 Conditioning in Textiles Production 2 Cr. Introduction to heating and ventilation and humidification, air thermodynamic properties, Air conditioning, Psychometrics charts, Heat transfer through building envelope, Heating Systems and ɜoilers, Refrigeration system, Different types of humidification, Air handling units in textile industry, Effect of moisture of properties of fibers, Air-conditioning requirements in manmade-fiber plants, Air-conditioning requirements in nonwoven plants, Air-conditioning requirements in spinning and weaving plants, Air-conditioning units in textile mills, Air pollution control in textile industry, Dehumidification.
3414328 Weaving (I) 2 Cr. A history and overview of weaving process, the elementary study of weaving process, the introduction of weaving process, the definition of woven fabrics parameters and their relation with weaving machine and weaving process, the method of determining woven fabric parameters on weaving machine, technical calculation of woven fabric, production calculation of weaving machine, evaluation and explaining the weaving elements in warp direction by considering theoretical and practical aspects, beat-up mechanisms, beat-up force and effective parameters, shed geometry and its parameter, shed formation mechanisms.
3414329 Weaving Workshop (I) 1 Cr. Weaving process, Shedding mechanism, cam dobby and jacquard, timing diagram of weaving machinery.
- Woven Fabric Design and Analysis 3 Cr. Classification of fabrics, basic designs and their subclasses, combined designs, Jacquard designs. Initial setup of weaving machineries such as drafting and lifting plan.
3412305 Finishing Processes 2 Cr. An introduction to textile finishing including definitions, aims and different method of classifications, preparation and functional finishes, chemical and physical and mechanical finishing, categorizing according to fastness, cotton goods preparation including shearing, singeing, desizing, scouring, bleaching using hydrogen peroxide and sodium hypochlorite, mercerizing, short explanation to batch and continuous process, a brief summary on washing, surfactants and water softening methods, synthetic fiber fabric preparatio and their blends with cellulosic fibers, a short introducing on wool fabric finishing with emphasizing on advanced processes such as contipress, continuous decatizing, super-finish and steam-shrink, brief explanation of functional finishing with related equipment and machineries.
- Knitting (II) 2 Cr. Knitting at a glance, classification of knitting, weft knitting elements and loop formation, general terms in weft knitting, needles classification (beard, latch and compound), basic weft knitting structures (miss, tuck and knit loop), flat bed knitting techniques, circular weft knitting machines and mechanism, design and design elements, single and double-jersey (plain, purl, rib, interlock and etc.), introduction to jacquard and jacquard

mechanism, quality aspects in weft knitting, warp knitting machines (tricot and raschel) and knitting elements, principles of loop formation in warp knitting. Warp-knitted stitches and structures, double needle bar warp knitting machines, let-off and take-up mechanism, development in knitting, yarn and its selection for knitting, application of electronics in knitting, yarn tension in knitting and its measurements, knitting related calculations, analysis and testing of knitted fabrics, relaxation treatments of knitted fabric.
3414407 Knitting Workshop (II) 1 Cr. The structure of warp knits, machinery classifications, basic designing principles and lapping movements, tricot knitting technology, Rachel knitting technology.
3414402 Weaving (II) 2Cr. Effect of woven fabric parameters of physical and mechanical properties of it, effective parameters on weft and warp crimp and crimp distribution, practical and theoretical explanation of warp let-off mechanism, warp beam calculation, practical and theoretical explanation of fabric take-up mechanism, fabric take-up calculation, general definition of weft insertion systems, detail explanation of projectile weft insertion system, calculation of projectile weft insertion system, detail explanation of rapier weft insertion system, detail explanation of air jet and water jet weft insertion systems, effective parameters on efficiency of air jet weaving machine, brief explanation of multi-phase weft insertions systems.
3414403 Weaving Workshop (II) 1 Cr. Let-off and take-up mechanisms, different methods of weft insertion namely projectile, water jet, air jet, and rapier, checking mechanisms, structure of woven fabrics and their parameters.
- Nonwoven Fabrics 2 Cr. This is a coursed intended to provide in depth understanding of wide range nonwoven textiles. The course begins with a concise introduction to subject of textile fabric formation and a brief comparison based on various aspects such as technology, costs and applications of nonwoven textiles with other type of conventional textiles are made. The course is basically divided into two main sections i.e. web formation and bonding. In the first section various methods of web formation such as dry, wet and polymer laying are discussed. In the second section various methods of web bonding including mechanical, chemical, thermal or their combinations are discussed. In each section relevant machines and mechanisms are introduced. Production of various non-conventional textile floor coverings including needled, tufted and woven type is explained.
3414330 New Spinning Systems 2 Cr. New spinning systems: rotor spinning, friction spinning, air jet spinning, hallow spindle, etc, machinery classification, yarn structure in various systems, physical and mechanical properties of yarns, theoretical aspect, operating principles, capabilities and limitations.
3414412 Quality Control in Textile 2 Cr. Introduction, definition of quality, aspects of quality, quality control sheets and data recording, histogram and data presenting methods, statistical distributions applicable in textile industries, sampling, Importance of sampling, sampling theories, hypothesis testing, estimation, confidence limit, estimation error percentage, control charts, basics of analyzing the control charts, principles and methods of fibers and yarn quality control, fiber evenness, fiber fineness, fiber tensile strength, fiber elongation at break, Fiber length, yarn mass irregularity, limit irregularity, Martindale equation, irregularity in compound yarns, irregularity index, added irregularity, analyzing irregularity types, spectrogram application, identifying the cause and place of faults, yarn hairiness, yarn crimp, yarn tensile strength, yarn elongation at break, sampling methods for yarn and fabric testing, number of samples, fabric surface irregularity, drape test, abrasion test, pilling test, breaking strength.
3414426 Factory Planning and Design 2 Cr. Production Design. Transportation. Location decisions. Basic layouts. Cellular layouts. Line balancing. Process layout. Job design. Operations strategy. Inventory design. Packaging.
- Long Staple Spinning 2 Cr. Animal fibers and their classification, wool preparation, long staple spinning systems and their differences, wool spinning mechanism, worsted and semi worsted mechanism and different methods of tow to tops conversion.
3412226 Polymer Chemistry 3 Cr. General properties of polymerization reactions, polycondensation reaction, chain polymerization, free-radical, cationic, anionic, stereo chemistry, copolymerization, other specialized metahods of polymerization.
- Spinning process 2 Cr. Principles of short-staple, long staple fibers, modern spinning systems, operating principles of relevant machineries, opening, cleaning, carding, drawing, combing, blending, equalizing, twisting.
- Spinning Workshop 1 Cr. Introduction and practical workon feeding, opening and mixing machine, Blow room, carding, pre comber drawing and lap former, combing, draw frames, flayer and ring spinning, rotor spinning, long staple spinning machine.
- Color Science 2 Cr. Radiometric and Photo metric Quantities and the Relation to Light, Fluorescence and Phosphorescence Phenomena, Interaction of Light and Objects, Beer-Lambert and Kubelka-Munk Theories, Black Body Radiator, Color Temperature, Artificial and Natural Light Sources, Light Efficiency and Light Rendering of Illuminants, Standard Illuminants, Eye Structure, Standard Observer, Surface Properties of Objects, Color Order Systems, Munsell System, CIERGB Color System and The derivatives, Color Mesurement Devices, Colorimeters and Spectrophotometers, Color Measurement and Color Control, Metamerism and Metamerism Indices, One Dimensional Color Systems, Whiteness Indices and Yellowness Indices, Principles of Color Mixing, Additive,

Subtractive and Partitive Color Mixing, Color Matching (Colorimetric and Spectrophotometric) Methods, Spectrophotometric Color Matching, single and Two Constants Theories
- Weaving Processes 2 Cr. This course is designed with aim of providing an adequate knowledge of woven fabric production to students of other than textile technology disciplines. The course begins with a very brief introduction to various methods of textile fabric formation with particular emphasis on woven fabric formation. Then various aspect of yarn preparation operations needed prior to weaving is discussed. This is followed by introduction of all the mechanisms involved in weaving process during which each mechanism is discussed in relatively considerable depth.
- Weaving Processes Workshop 1 Cr. This laboratory course is intended to compliment the textile technology (2) course and aims to create a practical understanding of the theoretical points relevant to both yarn preparation operations and weaving process. Machines and their mechanisms are demonstrated and students are required to do practical trials on the machines.
3412304 Textile Finishing (I) 2 Cr. Introduction to textile finishing, water purification, surfactants, preparation of cotton fabrics (shearing, singeing, desizing, scouring, bleaching, mercerizing) and preparation of polyester, polyester- cellulosic blend fabric, textile finishing machineries and mechanical finishing.
2118295 Analytical Chemistry 3 Cr. Acid-base, precipitation techniques, electrochemistry, spectroscopy.
- Principles of Dyeing 2 Cr. Dyeing of acetate, ploy amide and polyurethane, polyester, acrylonitrile, polypropylene and blends of natural and man-made fibers with different dyestuffs including the theory and practice.
- Principles of Dyeing Laboratory 1 Cr. Dyeing of acetate, ploy amide and polyurethane, polyester, acrylonitrile, polypropylene and blends of natural and man-made fibers with different dyestuffs including the theory and practice.
- Fibre Chemistry 2 Cr. Natural fiber classification including cellulosic and protein fibers. Carbohydrates and amino acids (Chemical structure, synthesizing, modification and identification)-Polysaccharides, polypeptides and proteins (chemical structures and properties, their chemical reactio against acids, bases, Oxidizing and reductive agent, UV and Enzymes - Chemical modifications for antibacterial, water repellency, fire protection. Regenerated and special natural fibers (Alginates, chitosan, casein, spider and …)
3412335 Fiber Chemistry laboratory 1 Cr. Studying chemical structure and properties of cellulosic and protein fibers. Cellulosic fibers are examined by their lignin content, degree of polymerization, qualitative and quantitative test such as copper number and solubility test for analyzing aldehyde content in cotton, regenerated cellulose and damaged. Amino acids identification by chromatography and electrophoresis methods, sulfur and wax content measurements and degree of damage is applied for protein fiber such as wool and silk.
3412336 Principle of Chemical Engineering 3 Cr. Material and energy balances, description of process equipment, fluid flow, heat transfer, distillation, absorption, humidification, drying, unit processes, economics and plant design.
3412328 Textile Finishing (II) 2 Cr. Mechanical finishing of cotton and wool fabrics (shearing, raising, calendaring, embossing, compressive shrinkage, pressing, decatising), chemical finishing of cotton and wool fabrics (weighing, stiffening, softening, flameproofing, water repellency, oil proofing, crease resist cotton, nonfelting and mothproofing of wool fabrics).
3412412 Printing 2 Cr. Definition of printing, history of printing, printing on different fiber structures, introduction to printing instruments, rotary, inkjet, transfer, introduction to direct and discharge and resist and one-step and two-step printing methods, whitening's, thickening agents, types and applications of thickening agents, steam and steam machines, printing on cellulosic goods including mechanism, theory, functions of the printing paste ingredients and fixation methods, printing on protein goods including mechanism, theory, functions of the printing paste ingredients and fixation methods, printing on goods consisting of synthetic fibers including mechanism, theory, functions of the printing ink ingredients, fixation methods, special printing techniques, pigment printing, introduction of digital textile printing, mechanisms of drop formation, pre- and post- treatments of digitally printed goods, review on color science, digital color management, device dependent and independent color spaces, principles of device characterization, evaluation methods of device characterization performance, characterization of printers and screens, color gamut, introducing printing software and hardware.
3412413 Printing Workshop 1 Cr. One phase printing of reactive dyes on one-hundred percent cotton fabric, two phase printing of reactive dyes on one-hundred percent cotton fabric, printing one-hundred percent polyester fabric with disperse dyes, printing one-hundred percent polyamide fabric with acid dyes, printing one-hundred percent acrylic fabric with cationic dyes, printing one-hundred percent cotton fabric with pigments, printing white and colored discharge on one-hundred percent cotton fabric dyed with reactive dyes, white and colored matt printing on one-hundred percent cotton fabric, white and colored burn out print on cotton- polyester fabric, white and colored foam printing on one-hundred percent cotton fabric, basics and application of a digital printing management software.
3412430 Principles of Dyes Chemistry 2 Cr. Dye theory (Conjugation, Molecular orbital theory,…)

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3412329 Textile Finishing Laboratory 1 Cr. Meauring water hardness, bleaching via hypochlorite and hydrogen peroxide, milling, shrinkproofing and cabonizing of wool fabric,analysis of surfactants, repellent finishing, flame retardant, crease resistant finish and mercerizing.
3412484 Effluents 2 Cr. Pollution and basic concepts of environmental pollution, general characteristics of waste, different types of water and the methods of water preparation for textile processes, textile industries pollutants including spinning and weaving and nonwoven factories, pollutants from dyeing and printing and finishing of textiles, conventional methods of physical wastewater treatments including coagulation and filtration and reverse osmosis and electro-filtration and micro-filtration, conventional methods of chemical wastewater treatments including electrochemical and advanced oxidation, conventional methods of biological wastewater treatments including aerobic and anaerobic, conventional methods of biochemical wastewater treatments, novel methods of water and chemicals recovery from wet and dry textile processes, green chemistry in textile processes, principles of design of wastewater treatment systems and the removal of wastewater to surface and subsurface resources, water recovery and the methods of removal and disinfection of treated wastewater, case study of a wastewater treatment textile plant containing dyes and finishing materials, applications of nanotechnology and biotechnology in textile wastewater treatment.
- Dyehouse Color Management 2 Cr.
3412302 Fiber Structure 2 Cr. Theories of fine structure of fibers, characterization methods for determination of fiber structure; such as optical and polarized microscopy, scanning electron microscopy (SEM, TEM), scanning probe microscopy (AFM, STM), wide angle x-ray diffraction (WAXS), small angle x-ray scattering (SAXS), thermal properties of fibers.
3412227 Polymer Chemistry laboratory 1 Cr. Polymer specifications, molecular weight, coating, synthetizing of nylon, elastomers etc.
- Principles of Polymer Rheology 2 Cr. classification of non-Newtonian fluids, experimental characterization, rotational and capillary viscometers, flow in pipes and channels, mixing characteristics, viscometer measurements and apparatus.
- Physical Chemistry of Polymer Solutions 2 Cr. Small-molecules solutions, ideal and real solutions, polymer solutions, solvent types for dissolution of polymers, thermodynamics of polymer solutions, solubility parameter, solvent-polymer interaction parameter (IP), solvent-nonsolvent IP, nonsolvent-polymer IP, measurement of IPs, theories of polymer solutions, Flory-Huggins theory, advanced theories of polymer solutions, chemical potential, calculation of chemical potential, osmosis phenomena, liquid-liquid phase separation, solid-liquid phase separation, phase separation mechanisms including nucleation and growth (NG), Spinodal decomposition (SD), binary and ternary phase diagrams, morphology prediction and control of polymer structures developed based on dry- / wet-casting and dry/wet-spinning**.**
- Textile Fibers Production Technology 2 Cr. Introduction to synthetic fibers(classification and statistic), melt and solution spinning concept, polymerization and spinning of fibers made from synthetic polymers(PET, Nylon 6, Nylon 66, Poly propylene, Acrylic), fibers made from natural polymers(viscose rayon, cellulose diacetate and triacetate, alginate fibers), post spinning treatment(Drawing, Heat treatment).
3412426 Texturizing 2 Cr. Description of texturizing and the properties bestowed by it to the flat continuous filament yarns, classification of texturizing according to the process involved as well as the kind of products obtained, Determination of the importance of texturizing in the synthetic fiber industry considering the world fiber production statistics , description of thermoplasticity and thermosetting properties of fibers in relation to their microstructure and highlighting the importance of first and second order transition temperatures in yarn texturing, description of setting in general terms and specifically heat setting together with its importance in texturizing, brief description of the obsolete and uncommon texturing methods, in depth discussion of the stuffer boxes used for crimping tow and their place in tow to top conversion lines, brief discussion on tow to top and tow to bale systems, in depth discussion on BCF production lines as well as finishing applied to them like heat setting and friezing, in depth discussion on false-twist, false-twist texturing machines and their products, in depth discussion on air jet texturing, its products as well as intermingling process and its applications.
3412372 Production Management 2 Cr. Introduction to Management, Decision making, factory design, product design, layout design, Calculation of energy consumption, Human resources organization, Work study, Time study, Inventory control, Quality control, Repair and maintenance, Forecasting, Break-even point analysis, Line balancing in textile industry, Facilities layout in Textile Industry, Increasing the Productivity of Textile Machines.
- Fundamentals of Clothing Design 1 Cr.
- CAD for Clothing Design 1 Cr.
- Color Physics and Psychology 2 Cr. Light incident upon the objects and diffraction, absorption, reflection, scattering and transmission phenomena, Fluorescence and phosphorescence phenomena, Investigation into surface characteristics of objects, Beer-Lambert's and Kubelka-Munk law, Black body, Colour temperature and natural and synthetic light sources, illuminants, Principle of colour vision, Standard observer, Colour order systems, Munsell system, NCS system, CIERGB system and other CIE colour spaces, Artistic aspects of colour, Principles of colour

measurement instruments, Colourimeters, Spectrophotometers, Colour measurement, Colour difference formulae, Metamerism, Principles of the calculation of metamerism indices, Colour rendering index, Uni-dimentional scales, Whiteness, yellowness and blackness index, Shade sorting techniques, Principles of colour mixing, Principles of colour matching in additive, subtractive and partitive colour matching systems, Principle of computer colour matching formulae.

- Technology of Garment Manufacturing (I) 3 Cr. Basic understanding of clothing production line and introduction of machinery used in production lines, Design and organization of the production process in various sectors, Effect of fabric pattern on the cutting marker, Fabric spreading and decreasing marker waste, effect of pattern count and sizing on cutting marker, cutting utilization, types of cutting marker wastes, effect of marker length and laying count on production planning, calculation of required layer count and cutting plan, encoding principles, effect of fabric properties on marker planning, pattern characterization and nesting methods, importance of sizing systems, introduction of cutting methods, production planning for determining of layers count according to capacity, types of lining and their potential application, lining formation technology, resins in fused layered fabrics, principles of fusing, Selection of resins, fusing technology, affecting factors on fusing quality, assessment of quality control of fused layers, fusing equipment, effect of temperature, time and pressure on fusing quality, lamination (principles and technology), applications of lamination in layerd clothing production, principles of industrial and protective clothing production.

- Technology of Garment Manufacturing Lab (I) 1 Cr. The measurement of the human individual (anthropometry), drawing the pattern on paper, introduction to different patterns (skirts, trousers, sleeves, collar, …), introduction to Gemini Pattern software (pattern making software), converting single pattern design to other sizes directly by software, introduction to marker making in Gemini Nest Expert, introduction to Gemini Cut Plan software, introduction to digitizer, introduction to plotter, introduction to cutting scissors, introduction to working procedures of continuous fusing press machine.

- Clothing Construction 2 Cr. Design principles, fashion and colors, anthropometric, sizing systems, sizing standards, pattern design

- Technology of Garment Manufacturing (II) 3 Cr. Different types of sewing machines, different types of mechanisms in sewing machines, sewing machine dynamics, different types of feed system, types of stitches, types of seams, needle, parts of a needle, types of needle for different applications, needle sizing methods, sewing threads for different applications, sewing thread properties, sewing threads finishing, fabric types, controllable items in sewing of different fabrics, geometrical shape of stitches, sewing defects, removal sewing defects, seam performance, seam strength, different types of sewing puckering, removal of puckering, introduction to unconventional methods of seaming ,i.e. welding, casting and using adhesive, basic concepts in press and influencing factors of clothing press, effects of pressure and vapor on physical and mechanical properties of fabrics in press and ironing, different types of press.

- Technology of Garment Manufacturing Lab (II) 3 Cr. Different types of sewing machines, different types of mechanisms in sewing machines, sewing machine dynamics, different types of feed system, types of stitches, types of seams, needle, parts of a needle, types of needle for different applications, needle sizing methods, sewing threads for different applications, sewing thread properties, sewing threads finishing, fabric types, controllable items in sewing of different fabrics, geometrical shape of stitches, sewing defects, removal sewing defects, seam performance, seam strength, different types of sewing puckering, removal of puckering, introduction to unconventional methods of seaming ,i.e. welding, casting and using adhesive, basic concepts in press and influencing factors of clothing press, effects of pressure and vapor on physical and mechanical properties of fabrics in press and ironing, sewing of an apparel item as a project.

3418213 Finishing Textile Products Lab 1 Cr. Meauring water hardness, bleaching via hypochlorite and hydrogen peroxide, milling, shrinkproofing and cabonizing of wool fabric,analysis of surfactants, repellent finishing, flame retardant, crease resistant finish and mercerizing.

3418220 Clothing Comfort 2 Cr. Basic Concepts of Comfort, Different Aspects of Clothing Physiological Comfort, Tactile Comfort, Assessment of Tactile Comfort, Thermo-physiological comfort, Liquid Water Tra ort Properties of Fabrics and Clothing, Garment Fit and Ease of Body Movement, Pressure comfort, Psychological Comfort of Fabrics and Garments, Assessment of Psychological Comfort, Factors Affecting Psychological Comfort, Effects of Color and Surface Texture, Effect of Garment Design, Effects of Garment Sizing and Fit, Fashion, Extreme Conditions and Hazardous Environments, Comfort parameters in Technical Garment, Technical Fabrics in Sport clothing, Protective Garment, Special Techniques in the Production of Protective Clothing for Thermal Insulation, Waterproof and Fire Retardants.

- Mechanical Properties of Textile Materials in Clothing 2 Cr. Introduction to textile materials in clothing and importance of their mechanical properties in clothing manufacturing and wear. Fibers: General concepts in mechanical properties of fibers, tensile properties, shear stresses, torsion and bending properties, compression, buckling and fatigue properties, mechanical & thermal failure. Yarn: Effect of physical structure and twist on the mechanical properties, tensile stresses and bending properties, blend yarns, sewing threads. Fabrics: structural

mechanics, investigation of structural parameters, interaction of mechanical properties of textile materials on fabric properties, tensile and bending properties, shear, compression and surface properties, drape, pilling, bagging, tearing, the effect of sewing parameters on the mechanical properties of cloth.
- Laboratory of Properties of Textile Materials in Clothing 1 Cr.
3414404 Woven Fabric Analysis and Calculation 2 Cr. Explaining different methods of determining structural parameters of woven fabrics, different methods of determining design of woven fabrics, Introducing and explaining different methods to determine the weave design of woven fabrics with more than one warp and weft system, different methods of measuring woven fabric parameters, weaving calculation.
- Motion and Time Study 3 Cr.
- Technical Fibers Production Technology 2 Cr.
- Resin Properties 2 Cr.
3414390 Technical Textiles (I) 3 Cr. Definition of technical textiles, classification of technical textiles based on ranking of Frankfuort Institute of Technical Textiles, methods of production of technical yarns, metal yarns, fancy yarns, tape yarns, monofilaments, cords, technologies of rope production, modeling of mechanical properties of ropes, methods of technical fabrics production in weaving systems, methods of production of technical nonwovens, calculation of theoretical strength in woven technical textiles, agrothech, buildtech, clothtech, geotech, mobiletech, packtech, protech, oekotech, sporttech, meditech, indutech, textiles in civil engineering, textiles in transmission and conveyor belts, nonwoven filter media, super absorbant textiles, multiaxial fabrics.
- Mechanics of Fibrous Composites 2 Cr. Basic concepts and definitions, composite classifications, specifications of fiber-reinforced composites, specifications of textile-reinforced composites, fibers and resins used in composite manufacturing, composite manufacturing processes, mechanical analysis of the fibrious composites, introduction to textiles, mechanical properties of textiles, shear in textiles, tension in textiles, internal structure of textiles, specifications of the composites reinforced with woven and knitted fabrics, specifications of the composites reinforced with braid, specifications of the composites reinforced with nonwoven, mechanical tests for composites, bending properties of textile composites, application of the fibrious compostes in different industries.
- Composites Workshop 1 Cr.
- Chemistry of Technical Textiles (I) 2 Cr. Introduction and classification of technical and smart textiles, chemical structural analysis, action mechanisms of technical and smart textiles, methods of measurement of properties, fabrication methods of bio and biological textiles, antibacterial textiles, anti-insects textiles, anti-pesticides textiles, functional medical textiles
- Chemistry of Technical Textiles (II) 2 Cr. Introduction and classification of technical and smart textiles, of protective textiles against environmental conditions such as temperature and humidity, protective textiles against chemicals such as gases and liquids and toxicants, fire proof textiles, UV resistant textiles, ballistic textiles, shape memory textiles sensitive to temperature and humidity and pH and light and electrical fields and applied stresses
- Technical Textiles (II) 2 Cr. Technical knitted fabric structures terms and definitions, limitations of two-dimensional textile structures, introduction to three-dimensional knitted fabric structures, applications of three-dimensional knitted textiles, three-dimensional knitting machines and process control, physical and mechanical properties of three-dimensional knitted fabrics, introduction to multiaxial knitted fabrics, general structure and behavior of multiaxial knitted fabrics, advantages of multiaxial knitted fabrics, manufacture of multiaxial knitted fabrics, mechanical properties of multiaxial knitted fabrics, formability of multiaxial knitted fabrics, introduction and classification of braided structures, geometry of tubular braids, elements of a tubular braiding machine, differences between flat and tubular braid, limitations of braiding systems, triaxial braided structures, three-dimensional braided structures and their production methods, two and three dimensional braided structures, physical and mechanical properties of braided structures.
3412368 Medical Textile 2 Cr. Introduction and classification of medical textile, market scenario of medical textile industry, applied polymers in medical textile, biodegradability assessment of medical device, In vivo biodegradability mechanisms, biocompatibility concept and biocompatibility assessment of medical device, sterilization methods of medical device, examples of textiles in various medical applications(implantable and non-implantable medical textile, hygienic textile, extracorporeal medical textiles), nano fibrous materials and their application in drug delivery and tissue engineering, application of nonwoven in medicine.
- Technical Clothing 2 Cr. Introduction to fibers used for technical clothing, technical clothing requirements, introduction to technical fibers, sewing yarn production methods for technical clothing, technical sewing threads, relation between geometry of woven fabrics and performance of technical clothing, innovations in technical knitted clothing, technical clothing design techniques, anthropometry for technical clothing and its standards, ergonomic technical clothing considerations, technical clothing fit considerations, technology of technical clothing lamination, joining techniques for technical clothing, applied seams in technical clothing, seam classification, stitches classification, welding types adhesives, seam sealing, seams used in knitted fabrics and stretch and coated and waterproof clothing, technical clothing comfort, key features in technical apparels, design of technical clothing

from the comfort point of view, types of technical clothing, ballistic cloths, protective clothing, protection against mechanical impacts, protection against heat, protection against fire, protection against cold, protection against rain, protection against chemicals, protection against electricity, protection against radiation, sports functional clothing, breathable cloths, Moisture management cloths, wind proof cloths, medical textiles, classification of medical textiles, intelligent functional clothing.

- Coloration of Technical Textiles 2 Cr. Introduction to conventional dyeing and printing, conventional dyeing and printing of technical textiles, mass dyeing of synthetic fibers, new dyeing methods such as critical carbon dioxide and microwave and ultrasonic and microencapsulation and plasma and electrochemistry, what is light and color, interaction between color and light, light sources, colorimetry, color spaces, color difference formula, metamerism phenomena, color constancy and adaptation, conventional color control and measurement instruments, digital method of color measurement, phenomena involving a reversible color change including photochromism and electrochromism and thermochromic, phenomena involving absorption of energy and emission of light including fluorescence and phosphorescence and chemoluminescence, phenomena involving absorption of light and energy transfer, phenomena involving the manipulation of light including interference and dispersion and diffraction and liquid crystals and iridescence, color quality control of technical textile.

3414473 Fibrous Filters 2 Cr. Introduction to filtration and separation process, importance of filtration process, filtration mechanisms, principles of fibrous filtration, materials used in filter media, capture mechanisms of particles, methods of particle capture, filtration evaluation methods, filtration efficiency, pressure drop, Beta ratio, filtration standards, classification of filter media, properties of filter media, properties of fibers used in filter media, fibers for high temperature filtration, introduction to woven filter media, properties of yarns, effect of type of yarn and yarn structure on filter fabric performance, effect of fabric weave pattern on filter fabric performance, filter fabric finishing processes, properties of woven fabric filters, introduction to nonwoven fabric media, nonwoven filter types, needles used for production of nonwoven filters, needled nonwoven filter media, electrostatic effects on nonwoven filters, Resin bonded filters, thermal bonded filters, Dry-laid and spun bonded filter media, melt blown filter media, composite nonwoven filters, knitted filters, applications of fibrous filters

3412313 Technical Textiles Finishing 2 Cr. An introduction to textile finishing including definitions, aims and methods of classification, flame retardant and heat resistant finishing including permanent and temporary finishes, chemicals for each kind of substrate and applications, repellent and super-hydrophobic finishes including hydrocarbons, silicones and fluorocarbons, breathable waterproof fabrics and new industrialized samples like Gore-Tex, oil repellent finishes, finishing agents and methods for antimicrobial finishing, UV and weather resistant finishes, snake and insect repellent finishing, softeners and builders finishes and their classification and application introduction, Anti-spot finishes, enzymatic finishing including definitions, categorizing and applications, finishing for bioactive textiles, mechanical finishing including calendaring with explanation particular effect of each type of calendaring on final properties of the goods, raising with conventional and advanced methods, compact, shearing, embossing and its applications, plasma finishing.

- Physical and Mechanical Properties of Technical Textiles 2 Cr. Introduction to technical textiles, fibers structure, yarn and industrial fabrics, standard test methods for determination of physical and mechanical properties of technical textiles, physical and mechanical tests on technical textiles including ambient tests, preparation, dimensions and physical configuration, sound and thermal insulation, axial and biaxial tensile tests, bending, shear, compression, torsion and bursting strength in technical textiles, impact and explosion tests, fatigue test in technical textiles, nonwoven tests including punching strength, tear strength test, fiber reinforced concrete, tire cords, ropes, braids, hoses, filters, fungi and bacteria resistance, water repellent properties, anti-spot properties, fire resistance properties.