

CURRICULUM
OF
Textile Engineering
B.E/B.Sc

2008



HIGHER EDUCATION COMMISSION
ISLAMABAD.

CURRICULUM DIVISION, HEC

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PREFACE

Curriculum development is a highly organized and systematic process and involves a number of procedures. Many of these procedures include incorporating the results from international research studies and reforms made in other countries. These studies and reforms are then related to the particular subject and the position in Pakistan so that the proposed curriculum may have its roots in the socio-economics setup in which it is to be introduced. Hence, unlike a machine, it is not possible to accept any curriculum in its entirety. It has to be studied thoroughly and all aspects are to be critically examined before any component is recommended for adoption.

In exercise of the powers conferred by sub-section (1) of section 3 of the Federal Supervision of Curricula Textbooks and Maintenance of Standards of Education Act 1976, the Federal Government vide notification No. D773/76-JEA (cur.), dated December 4th 1976, appointed the University Grants Commission as the competent authority to look after the curriculum revision work beyond class XII at the bachelor level and onwards to all degrees, certificates and diplomas awarded by degree colleges, universities and other institutions of higher education.

In pursuance of the above decisions and directives, the Higher Education Commission (HEC) is continually performing curriculum revision in collaboration with universities. According to the decision of the special meeting of Vice-Chancellor's Committee, the curriculum of a subject must be reviewed after every 3 years.

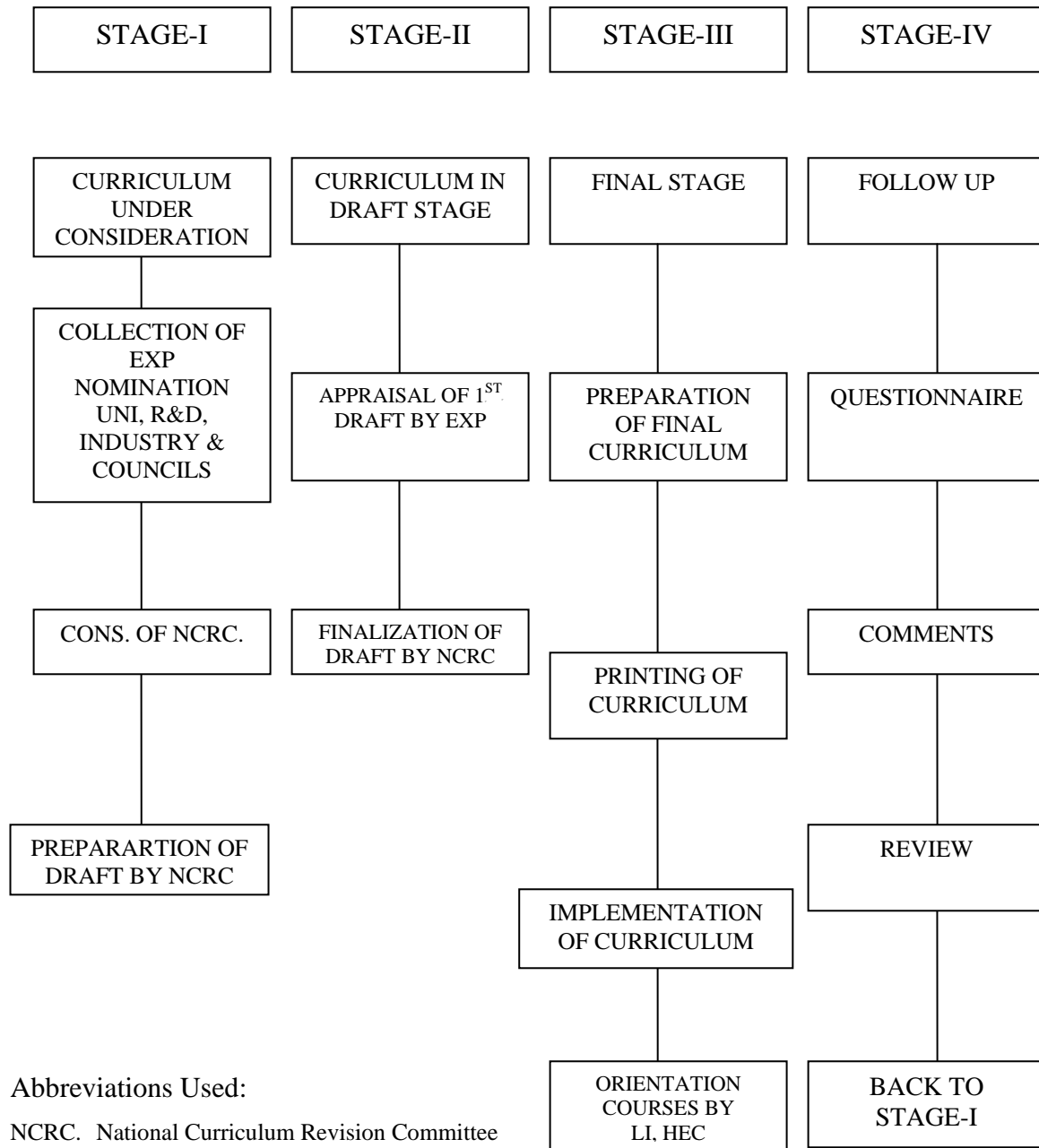
A committee of experts comprising of conveners from the National Curriculum Revision of HEC in Basic, Applied Social Sciences and Engineering disciplines met in April 2007 and developed a unified template to standardize degree programs in the country to bring the national curriculum at par with international standards, and to fulfill the needs of the local industries. It also aimed to give a basic, broad based knowledge to the students to ensure the quality of education. The new BS degree shall be of 4 years duration, and will require the completion of 130-136 credit hours. The engineering degree will devote 65-70% of the curriculum towards engineering courses, and 35--30% to non Engineering courses.

For the purpose of curriculum revision various committees are constituted at the national level, comprising of senior teachers nominated by universities, degree awarding institutions, R&D organizations and respective accreditation councils. The National Curriculum Revision Committee for Textile Engineering in a meeting held on June 3, 2008 at HEC Regional Centre, Lahore in continuation of its earlier meetings held on February 12-14, 2008 at HEC Regional Centre, Lahore revised the curriculum in light of the unified template. The final draft prepared by the National Curriculum Revision Special Committee, duly approved by the competent authority, is being circulated for implementation in the concerned institutions.

DR. RIAZ-UL-HAQ TARIQ
Member Academics

April 2008

CURRICULUM DEVELOPMENT



Abbreviations Used:

- NCRC. National Curriculum Revision Committee
- VCC. Vice-Chancellor’s Committee
- EXP. Experts
- COL. Colleges
- UNI. Universities
- PREP. Preparation
- REC. Recommendations
- LI Learning Innovation
- R&D Research & Development Organization
- HEC Higher Education Commission

Introduction

A special meeting of NCRC in Textile Engineering was held on June 3, 2008 at the HEC Regional Centre, Lahore to finalize the Textile Engineering Curriculum in the light of HEC generic framework/template for engineering education in Pakistan. The meeting was attended by the convener and the secretary of the committee.

The last meeting of National Curriculum Revision Committee for Textile Engineering was held from February 12-14, 2008 at the HEC Regional Centre, Lahore to revise and update the curriculum developed in July 2003. The following attended the meeting:

Dr. Mumtaz Hasan Malik, Department of Yarn Manufacturing & Textile Testing, National Textile University, Faisalabad.	Convener
Prof. Dr. Syed Ishrat Ali, Department of Applied Chemistry, University of Karachi, Karachi	Member
Prof. Dr. M. Ejaz Sandhu, Faculty of Engineering, Hajvery University, Lahore.	Member
Dr. Nabeel Amin, Department of Textile Engineering, University of Faisalabad. Faisalabad.	Member
Mr.M. Akhtar Zia, Textile Engineering Department, University of Management & Technology, Lahore.	Member
Dr. Tanveer Hussain, Department of Textile Chemistry, National Textile University, Faisalabad.	Member/Secretary

Mr. Bashir Ahmed Director Incharge, HEC Regional Centre, Lahore welcomed the participants on behalf of Chairman and Member (Academics), Higher Education Commission.

The revised curriculum was developed keeping in view the decisions taken by the Joint Committee of Conveners on Engineering Programs with the consent of

Pakistan Engineering Council on April 21, 2007 at the Higher Education Commission, Islamabad. The decisions of the joint committee are as under:

- The universities should adopt a uniform framework in the fields of engineering at undergraduate level.
- The total curriculum of an undergraduate engineering program should spread over four years, consisting of 8 semesters.
- Each semester should consist of 18 weeks, 16 weeks for teaching and 2 weeks for examinations.
- Each semester should have a minimum 15 and a maximum 18 credit hours.
- Three contact hours of laboratory should be equivalent to one credit hour;
- The total credit hours for an undergraduate engineering program should range from 130-136, in which the weightage of the engineering courses should be from 65-70 % and that of non-engineering courses from 30-35 %.
- The subjects pertaining to engineering domain should have foundation, breadth and depth courses. The foundation courses are compulsory for all engineering students of a particular discipline. These courses provide students basic concepts and tools to pursue their studies in the senior classes of the undergraduate engineering programs. The breadth courses provide students introduction to different specializations of any engineering discipline early in their studies. The depth courses offer specialization within each engineering discipline.

In the concluding session the National Curriculum Revision Committee for Textile Engineering agreed to recommend the following scheme of studies for BE/ B.Sc. Textile Engineering. The committee also gave it recommendations for enhancing the overall academic standard of textile engineering students.

Rationale:

Textile is the largest industrial sector of Pakistan accounting for about 63% of our national exports. Over the last couple of decades the face of textiles has changed dramatically all over the world. Textile is no longer a commodity industry but it involves manufacturing of very high-tech products including, but not limited to: development of the strongest fiber ever known to man; development of nano-composite material for deep space exploration; development of new bio-compatible materials for artificial organs, blood vessels, tendons or ligaments; development of high-performance fabrics worn by Olympic athletes; development of textiles which provide protection from chemical and biological weapons; development of self-cleaning fabrics; pajamas that sense a baby's breathing; socks that do not stink, etc.

The existing textile curricula are more technology-oriented rather than engineering-oriented. Although the existing curricula help students in building skills in the use of available textile technologies, these are not of much help when it comes to innovation and development of new products or processes. Moreover, the existing curricula do not include emerging textile technologies such as non-wovens and technical textiles. In this new proposed curriculum, an effort has been made to remove the previous short-comings. However, it must be emphasized that it is not only the 'content' of the textile curriculum that is important but also the 'process' by which it is delivered to the students. Even the best developed curriculum can not bear good fruits if it is not combined with good teaching methodologies.

Goals:

This proposed curriculum is aimed at providing students with a broad-based education and creating in them the ability to innovate and design new textile products and processes. In the delivery of this curriculum, every effort should be made to pass students NOT just the 'technical information' but impart 'real knowledge' with critical & creative thinking, analytical reasoning and problem-solving skills. Covering the curriculum should not be the sole aim of the teachers but the curriculum should be used as a means to develop creativity and practical real-world problem-solving abilities.

Another core aim of this curriculum is to teach students the 'human skills' along with the 'technical skills' so as to hone not only their intelligent quotient but also their 'social intelligence' in order to make them good and productive citizens of Pakistan.

FRAMEWORK FOR B.E/B.Sc IN TEXTILE ENGINEERING

Duration: 4 years
 Number of semesters: 8
 Number of weeks per semester: 16 - 18 (16 for teaching and 2 for examinations)
 Total number of credit hours: 134
 Number of credit hours per semester: 15-18
 Engineering Courses (Minimum): 65-70 per cent
 Non-Engineering Courses: 30-35 per cent

Non-Engineering Domain									
Knowledge Area	Sub Area	Name of Course	Lec CR	Lab CR	Credit Hours	Total Courses	Total Credits	% Area	% Overall
Humanities	English	English-I (Functional English)	3	0	3	4	9-11	20.5-23.4	6.9-8.1
		English-II (Communication Skills)	3	0	3				
		English-III (Technical Writing & Presentation Skills)	3	0	3				
		English-IV (Optional)	2	0	2				
	Culture	Islamic Studies	2	0	2	2	4	9.10-8.5	3.1-2.9
		Pakistan Studies	2	0	2				
	Social	Social Sciences-I	3	0	3	2	6	13.6-12.8	4.6-4.4
	Sciences	Social Sciences-II	3	0	3				
Management	--	Professional Practice	3	0	3	2	6	13.6-12.8	4.6-4.4
Sciences		Engineering Management	3	0	3				
Natural	Math	Math-I (Calculus-I)	3	0	3	3	9	20.5-19.1	6.9-6.6
Sciences		Math-II (Calculus-II)	3	0	3				
		Math-III (Calculus-III)	3	0	3				
	Physics	General Physics	3	3	4	1	4	9.1-8.5	3.1-2.9

	Electives	Elective-I * (Chemistry-I)	2	3	3	2	6-7	13.6-14.9	4.6-5.1
	--	Elective-II * (Applied Physics/Chemistr y-II/Engineering Economy)	3/3	0/3	3/4				
Total						16	44-47	100	33.8-34.6

- Math/Physics/Chemistry/Biology/Engineering Economics or related subject as appropriate for the program
- Lec CR: Lecture Credit Hours, Lab CR: Laboratory Credit Hours

Engineering Domain									
Knowledge Area	Sub Area	Name of Course	Lec CH	Lab CH	Credit Hours	Total Courses	Total Credits	% Area	% Overall
Computing	Fundamentals	Introduction to Computers	2	3	3	3	9	10.5-10.1	6.9-6.6
	Programming	Computer Programming	2	3	3				
	Design	Computer Application in Engineering Design	2	3	3				
Engineering Foundation	--	Engineering Fundamentals	3	3	4	8	26	33.72 -32.6	22.3-21.3
		Engineering Foundation-I (Textile Raw Materials)	4	0	4				
		Engineering Foundation-II (Fibre Science)	2	3	3				
		Engineering Foundation-III (Mechanics of Fibrous Structures)	2	3	3				
		Engineering Foundation-IV (High Performance Fibres)	3	0	3				
		Engineering Foundation-V (Environmental Issues of Textile Industry)	2	3	3				
		Engineering Foundation-VI (Textile Engg. Utilities & Services)	3	0	3				
		Probability Methods in Engineering	3	0	3				
Major Based Core (Breadth)	--	Breadth-I (Introduction to Yarn Manufacturing)	3	3	4	5	19	22.09 -22.5	14.6-14.7
		Breadth-II (Introduction to Weaving & Knitting)	3	3	4				

		Breadth-III (Introduction to Non-wovens & Technical Textiles)	3	0	3				
		Breadth-IV (Introduction to Textile Chemical Processing)	3	3	4				
		Breadth-V (Introduction to Garment Manufacturing)	3	3	4				
Major Based Core (Depth)	--	Engineering Elective-I	2	3	3	5	17-18	19.77 -20.2	13.1-13.2
		Engineering Elective-II	3	3	4				
		Engineering Elective-III	3	3/0	3/4				
		Engineering Elective-IV (Depth- IV) (Fancy Yarns/Advanced Weaving & Knitting Techniques/Textile Finishing/Producti on Planning & Control)	3	3	4				
		Engineering Elective-V (Depth- V) (Spinning Calculations/Weav ing & Knitting Calculations/Colou r Science/ Merchandising)	3	0	3				
Inter- Disciplinary Engineering Breadth (Electives)	--	IDEE-I (Mechanical Engineering Fundamentals)	2	3	3	2	7	7.0-7.9	4.6-5.1
		IDEE-II (Electrical & Electronic Systems)	3	3	4				
Senior Design Project	--	Senior Design Project-I	1	6	3	2	6	7.0-6.7	4.6-4.4
		Senior Design Project-II	1	6	3				
Industrial Training (Summer)			0	0	0	0	0 0 0	0-0	0-0
Total			68			25	84	100	66.2-65.4

Summary

Domain	Knowledge Area	Total	Total	% Overall
Non-Engineering	Humanities	Courses 8	Credits 19 / 21	33.8 / 34.6
	Management Sciences	2	6	
	Natural Sciences	6	19 / 20	
	Sub Total	16	44 / 47	
Engineering	Computing	3	9	66.2 /
	Engineering Foundation	8	29	
	Major Based Core (Breadth)	5	19 / 20	
	Major Based Core (Depth)	5	17 / 18	
	Inter-Disciplinary Engineering Breadth (Electives)	2	6 / 7	
	Senior Design Project	2	6	
	Industrial Training (Summer)	0	0	
	Sub Total	25	86 / 89	
Total		41	130 / 136	100

The curriculum design is based on the concept of foundation, breadth and depth courses so that streams for different specializations can be created within each discipline.

Foundation Courses:

The foundation courses are the courses that all students in a given discipline of engineering must take. These courses provide students with the fundamental concepts and tools to pursue their studies at the higher level.

Breadth Courses:

The breadth courses introduce students to different specialties in the given discipline of engineering early in their studies. Before taking the breadth courses, the students should be advised that their choices will affect taking follow up courses because of pre-requisite requirement.

Depth Courses:

The depth courses offer specialization within each engineering discipline. All depth courses must integrate a substantial design component. The students may select electives from any of the areas of specialization with some guidelines from their respective advisors.

General Objectives of the Program

The main objective of textile engineering program is to make the textile engineering graduate a creative problem-solver using latest tools of engineering to design novel, functional textiles and processes. The emphasis is on process and product development using textile materials. The graduates will have know-how in traditional textile manufacturing as well as in technical textiles. The graduates will be able to

analyze structure property relationships of textile materials, and develop and characterize novel textiles including woven, knitted and non-woven structures. The graduates will have the ability to pursue post-graduate studies with a strong knowledge gained in the fundamentals of mathematics, physics, chemistry and research skills developed through project work. The course work, final project and general studies will give the graduates the required problem solving skills, critical thinking ability and communication capability for succeeding in their careers.

Learning Outcomes

On completion of the BS Textile Engineering program, graduates will:

1. have a solid foundation in basic sciences (i.e. physics, mathematics, chemistry) and engineering fundamentals and will be able to apply this knowledge to the solution of practical problems.
2. be able to demonstrate the ability to design and develop useful textile-related products, processes, and/or other systems;
3. be able to demonstrate the ability to design and conduct experiments and analyze and interpret data related to problem solving in the areas encompassed by textile engineering;
4. be able to work in teams and appreciate the value of diversity in team-based problem solving;
5. have commitment to life-long learning, and an ability to adapt to changes and developments in the field of textiles;
6. demonstrate integrity and ethics in engineering practice and in life;
7. demonstrate the ability to communicate effectively; and
8. have a broad-based educational background enabling them to pursue careers within or outside of textile engineering.

SCHEME OF STUDIES BE/B.Sc. TEXTILE ENGINEERING

COURSE TITLE	LEC	LAB	CR	COURSE TITLE	LEC	LAB	CR
First Year							
English –I (Functional English)	3	0	3	Communication Skills	3	0	3
Calculus-I	3	0	3	Calculus-II	3	0	3
Chemistry-I	3	3	4	Applied Physics/Engineering Economy/Chemistry-II	2/3/2	3/0/3	3
General Physics	3	3	4	Mechanical Engineering Fundamentals	2	3	3
Introduction to Computers	2	3	3	Textile Raw Materials	4	0	4
Total	14	9	17	Total	14/15	3/6	16
First Year Credits	33						

Second Year

Calculus-III	3	0	3	Introduction to Weaving & Knitting	3	3	4
Fibre Science	2	3	3	Electrical & Electronic Systems	3	3	4
Technical Writing and Presentation Skills	3	0	3	Introduction to Non-wovens & Technical Textiles	3	0	3
Engineering Fundamentals	3	3	4	Introduction to Textile Chemical Processing	3	3	4
Introduction to Yarn Manufacturing	3	3	4	Islamic Studies	2	0	2
Total	14	9	17	Total	14	9	17
Second Year Credits	34						

Third Year

Mechanics of Fibrous Structures	2	3	3	Computer Applications in Engineering Design	1	6	3
Introduction to Garment Manufacturing	3	3	4	Statistical Methods in Textile Engineering	3	0	3
Pak Studies	2	0	2	Engineering Elective-I*	2	3	3
Computer Programming	2	3	3	Textile Engg. Utilities & Services	3	0	3
Social Science-I	3	0	3	High-Performance Fibres	3	0	3
Total	12	9	15	Total	12	9	15
Third Year Credits	30						

Fourth Year

Senior Design Project-I	1	6	3	Senior Design Project-II	1	6	3
Engineering Management	3	0	3	Professional Practice	3	0	3
Engineering Elective-II*	3	3	4	Engineering Elective-V*	3/2	0/3	3
Engineering Elective-III*	3	3	4	Environmental Issues Related to Textile Industry	2	3	3
Engineering Elective-IV*	3	3	4	Social Science-II	3	0	3
Total	13	15	18	Total	12/11	9/12	15
Fourth Year Credits	33						

Total Credits	130
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Engineering Foundation Courses

1. Engineering Fundamentals
2. Engineering Foundation-I: Textile Raw Materials
3. Engineering Foundation-II: Fibre Science
4. Engineering Foundation-III: Mechanics of Fibrous Structures
5. Engineering Foundation-IV: High-Performance Fibres
6. Engineering Foundation-V: Environmental Issues Related to Textile Industry
7. Engineering Foundation-VI: Textile Engineering Utilities & Services
8. Statistical Methods in Textile Engineering

Engineering Major Based Breadth Courses

1. Breadth-I: Introduction to Yarn Manufacturing
2. Breadth-II: Introduction to Weaving & Knitting
3. Breadth-III: Introduction to Non-wovens & Technical Textiles
4. Breadth-IV: Introduction to Textile Chemical Processing
5. Breadth-V: Introduction to Garment Manufacturing

Engineering Major Based Depth Courses *

1. Engineering Elective-I: Pre-spinning processes/Weaving preparatory processes/Pre-treatment of Textiles/Anthropometry & Clothing Constructions
2. Engineering Elective-II: Yarn Production Engineering/Weaving Mechanisms/Textile Dyeing/Sewn Production Engineering
3. Engineering Elective-III: Advanced Spinning Techniques/Textile Design & Structures/Textile Printing/Clothing Productivity & Quality Management
4. Engineering Elective-IV: Fancy Yarns/Advanced Weaving & Knitting Techniques/Textile Finishing/Production Planning & Control
5. Engineering Elective-V: Spinning Calculations/Weaving & Knitting Calculations/Colour Science/Merchandising

Inter-Disciplinary Engineering Breadth Courses

1. Mechanical Engineering Fundamentals
2. Electrical & Electronic Systems

Electives for specialization in Yarn Manufacturing

1. Pre-spinning Processes
2. Yarn Production Engineering
3. Advanced Spinning Techniques
4. Fancy Yarns
5. Spinning Calculations

Electives for specialization in Fabric Manufacturing

1. Weaving Preparatory Processes
2. Weaving Mechanisms
3. Textile Design and Structure
4. Advanced Weaving and Knitting Techniques
5. Weaving and Knitting Calculations

Electives for specialization in Textile Chemical Processing

1. Pre-treatment of Textiles
2. Textile Dyeing
3. Textile Printing
4. Textile Finishing
5. Colour Science

Electives for specialization in Garment Manufacturing

1. Anthropometry and Clothing Constructions
2. Sewn Production Engineering
3. Clothing Productivity and Quality Management
4. Production Planning and Control
5. Merchandising

In addition to the above specializations, the universities may also offer other specializations in areas like “Non-wovens and Technical Textiles”, “Textile Materials”, “Textile Machine Manufacturing”, “Textile Information Systems Design”, etc.

DETAILS OF COURSES

FOR B.E/B.Sc. TEXTILE ENGINEERING

Calculus – I (3 0 3)

Prerequisites: FSc/A-Level mathematics

Specific Objectives of the Course:

The objective of this course is to familiarize the textile engineering students with the fundamental concepts of calculus including derivatives and integration along with their applications.

Course Outline

Module 1 Engineering Functions

- Real numbers and real line, Engineering functions, Shifting graphs, Trigonometric functions.

Module 2 Derivatives and their Application

- Derivatives of a function, Differentiation rules, Rates of change, Derivatives of trigonometric functions, Chain rule, Extrema on an interval, Rolle's and mean value theorem, Increasing and decreasing functions and first derivative test, Concavity and second derivative test, Optimization problems, Differentials, Limits at Infinity, Summary of curve sketching.

Module 3 Integration and its Application

- Indefinite integrals, Integration by substitution, Riemann sums and definite integrals, Fundamental theorem, Area of a region between two curves, Volume by the slicing, disk, washer and shell method, Arc length and surface of revolution.

Module 4 Transcendental Functions:

- Indeterminate forms, inverse trigonometric functions and their derivatives, Integrals, Hyperbolic functions.

Module 5 Techniques of Integration:

- Basic integration formulas integration by parts, Trigonometric substitutions, Improper integrals.

Module 6 Multivariable Functions and Partial Derivatives:

- Functions of several variables, Partial derivatives, Higher order partial derivatives, Differentials, Chain rule.

Module 7 Infinite Series

- Sequences, Limit of an infinite sequence, Convergent and divergent sequences, Bounded sequences, Monotone sequences, Infinite series, Convergence, Tests for convergence, Absolute and conditional convergence.

Recommended Books:

1. Calculus and Analytic Geometry by George B. Thomas and Ross L. Finney, 2002
2. Advanced Engineering Mathematics by Ervin Kreyszig, 2007

Calculus – II (3 0 3)

Prerequisites: Calculus-I

Specific Objectives of the Course:

The objective of this course is to familiarize the textile engineering students with the fundamental concepts differential equations, Laplace transform and their applications in textile engineering.

Course Outline***Module 1 First Order Differential Equations***

- Basic concepts and ideas, Differential equations and their classifications, Formation of differential equations, Initial and boundary conditions, Geometrical meaning of $\dot{y}=f(x,y)$, Separable differential equations, Homogenous equations, Differential equations reducible to homogenous form, Extract equations, Integrating factors, Linear equations, The Bernoulli equation, Orthogonal trajectories of curves, Clairaut's equation.

Module 2 Linear Differential Equations of Second and Higher Order

- Homogenous linear Equations of second order, Differential operators, Euler-Cauchy equation, Homogenous linear equations, Reduction of order, Existence and uniqueness theory, Wronskian variation of parameters, Higher order differential equations, Higher order homogenous equations with constant coefficients, Higher order non-homogenous equations.

Module 3 Series Solution of Differential Equations, Special Functions

- Power series method, Theory of power series method, Legendre's equation, Legendre polynomials, Forbenius method.

Module 4 System of Differential Equations

- Vectors, matrices, Eigenvalues, Homogenous systems with constant coefficients, Phase plane, Critical points, Criteria for critical points, Stability, Non-homogenous linear systems.

Module 5 Laplace Transforms

- Properties of laplace transforms, Tables of some laplace transforms, Inverse transforms, Linearity, Shifting, Transforms of derivatives and integral, Differential equation, Solution of initial value problems.

Recommended Books:

1. Calculus and Analytic Geometry by George B. Thomas and Ross L. Finney, 2002
2. Advanced Engineering Mathematics by Ervin Kreyszig, 2007

Calculus – III (3 0 3)

Prerequisites: Calculus-I, Calculus-II

Specific Objectives of the Course:

The objective of this course is to familiarize the textile engineering students with the fundamental concepts of linear algebra, matrices & vectors, linear system of equations, Fourier analysis and complex numbers, and their applications in textile engineering.

Course Outline***Module 1 Linear Algebra-Matrices, Vectors***

Basic concepts, Matrix addition, Scalar multiplication, Linear system of equations gauss elimination, Partitioning of matrices, Elementary row operations, Elementary column operations rank of matrix, Linear independence, Solution of linear systems.

Module 2 Determinations, Linear System of Equations

Determinations, Cramer's rule, Inverse of a matrix, Gauss-Jordan elimination, Vector spaces, Linear product spaces, Linear transformations.

Module 3 Matrix Eigenvalue Problems

Eigenvalues, Eigenvectors some application of eigenvalues problems, Symmetric, Skew-symmetric and orthogonal matrices, Complex matrices: Hermitian, Skew-Hermitian, Unitary, Similarity of matrices, Basis of eigenvectors, Diagonalization.

Module 4 Fourier Analysis

Periodic functions, Trigonometric series, Fourier series Functions of any period $p = 2L$, Even and odd functions, Half – Range expansions, Complex fourier series, Fourier integral, Fourier cosines and sine transforms, Fourier transforms, Table of transforms.

Module 5 Complex Numbers

Complex numbers, Complex plane, Polar form of complex numbers, De-Moiver's theorem, the nth root of complex numbers, Application of De-Moiver's theorem in summation of series.

Recommended Books:

1. Calculus and Analytic Geometry by George B. Thomas and Ross L. Finney, 2002
2. Advanced Engineering Mathematics by Ervin Kreyszig, 2007

General Physics (3 3 4)

Prerequisites: College-level physics

Specific Objectives of the Course:

The objective of this course is to familiarize the textile engineering students with the fundamental concepts of statics of continuous media, dynamics of fluids, temperature and heat flow and mechanics, and their applications in textile engineering.

Course Outline

Module 1 Statics of Continuous Media

Uniaxial stress and strain, Poisson's ratio, shear stress and strain; Fluids: Pressure and bulk modulus, Archimedes' principle, Boyle's law.

Module 2 Dynamics of Fluids

Steady state and the continuity equation, Bernoulli's equation, Laminar flow.

Module 3 Temperature and Heat Flow

Thermometers and thermometry, Constant-pressure gas thermometer and Charles law, Thermal expansion, Heat flow, Phase changes and latent heat, Mechanical equivalent of heat, The first law of thermodynamics, The second law of thermodynamics, Kinetic theory of heat.

Module 4 Study of Mechanics

Work and energy, Linear momentum and mechanical energy, Potential energy, Rotational mechanics.

Module 5

Friction, simple harmonic motion, impulse and electrostatics.

Lab Outline

As per course outline

Recommended Books:

1. University Physics by Young and Freedman
2. Physics by Halliday, Resnick and Krane
3. Physics for Scientist and Engineers by Lawrence S. Lerner, 1996

Applied Physics (2 3 3)

Prerequisites: College-level physics

Specific Objectives of the Course:

The objective of this course is to familiarize the textile engineering students with the fundamental concepts of electric force and electric field, electric flux, electric potential, capacitance and optics.

Course Outline

Module 1 Electric Force and Electric Field

Qualitative effects of electric charge, Coulomb's law, Force per unit charge of electric field, Electric field of a continuous charge distribution.

Module 2 Electric Flux and Electric Field

Electric charge and electric flux, Gaussian surfaces and Gauss's law and its applications.

Module 3 Electric Potential

Electric potential energy and electric potential, Equipotentials and flux lines.

Module 4 Capacitance and Electric Field Energy

Capacitors and capacitance, Capacitor in parallel and in series, Dielectrics energy of the electric field.

Module 5 Optics

Speed of light, Huygens's construction, Law of reflection, Snell's law, Total internal reflection, Dispersion, Polarization of light, Interference in one dimension, Thin-film interference, Interference in two dimensions, Two-slit interference, Multiple-slit interference, Quantitative details of interference, Diffraction, Limit of resolution, Diffraction grating, Geometric optics.

Lab Outline

As per course outline

Recommended Books:

1. University Physics by Young and Freedman
2. Physics by Halliday, Resnick and Krane
3. Physics for Scientist and Engineers by Lawrence S. Lerner, 1996

Chemistry-I (3 3 4)

Prerequisites: College-level chemistry

Course Outline

Water, solutions, electro and surface chemistry, acids, bases and other chemicals used in textiles, oils and fats, chemical kinetics and thermodynamics reactions.

Lab Outline

As per course outline

Recommended Books:

1. General Chemistry by Jhon W. Hill, 2004
2. Physical Chemistry by F. Hussain
3. Physical Chemistry by G. Nabi

Chemistry-II (2 3 3)

Prerequisites: Chemistry-I

Course Outline

Aliphatic and aromatic hydrocarbons and synthesis of their derivatives including alkyl halides, amines, oils, fats and hetro-cyclic compounds and their applications in textile industry.

Lab Outline

As per course outline

Recommended Books:

1. Organic Chemistry by L.G. Wade, 2006
2. Organic Chemistry by Paul Y. Bruice, 2006

Functional English (3 0 3)

Prerequisites: College-level English

Annexure - D

Communication Skills

Prerequisites: Functional English

Annexure - D

Technical Writing & Presentation Skills

Prerequisites: Functional English

Annexure - D

Islamic Studies (2 0 2)

Prerequisites: None

Annexure – A

Pakistan Studies (2 0 2)

Prerequisites: None

Annexure - C

Social Science – I (3 0 3)

Annexure - B

The content of the course shall be as per HEC approved syllabus, applicable for all the undergraduate engineering programs in Pakistan.

Social Science – II (3 0 3)

The content of the course shall be as per HEC approved syllabus, applicable for all the undergraduate engineering programs in Pakistan.

Annexure - B

Professional Practice (3 0 3)

Annexure - B

Engineering Economy (3 0 3)

Course Outline

Basic concepts and tools, Simple and compound interest, Time value of money, Inflation, Depreciation, Taxes, Cash flows, Compounding, Equivalence, Present worth, Equivalent annual worth, Internal rate of return, Payback period, Benefit/cost ratio, Choosing among investment alternatives, Equipment replacement and retirement, Preparing and presenting an economic feasibility study, Competitiveness and efficiency.

Recommended Books:

1. Engineering Economy by William G Sullivan, Elin M Wicks, James Luxhoj, 2005
2. Engineering Economy: Applying Theory to Practice (Engineering and Technology) by Ted G. Eschenbach, 2003
3. Basics of Engineering Economy by Leland T Blank, Anthony J. Tarquin, 2007
4. Engineering Economic Analysis: CD-ROM containing Interactive Tutorials, Spreadsheets and Interest Tables by Donald G. Newnan, Ted G. Eschenbach, Jerome P. Lavelle, 2004
5. Principles of Engineering Economy by E.L. Grant, W.G. Ireson, R.S., 1990

Engineering Management (3 0 3)

Course Outline

Introduction, Overview and scope of discipline, The evolution and emergence of management thought, Management functions, Planning concepts, Objectives, Strategies and policies, Decision making, Organizing; Departmentalization, line/staff authority, Commitments and group decision making, Staffing, Principles of selection, Performance.

Recommended Books:

1. Engineering Management: Challenges in the New Millennium by C.M Chang, 2004
2. Engineering Management: Creating and Managing World Class Operation by W. Dale Compton, 1997
3. Engineering Management by Fraidoon Mezda, 1997
4. Essentials of Manufacturing Engineering Management by Peter Pang, 2004
5. Engineering Project Management by N.J. Smith, 2002
6. Basic Cost Engineering by Kenneth K. Humphreys, 1995
7. Cost Analysis and Estimating for Engineering and Management by Phillip F. Ostwald, 2003
8. Hand Book of Industrial Engineering: Technology and Operations Management by Gavriel Salvendy, 2001

Introduction to Computer (2 3 3)

Course Outline

Computer hardware, Input devices, Output devices, Operating systems, Microsoft office (Word, Excel, Access, PowerPoint), Internet, LAN, Networking.

Lab Outline

As per curriculum

Recommended Books:

1. Discovering Computers by Shelly, Cashman, Waggoner
2. Introduction to Computers by Peter Norton 2004
3. Absolute beginner's Guide to Computer Basics by Michael Miller, 2007
4. How Computer Work by Rou White and Timothy Edward Donns, 2005

Computer Programming (2 3 3)

Course Outline

Introduction to programming in C++ with emphasis on algorithm development and problem solving. Methodical development of C++ programs from specifications, Documentation and styles, Appropriate use of controlled structure, Data types and sub programs, Data abstraction and verification, Numeric and non-numeric applications, Introduction to object-oriented programming and design.

Lab Outline

As per curriculum

Recommended Books:

1. Beginner's Programming for Dummies by Wallace Wang, 2006
2. You can do it!: A Beginner's Introduction to Computer Programming by Francis Glassborow, 2004
3. Learn to Program (Pragmatic Programrs) by Chris Pine, 2006
4. How Computer Programming Works by Dan Appleman, 2000
5. Concepts, Technique and Models of Computer Programming by Peter Vian Roy, 2004
6. C++ primer Plus by Stephen Prata, 2004
7. Sams Teach yourself C++ in 21 days by Jesse Liberty, 2004
8. C++ Programming for the Absolute Beginners by Dirk Henkemans and Mark Lee, 2002

Computer Application in Engineering Design (1 6 3)

Course Outline

Hands on experience of current available softwares being used in all sub sectors of textile industry e.g. Gerber Clothing Technology, CAD/CAM/ERP.

Lab Outline

As per curriculum

Engineering Fundamentals (3 3 4)

Prerequisites: None

Specific Objectives of the Course:

The objective of this course is to introduce students to the discipline of engineering, its history, fundamental concepts and modern engineering challenges.

Course Outline

Module 1: Introduction to Engineering

1. Definition of engineering
2. Difference between engineering, technology and science

Module 2: Historical Development of Engineering

3. Origins of engineering
4. Influential inventions of the middle ages
5. Growth of science in engineering
6. Industrial revolution
7. Electrical and IT revolution
8. Contributions of engineering to society

Module 3: Modern Engineering Challenges

9. International competitiveness
10. Rebuilding the infrastructure
11. Air pollution
12. Water pollution
13. Acid rain
14. Greenhouse effect

Module 4: Getting Started in Engineering

15. Structure of engineering education
16. Study habits
17. Problem solving
18. Problem sets

Module 5: The Engineering Profession

19. Supply and demand

- 20. Technological spectrum
- 21. Functions of engineering
- 22. Professional registration
- 23. Engineering ethics

Module 6: Critical Thinking and Creative Thinking

- 24. Critical Thinking
- 25. Creative person
- 26. Enhancing creativity

Module 7: Engineering Design

- 27. Design process
- 28. Design layout
- 29. Managing the design process

Module 8: Presentation of Engineering Results

- 30. Obtaining engineering information
- 31. Presenting engineering information
- 32. Interpreting and evaluation engineering information

Module 9: Patents

- 33. Invention
- 34. Value of patents
- 35. Anatomy of a patent

Module 10: Engineering Economics

- 36. Assets, liabilities and net worth
- 37. Profit and rate of return
- 38. Interest and annuities
- 39. Depreciation
- 40. Economic decisions

Module 11: Health & Safety in Engineering

- 41. Safety
- 42. Product liability
- 43. Electrical hazards
- 44. Fire hazards
- 45. Mechanical hazards
- 46. OSHA standards

Lab Outline

As per curriculum

Recommended Books

1. Exploring Engineering: An Introduction for Freshmen to Engineering and to the Design Process by Philip Kosky, George Wise, Robert T. Balmer, and William D. Keat, 2006.
2. Introduction to the Engineering Profession by John Dustin Kemper, Oxford University Press, 1995.

Textile Raw Materials (4 0 4)

Prerequisites: None

Specific Objectives of the Course:

In this course, the students will study the classification of different textile fibres, their physical and chemical properties and end uses.

Course Outline

Module 1: Textile Fibres

- Definition and classifications of textile fibres

Module 2: Vegetable Fibres

- Cotton: introduction of cotton and its types, Cultivation, harvesting and picking of cotton, Structure of cotton fibre, Physical, chemical properties and end uses of cotton fibre, Varieties of Pakistani cotton, Cotton grading.
- Bast fibres: Fibres such as jute, flax, ramie etc., Production and processing of bast fibres, Fibre properties and uses.
- Leaf fibres: Fibre such as abaca and sisal etc., Production, processing, properties and uses of leaf fibres.

Module 3: Animal Fibres

- Hair fibres: Introduction, classification, structure, production, properties and uses of wool fibres, Grading of wool, Introduction of fibres such as Camel, Mohair, Cashmere, Alpaca and Angora.
- Silk: Production, properties and uses of silk yarn.

Module 4: Mineral Fibres

- Introduction, processing, properties and end uses of natural mineral fibres such as Asbestos.

Module 5: Regenerated Fibres

- Manufacturing methods of viscose, acetate, tencel and lyocel fibres, Their properties and uses in textile industry.

Module 6: Synthetic Fibres

- Manufacturing methods of polyester, polyamide and acrylic fibres, Their properties and uses in textile industry.
- Manufacturing methods of various elastane fibres, Their properties and uses in textile industry.

Recommended Books

1. Handbook of Textile Fibres by J. Gordon Cook, 1984.

Fibre Science (2 3 3)

Prerequisites: Textile Raw Materials

Specific Objectives of the Course:

In this course, the students will study in detail the microscopic and sub-microscopic structure, mechanical, chemical, electrical, thermal and optical properties of textile fibres.

Course Outline

Module 1: Structure of Fibres

- Crystalline and non-crystalline materials, structure of crystals, polymer crystals, X-ray diffraction and crystallinity, assessment of crystallinity, microstructure and macrostructure of natural fibres; cotton and other vegetable fibres, silk wool and other animal fibres, micro and macro structure of synthetic fibres; polymer crystallization from the melt solution, fibre formation, microstructure of manmade fibres.

Module 2: Fibre Cross-section and Linear Density

- Fibre linear density, fibre cross-sectional shape and surface area, variability in fibre denier, measurement of denier, maturity of cotton; measurement of maturity using optical microscopy, differential dyeing as a test of maturity, measurement of maturity by air-flow method.

Module 3: Moisture Absorption and Swelling of Fibres

- Equilibrium absorption of water, humidity and relative humidity, relation between regain and relative humidity, comparative curves for various fibres, heat of sorption, effect of evolution of heat swelling of fibres, axial swelling, transverse swelling, measurement of swelling, theories of sorption, effect of hydrophilic groups, absorption in crystalline and non crystalline regions, hysteresis – a molecular explanation, structural effects in rayon fibres, structural effects in other fibres, theories of time dependence.

Module 4: Dielectric Properties

- Definition of dielectric properties, effect of frequency, effect of moisture, effect of temperature, static electricity, influence of moisture on resistance, measurement of static charge, and static problems in textile.

Module 5: Optical Properties

- Refractive index and birefringence, measurement of refractive indices,
- Absorption and dichroism, reflection and luster.

Module 6: Mechanical Properties

- Tensile properties; true stress, specific stress, tenacity, breaking length, elastic and plastic deformation, Hooke's law, Poisson's ratio, stress-strain curves, elastic recovery. Torsion of fibres, bending, compression. Strain rate and temperature dependence, creep and stress relaxation.

Module 7: Thermal Properties

- Heat capacity, thermal conductivity, decomposition and degradation, coefficient of thermal expansion.
- Fibre friction, effect of fibre friction and lubrication.

Lab Outline

As per course outline

Recommended Books

1. Fibre Science by Steven B. Warner, 1994
2. Physical Properties of Textile Fibres by John W. S. Hearle and W. E. Morton, 2008
3. Textile Science by E.P.G. Gohl and L.D. Vilensky, 1984

Mechanics of Fibrous Structures (2 3 3)

Prerequisites: Fibre Science

Specific Objectives of the Course:

In this course, the students will study about the mechanics of engineering materials, including textile yarns and fabrics, plasticity of textile fibres, compression of textile materials, drape and hand of woven and knitted fabrics.

Course Outline

Module 1: Introduction to Mechanics of Materials:

- Role of Mechanics of Materials in Engineering, Stresses and Deformations, True Stress and True Strain

Module 2: Study of Stress and Strain:

- Stress - Strain Diagrams of Ductile and Brittle Materials, Isotropic and Anisotropic Materials
- Modulus of Elasticity
- Modulus of Rigidity
- Elastic and Plastic Behavior of Materials
- Non Linear Elasticity
- Linear Elasticity
- Stress and Strain in Changed Thermal Conditions
- Repeated Loading
- Bending of Elasto-plastic Materials
- Analysis of Stresses and Deformations

Module 3: Tensile Behavior of Textile Fibres

- Tensile Recovery
- Elastic Performance Coefficient in Tension
- Inter Fibre Stress and its Transmission

Module 4: Stress Analysis of Yarn

- Staple Fibre Yarn
- Continues Filament Yarn
- Influence of Twist on Modulus of Rigidity of Yarn

Module 5: Plasticity of Textile Fibres

- Effect of Load, Temperature Time etc.

Module 6: Mechanical Properties of Textile Materials

- Translation of Mechanical Properties of Fibres into Yarn, Yarn into Fabric

Module 7: Mechanics of Yarns

- Mechanics of Bent Yarns
- Flexural Rigidity
- Fabric Wrinkling
- Stiffness in Textile Fabrics
- Creasing and Crease-proofing of Textiles

Module 8: Compression of Textile Materials

- Study of Resilience
- Friction between Single Fibres
- Friction in Plied Yarns

Module 9: Drape and Hand of Woven and Knitted Fabrics

- Structural Geometry of Textile Fabrics
- Twisted Structure of Plied Yarn

Recommended Books

1. Mechanics of Materials by Ferdinand Pierre Beer, 2008.
2. Mechanics of Materials by Russell C. Hibbeler, 2007.
3. Structure and mechanics of woven fabrics by Jinlian Hu, Woodhead Publishing in Textiles, 2004.
4. Mechanics of Textile and Laminated Composites by A. Bogdanovich and C. Pastore, 1996.

High-Performance Fibres**(3 0 3)****Prerequisites:** Mechanics of Fibrous Structures**Specific Objectives of the Course:**

In this course, the students will study the second generation of manmade fibres, which became available in the last thirty years. They are high modulus, high tenacity, high thermal and chemical resistant fibres. They are extensively used in the manufacturing of technical textiles and the reinforcement of automobiles and other engineering elements.

Course Outline

Module 1 Aramid Fibres

- Manufacturing, structure, properties, end uses

Module 2 Polyethylene Fibres

- Manufacturing, structure, properties, end uses

Module 3 Carbon Fibres

- Manufacturing, structure, properties, end uses

Module 4 Glass Fibres

- Manufacturing, structure, properties, end uses

Module 5 Ceramic Fibres

- Manufacturing, structure, properties, end uses

Module 6 Chemical Reistant Fibres

- Manufacturing, structure, properties, end uses

Module 7 Thermally Resistant Fibres

- Manufacturing, structure, properties, end uses

Recommended Books

1. High-performance Fibres by John W. S. Hearle, 2001
2. High Performance Synthetic Fibers for Composites, National Research Council U.S.A, 1992

Environmental Issues of Textile Industry (2 3 3)

Prerequisites:

Introduction to Yarn Manufacturing; Introduction to Weaving & Knitting; Introduction to Textile Chemical Processing; Introduction to Non-wovens 7 Technical Textiles; Introduction to Garment Manufacturing

Specific Objectives of the Course:

The rapid advancements in technology have brought significant comfort in the lives of human being, but the environment is constantly subject to great pressures causing an imbalance in the eco system. The course shall give awareness to the students about the environmental issues particularly related with the textile industry.

Course Outline

Module 1: Textile & Environment

- Air pollution
- Water pollution
- Noise pollution

- Effect of fibre production & manufacturing industry on environment
- Effect of yarn manufacturing industry on environment
- Effect of fabric manufacturing industry on environment
- Effect of textile processing industry on environment
- Effect of garment manufacturing industry on environment

Module 2: Environmental Management Systems

- ISO 14000

Module 3: Eco-labelling

- Oeko-tex- 100
- EU eco-label

Module 4: Cleaner Production Technologies Related to Textile Industry

- Sources, impact, monitoring, reduction and control of pollution in textile industry

Module 5: Textile Effluents & Waste Management

- Environmental impact assessment
- Environmental audits
- National Environmental Quality Standards
- Textile effluent treatment methods: physical; chemical; biological
- Solid textile waste management

Lab Outline

As per course outline

Recommended Books:

1. Environmental Science-The Way The World Works, by Bernard J. Nebel, 1990
2. Environmental Engineering by Gerard Kiely, 2007

Textile Engineering Utilities & Services (3 0 3)

Prerequisites: Electrical & Electronic Systems, Mechanical Engineering Fundamentals

Specific Objectives of the Course:

Textile industry consists of different machines and electrical and electronic equipments. The study of lighting systems, humidifiers, air conditioners, compressors and steam and water energy conservations systems will be discussed in detail in this course.

Course Outline

Module 1 Compressors

Module 2 Air conditioners

Module 3 Humidifiers

Module 4 Industrial lighting

Module 5 Fire fighting systems

Module 6 Steam generation systems

Module 7 Steam transportation systems

Module 8 Water and energy conservation in textile industry

Recommended Books:

1. Air-conditioning in Textile Mills by S. P. Patel, ATIRA silver jubilee monographs, 1974
2. Heat Transfer Design Methods by John J. McKetta Jr, 1991
3. Textile Project Management by A. Ormerod, 1992

Statistical Methods in Textile Engineering

(3 0 3)

Prerequisites: Calculus-I; Calculus-II

Specific Objectives of the Course:

Variation of quality is one of the most vital features of textile materials, whether raw fibres, yarn, grey fabric or finished cloth, and it is responsible for many problems associated with the use of textiles. Knowledge of statistical method is important for textile engineers because these methods are designed to analyze the essential features of data that indicate variation and draw conclusion on test results.

Course Outline:

Module 1 Introduction to statistics & probability

Module 2 Acceptance sampling in textiles

Module 3 Measures of central tendency

Module 4 Measures of variation

Module 5 Analysis of variation (ANOVA)

Module 6 Correlation & regression

Module 7 Statistical process control

Module 8 Process control charts

Module 9 Pareto charts

Module 10 Process capability analysis

Module 11 Design & analysis of experiments

Recommended Books:

1. Statistical Methods for Textile Technologists by T. K.P. Norris, L.H. C. Tippet Murphy, 1973
2. Statistical Methods used in Textile Industry by A. Brearley & D.R. Cox

Introduction to Yarn Manufacturing

(3 3 4)

Prerequisites: Textile Raw Materials, Fibre Science

Specific Objectives of the Course:

In this course the students will study brief introduction to blow room, carding, drawing, combing, roving, ring spinning, woolen/worsted spinning systems, auto winding and yarn packing

Course Outline

Module 1: Spinning Processes

- Flow charts of spinning processes for filament and staple-spun yarns, carded and combed yarns, jute, flax and spun silk yarn.
- Input and output of each department.
- Intermittent spinning and continuous spinning.
- Flyer spinning, cap spinning.
- Rotor spinning and mule spinning.

Module 2: Blow Room

- Objectives of blow room.
- Working principles in blow room.
- Study of bale breaker, porcupine opener, various beaters, cage condenser, scutcher and removal of wastes.

Module 3: Carding

- Objectives of carding
- Carding actions
- Working of card
- Role of different parts and their speeds.

Module 4: Drawing

- Concept of drafting
- Real and perfect drafting
- Draft calculation
- Drafting system
- Drafting and doubling
- Objects of drawing frame
- Working of drawing frame.
- Breaker, inter and finisher drawing frame.

Module 5: Combing

- Objectives of combing
- Noil %age
- Combing preparatory processes
- Study of comber
- Working of Rectilinear comber.

Module 6: Roving

- Objectives of roving frame
- Winding principles
- Working of roving frame
- Why and how twist is imparted in roving.

Module 7: Spinning

- Objectives of ring spinning
- Principle and mechanism of twist insertion
- Working of ring frame
- Yarn counting and its systems

Module 8: Woolen Industry

- Wool and its classification
- Woolen and worsted yarn
- Flow charts for woolen and worsted spinning processes
- Wool classification and sorting
- Impurities in wool
- Raw material for woolen industry
- Wool scouring, carbonizing, drying and blending
- Woolen carding and woolen spinning.

Module 9: Worsted Industry

- Worsted carding, backwashing and gilling
- Combing, drawing and spinning.

Module 10: Winding and Yarn Packing

Lab Outline

As per course contents

Recommended Books

1. Manual of Cotton Spinning by Gilbert R. Merrill
2. Spun Yarn Technology by Eric Oxtoby.
3. The Woolen & Worsted Industry by Brearley and Iredale.

Introduction to Weaving and Knitting (3 3 4)

Prerequisites: Introduction to Yarn Manufacturing

Specific Objectives of the Course:

In this course the students will study a brief introduction to warping, sizing, drawing-in, weaving, types of weaving machines, basic weaves, fabric inspection and mending, and packing

Course Outline

Module 1: Basics of weaving

- History and scope of weaving

- Introduction to weaving technology-loom elements, yarn preparation – warping and its objectives, sizing and its objectives, primary motion of weaving, secondary and ancillary motions of weaving, different shedding systems-merits/demerits, shuttle and shuttle less weft insertion systems
- Merits/demerits of different weft insertion systems
- Beating-up and its types – Eccentricity (pros and cons)
- Fabric take-up and warp let – off
- Warp and weft stop motion warp protector motion, weave presentation, repeat, draft, peg plan and reed plan, plain weave and its derivatives, twill weave and its derivatives, construction of satin and sateen weaves.

Module 2: Basics of knitting

- History and scope of knitting
- Introduction to knitting and its terminology, machine knitting elements, beard latch and compound needles.
- Classification of knitting machines, principles and mechanism of weft knitting, knit tuck and loop formation, usage of different knit loops, properties of plain and rib fabrics, properties of purl and interlock fabrics
- Introduction to warp knitting, mechanism of loop formation in warp knitting, classification of warp knitting machines, basic warp knitted structures, stitch notation of warp weft knitted structure
- End usage of warp knitted structures

Lab Outline

As per course contents

Recommended Books:

1. Weaving Conversion of Yarn to Fabric by P.R. Lord & M.H. Mohd
2. Principles of Weaving by R.Marks & A.T.C. Robinson
3. Knitting Technology by D.J.Spencer
4. Woven Cloth Construction by A.T.C Robinson & R.Marks
5. Introduction to Textiles by Eurotex
6. Knitting Handbook: An Instructional Guide to Knitting by Viv Foster, 2004

Introduction to Non-wovens & Technical Textiles (3 0 3)

Prerequisites: Introduction to Yarn Manufacturing

Specific Objectives of the Course:

In this course the students will learn different types of non-woven technologies & study different types of technical textiles.

Course Outline

Module 1: Non-wovens

- Introduction to non-woven fabrics
- Fibre and polymer selection

- Web formation processes
- Web handling and transport processes
- Web bonding processes
- Finishing and functionalisation of nonwoven fabrics
- The manufacture-structure-property relations of selected nonwoven materials
- Study of nonwoven manufacturing routes for different product types,
- Characterization and testing, principles of design for performance

Module 2: Technical Textiles

- Agrotech
- Buildtech
- Geotech
- Medtech
- Mobiltech
- Oekotech
- Packtech
- Protech
- Sporttech
- Ropes
- Cleaning Textiles
- Advertising Textiles
- Coated and Laminated Fabrics

Lab Outline

As per course contents

Recommended Books

1. Encyclopedia of Textiles, Fibers and Non-Woven Fabrics by Martin Grayson, 1984
2. Handbook of Technical Textiles by A.R. Horrocks and S.C. Anand, 2000
3. Nonwoven Textiles, by Radko Krcma

Introduction to Textile Chemical Processing (3 3 4)

Prerequisites: Chemistry – I, Textile Raw Materials

Specific Objectives of the Course:

The objective of this course is to introduce the students to different areas of textile chemical processing, including chemical preparation of textiles, textile dyeing, textile printing and textile finishing.

Course Outline

Module 1 Introduction

- Introduction to textile chemical processing
- Chemical processing flow chart

Module 2 Shearing & Singeing Fundamentals

- Shearing & Singeing processes
- Shearing Machine and its description
- Singeing Machine and its description

- Evaluation of singed fabric

Module 3 Desizing & Scouring Fundamentals

- Chemical composition of Size and Cotton
- Desizing Techniques and Methods
- Scouring chemicals and Auxiliaries
- Saponification, Dispersion, Suspension and Emulsion
- Evaluation of desizing & scouring

Module 4 Bleaching & Mercerizing Fundamentals

- Bleaching Chemicals and auxiliaries
- Bleaching chemistry
- Effect of Mercerization on cotton fibre
- Evaluation of Bleaching & Mercerizing

Module 5 Dyeing Fundamentals

- Introduction to dyes
- Dyeing of cellulose with direct, reactive, sulphur and vat dyes
- Dyeing of polyester, nylon, acrylic, wool and silk
- Important characteristics of dyed fabrics

Module 6 Color Science Fundamentals

- Introduction to specification, measurement and quality control of color

Module 7 Printing Fundamentals

- Design Studio & Engraving
- Introduction to different methods and styles of printing

Module 8 Finishing Fundamentals

- Classification of finishes: chemical; mechanical
- Introduction to common chemical and mechanical finishes

Lab Outline

As per course contents

Recommended Books:

1. Cellulosic Dyeing by John Shore, Society of Dyers and Colorists, 1995
2. Dyeing of Textile Materials by Jose Cegarra, Textilia, 1992
3. Textile Printing by W.C. Miles, Society of Dyers & Colorists, 2003
4. Textile Finishing by Derek Heywood, Society of Dyers & Colorists, 2003

Introduction to the Garment Manufacturing (3 3 4)

Prerequisites: Textile Raw Materials

Specific Objectives of the Course:

In this course the students will study a brief introduction to clothing, clothing measurements, clothing sizes, pattern makings, sampling, cutting, induction, stitching machines, stitching, trimming, finishing, packing.

Course Outline

Module 1: Profile of Garment Industry in Pakistan

- Structure of garment industry
- Global garment market and trade

Module 2: Garment Manufacturing Fundamentals

- Clothing measurements & clothing sizes
- Pattern making
- Sampling
- Cutting
- Stitching machines
- Stitching, trimming
- Garment finishing
- Garment packing

Lab Outline

As per course contents

Recommended Books:

1. Introduction to Clothing Manufacture by Gerry Cooklin
2. Clothing Technology for Fashion Designers by Gerry Cooklin
3. Clothing by Jeanette Weber

Pre-spinning Processes (2 3 3)

Prerequisites: Introduction to Yarn Manufacturing

Specific Objectives of the Course:

In this course students will be given in-depth knowledge of machinery related to blow-room, carding, drawing, & combing. Latest innovations in the machines and their workings will be discussed in detail. Various Irregularity loss, its measurement, root causes, controls and effects on yarn and fabric.

Course Outline

Module 1: Blow-room

- Detailed study of blow-room machines e.g. bale breaker, coarse cleaner, mixers, fine cleaners etc
- Environmental conditions in blow-room line
- Grading of cotton

Module 2: Carding

- Detailed study of various regions of carding machine
- Detailed study of carding actions
- Modification in carding machines

Module 3: Drawing

- Detailed study of drafting
- Detailed study drafting zones

- Detailed study drafting system
- Detailed study drafting and doubling
- Auto leveling on drawing machines

Module 4: Lap Forming and Combing

- Lap forming and ribbon forming machines
- Combing mechanisms
- Detailed study of modern combers

Lab Outline

As per course contents

Recommended Books:

1. Manual of Cotton Spinning (Opening and Cleaning) by C. Shrigley, 1973
2. Manual of Cotton Spinning by A. F. W Coulson, 1958
3. Manual of Cotton Spinning (Carding) by W.G. Byerley, 1965
4. Manual of Cotton Spinning (Drawframes, Combers, and Speedframes) by Frank Charnley, 1964
5. Manual of Cotton Spinning (The Principles of Roller Drafting and the Irregularity of Drafted Materials) by G.A.R. Foster, 1958
6. Cotton Combing Manual by Horace Harold Willis
7. Eurotex-An Introduction to Textiles by R. Marks.

Yarn Production Engineering

(3 3 4)

Prerequisites: Introduction to Yarn Manufacturing, Pre-spinning Processes

Specific Objectives of the Course:

In-depth study of ring spinning frame will be discussed in this course. Modern concepts related to drafting, twisting, and package formation on roving frame and ring spinning frame will be focused. Different affects of conditioning and environmental conditions will also be discussed in this course.

Course Outline

Module1: Roving

- Detailed study of roving frame
- Detailed study of drafting systems, winding
- Detailed study of the different mechanisms of the roving frame

Module 2: Spinning

- Detailed study of ring spinning
- Detailed study of drafting systems, twisting and winding techniques
- Study of environmental conditions in the spinning department

Module 3: Auto winding

- Detailed study of package winding techniques
- Yarn clearing systems

Module 4: Yarn conditioning and packaging

- Conventional yarn conditioning systems
- Modern yarn conditioning systems
- Packaging types

Lab Outline

As per course contents

Recommended Books:

1. Spun Yarn Technology by Eric Oxtoby.
2. Textiles Mathematics Vol. I, II, III by J.E. Booth
3. Manual of Cotton Spinning by Gilbert R. Merrill

Spinning Calculations (3 0 3)

Prerequisites: Introduction to Yarn Manufacturing, Pre-spinning Processes

Specific Objectives of the Course:

Course Outline

Module 1: Blow-room calculations

Module 2: Calculations on carding machine

Module 3: Calculations on draw frame

Module 4: Calculations on lap former and comber

Module 5: Calculations on simplex

Module 6: Production and its balancing

Recommended Books:

1. Cotton Spinning Calculations by Scott-Taggart, Bolton
2. Textile Mathematics, Vol. I, II, III by J.E. Booth
3. Cotton Spinners Handbook by Gupta
4. Manual of Cotton Spinning by Textile Institute

Advanced Spinning Techniques (3 3 4)

Prerequisites: Introduction to Yarn Manufacturing, Pre-spinning Processes

Specific Objectives of the Course:

Course Outline

Module 1: Rotor spinning

Module 2: Air jet spinning

Module 3: Friction spinning

Lab Outline

As per course contents

Recommended Books:

1. New Spinning Systems (Manual of Textile Technology) by W. Klein, 1993
2. Complete Technology Book of Textile Spinning, Weaving, Finishing and Printing by NIIR
3. Progress Toward A Fundamentally New Cotton Spinning System by Mayer , ASME Publication 1969

Fancy Yarns

(3 3 4)

Prerequisites: Yarn Production Engineering, Advanced Spinning Techniques

Specific Objectives of the Course:

In this course students will study different types of fancy yarns, their production, properties and end uses.

Module 1: Slub yarns

Module 2: Filament textured yarns

Module 3; Melange yarns

Module 4: Neppy yarns

Module 5: Elastic yarns

Module 6: Hollow yarns

Module 7: Effect yarns

Lab Outline

As per course contents

Recommended books:

1. Fancy Yarns: Their Manufacture and Application by R H. Gong and R.M. Wright, 2002
2. Hand Spinners' Workbook: Fancy Yarns by Mabel Ross, 1989

Weaving Preparatory Processes

(2 3 3)

Prerequisites: Introduction to Weaving & Knitting

Specific Objectives of the Course:

The objective of this course is to familiarize students about different weaving preparatory processes including warping and sizing.

Course Outline

Module 1: Warping

- Types of warping machines

- Mechanism, systems of yarn tension controls

Module 2: Sizing

- Types of sizes (synthetic & natural)
- Size application machines & drying
- Drawing-in: manual & automatic

Lab Outline

As per course contents

Recommended Books:

1. Weaving: Conversion of Yarn to Fabric by P. R. Lord and M. H. Mohamed, 1982
2. Handbook of Weaving by Sabit Adanur, 2000
3. Eurotex-An introduction to Textiles by R.Marks
4. Weaving Technology and Operations by Allan Ormsrod
5. Cotton Weaving, Its Development, Principles and Practice by Richard Marsden, 2000

Weaving Mechanisms

(3 3 4)

Prerequisites: Introduction to Weaving & Knitting, Weaving Preparatory Processes

Specific Objectives of the Course:

Course Outline

Module 1: Let of Mechanism

Module 2: Shedding systems

- Tappet shedding
- Dobby shedding
- Jacquard shedding

Module 3: Weft insertion systems

- Mechanism of projectile loom
- Mechanism of air-jet loom
- Mechanism of rapier loom

Module 4: Beat-up Mechanism

Module 5: Take-up Mechanism

Lab Outline

As per course contents

Recommended Books

1. Weaving: Conversion of Yarn to Fabric by P. R. Lord and M. H. Mohamed, 1982
2. Eurotex-An introduction to Textiles by R.Marks
3. Weaving Technology and Operations by Allan Ormsrod
4. Textile Mathematics, Vol. I, II, III by J. E. Booth

Fabric Design & Structure

(3 3 4)

Prerequisites: Weaving Mechanisms

Specific Objectives of the Course:

The students will learn about important concepts of fabric structure, different types of weave designs, computer aided weave designs and use of color in weave designs as well analysis of construction and design of already woven fabric. They will also learn about simple but important weight calculations and concept of cover of fabric.

Course Outline

Module 1 Basic weaves

Module 2 Dobby designs

Module 3 Jacquard designs

Module 4 Terry fabrics

Module 5 Design of simple weaves

Module 6 Design of compound weaves

Module 7 Colour and weave effect

Lab Outline

As per course contents

Recommended Books

1. Advance Weaving Design by Watson
2. Woven Cloth Construction by R.Marks & A.T.C. Robinson
3. Fabric Structure and Design by N. Gokarneshan, 2005
4. Elementary Textile Design and Fabric Structure by John Read

Weaving and Knitting Calculations

(3 0 3)

Prerequisites: Introduction to Weaving and Knitting, Weaving Preparatory Processes

Specific Objectives of the Course:

This course will focus on the calculations involved in weaving and knitting processes, which include yarn and production calculations.

Course Outline

- Factors involved in woven and knitted cloth contraction, cloth geometry
- Determination of diameter of yarn, cover factor, cloth setting rules
- Production and planning for weaving and knitting process
- Weight of warp and weft per running yard/meter
- Weight of warp and weft per square yard/meter

- Weight per yard when using different counts and different material
- Weight of fabric and wastage calculation
- Weight of cloth with reference to picks and ends
- Yarn requirement for a particular quality and quantity of cloth
- Yarn quantity for a particular width and length of cloth
- Production planning and machinery requirements for certain quality and quantity of cloth in specific period
- Economic evaluation of different machines
- Cost of production and profitability calculation
- Material cost calculation, labor cost and total cost calculation
- Calculation of moisture regain and moisture content.
- Atmospheric condition in weaving shed i.e. relative humidity and temperature

Recommended Books

1. Weaving Technology and Operations by Allan Ormsrod
2. Shuttle less weaving machines by Idrich Talavasek
3. Weaving Calculation by Sen Gupta
4. Weaving Machine, Mechanism & Management by Talukdar

Anthropometry and Clothing Construction (2 3 3)

Prerequisites: Introduction to Garment Manufacturing

Specific Objectives of the Course:

This course is about the fundamentals of apparel manufacturing. Different types of machines, their automations and the computer aided software related to the stitching machines will be discussed in detail.

Course Outline

- Anthropometry of clothing
- Analysis of the patterns and markers
- Selection and handling of fabrics
- Selection of machines
- Special effects
- Computerized stitching machines
- Embellishments & decorative techniques
- Computer aided clothing designs

Lab Outline

As per course contents

Recommended Books:

1. Dress Pattern Designing by Natalie Bray
2. Clothing Construction by Evelyn A. Mansfield, 1953
3. The Bishop Method of Clothing Construction by Edna Bryte, Arch, Marjorie Stotler Arch, 1966

4. The Bishop Method of Clothing Construction by bishop/arch, 1959)
5. Clothing: Fashion, Fabrics & Construction, Student Text by Jeanette Weber and McGraw-Hill, 2002
6. Clothing Construction by Mary Jo Kallal, 1985

Sewn Product Engineering (3 3 4)

Prerequisites: Anthropometry and Clothing Construction

Specific Objectives of the Course:

Course Outline

- Clothing classifications
- Clothing functions
- Clothing manufacturing
- Clothing machinery
- Clothing industry's environment
- Clothing quality control and research & development in clothing
- Calculations of raw material and accessories, man power management, stitching-line management.
- Internal and external audits, inspection and packing

Lab Outline

As per course contents

Recommended Books:

1. Sewn Products Engineering and Reference Manual by Manuel Gaetan, 1977
2. Sewing Factory Operator's Training Handbook by Juki corporation
3. Applied Knowledge of Sewing by Juki Corporation
4. Basic Knowledge of Sewing by Juki Corporation
5. Vogue Sewing, Harper and Row Publishers, 1982

Clothing Productivity & Quality Management (2 0 2)

Prerequisites: Anthropometry and clothing construction and Sewn Product Engineering

Specific Objectives of the Course:

The purpose of the course is to create ability among the participants to develop productivity improvement plans, their execution. The participants will learn how to use different quality Tools and Techniques to produce products of good quality.

Course Outline

Module 1: Productivity Measurement Models

Module 2: Potential Measuring

Module 3: Clothing Raw Material
Module 4: Measuring Productivity Planning
Module 5: Personal Productivity Quality Culture
Module 6: Quality theories
Module 7: Quality circles
Module 8: Quality control
Module 9: Application of statistical tools

Recommended Books:

1. Managing Productivity in the Apparel Industry by Rajesh Bheda, 2003
2. TQM: Quality Training Practices by Richard S. Johnson, 1993
3. A Pictorial Guide for Managers by John S. Oakland, Peter Morris, 1997

Production planning and control (3 0 3)

Prerequisites: Introduction to Garment Manufacturing, Anthropometry and clothing construction

Specific Objectives of the Course:

In this course, the students will study different aspects of clothing operations management, production planning and control

Course Outline

Module 1: Operations Managements: Trends and Issues

- What is operations management?
- Emerging challenges and opportunities in operations management
- The role of operations management in an a textile chemical processing mill
- Key components of an operations management system and the nature of interactions among them

Module 2: Operations Strategy

- The importance of operations strategy for a textile processing mill
- The linkage between corporate strategy and operations strategy
- The way strategies are formulated
- The role of performance measures in an organisation
- Various options available for Pakistani textile processing mills to compete in the global market
- What is meant by world class manufacturing?
- Some of the emerging trends in textile technology and business and the impact of these trends in operations management

Module 3: Designing of Processes

- Various factors which determine the process design in organizations
- The link in process choices and flow characteristics of jobs
- Bearing of process choices on the structural aspects of organizations
- Comparison of different well known process design options available
- Difference of process design in service systems and manufacturing systems
- Benefits of the applications of technology in process design

Module 4: Product Development Process

- Strategic benefits of having a good product development process
- Various stages of product development process
- The concept of 'concurrent engineering' and the rationale of use of this concept
- Tools and techniques used in product development process
- Design for manufacturability

Module 5: Statistical Process Control

- The causes of variations in processes and ways to control them
- Elements of process control and ways to set up such a system
- Making and analysis of different types of control charts
- Method for predicting the quality level of a process and making improvements
- Six sigma methodology and the underlying logic behind this initiative in organizations
- Method of designing an acceptable sampling plan

Module 6: Facility Location & Layout Planning

- The role of globalization in the facilities location problem
- Different factors that influence the facilities location problem
- Method for solving facilities location problem
- Different qualitative and quantitative methods available for choosing one location from multiple candidates
- Comparison of different types of layouts and well known design options
- Method for assessing the appropriateness of a layout design
- Method for designing a product, a process and group technology layout

Module 7: Capacity Planning

- Capacity and way to measure it
- Various steps involved in a capacity planning exercise
- Various alternatives available for augmenting capacity in a textile processing mill

Module 8: Production Planning

- Reasons for aggregate production planning
- Various steps involved in an aggregate planning exercise
- Alternatives available to an organization to modify the demand and supply
- Generic strategies adopted in an aggregate planning exercise
- 'Master Production Scheduling' and its relation to aggregate production planning
- Scheduling of operations

Module 9: Resource Planning

- Basic building blocks of the materials planning methodology
- The steps involved in the material requirement planning methodology
- Method for capacity planning and its relationship to MRP
- Relationship between MRP and modern ERP systems

Module 10: Just-in-Time Manufacturing

- Philosophy of Just-in-Time manufacturing
- Structural and planning elements required for Just-in-Time system
- Push scheduling and pull scheduling methodologies

- The use of Kanban as a production planning and control tool in Just-in-Time systems
- Various implementation issues in a Just-in-Time system

Module 11: Continuous Improvement of Processes

- The concept of continuous improvement of processes
- Ways by which organizations can improve their operations
- Elements of a continuous improvement process

Recommended Books:

1. Operations Management Theory and Practice by B. Mahadevan, 2007
2. Production Planning and Control by William Bolton, 1994
3. Manufacturing Planning and Control by Paul A. Higgins, 1996

Merchandising (3 0 3)

Prerequisites: Introduction to Garment Manufacturing, Anthropometry and Clothing Construction

Specific Objectives of the Course:

This course offers an overview of merchandising with emphasis on sampling process, costing and information forwarding and monitoring other departments. The students will have knowledge of sampling process, costing, and coordination with other departments.

Course Outline

- Module 1: Role of Merchandising Department in a Garment Factory*
- Module 2: Communication Flow in a Vertical and Non- Vertical Garment Manufacturing Mill*
- Module 3: International Garment Trade and its trends*
- Module 4: Garment Costing*
- Module 5: Garment Order Package and its understanding*
- Module 6: Sampling Management*
- Module 7: Final Audit Preparation*

Recommended Books:

1. Apparel Merchandising: The Line Starts Here, by Jeremy A. Rosenau, David Willson, 2001

Pretreatment of Textiles (2 3 3)

Prerequisites: Chemistry–II, Textile Raw Materials and Introduction to Textile Chemical Processing

Specific Objectives of the Course:

In this course, the students will study in depth different preparatory processes to which textile materials are subjected before dyeing, printing and finishing. These

preparatory processes include, singeing, desizing, scouring, bleaching and mercerization. Both conventional and bio preparation methods are covered in the course. Students will learn in detail, the preparation of natural, manmade and blended textile materials in all forms. The emphasis will be on the rationale, principles, mechanisms, effect and control of various process parameters, most common problems, and their preventative and corrective measures. The course also includes lab practice.

Course Outline

Module 1: Greige Inspection & QC

- Greige receiving and Recording
- Greige faults and their grading systems
- 2-point and 10-point System
- Fabric inspection machinery and its description
- Fabric packing & storage

Module 2: Shearing & Singeing

- Principle, method and machinery for shearing
- Principle, method and machinery for singeing
- Common shearing & singeing faults and their countermeasures
- Testing & Q.C. of singed & sheared fabric

Module 3: Water for textile wet processing

- Sources of water
- Water impurities & water hardness
- Water quality required for textile chemical processing
- Testing of water hardness
- Water softening

Module 4: Desizing

- Chemical composition of Sizes and their identification
- Desizing mechanisms and methods
- Desizing Recipes & Process Design
- Testing & Q.C. of Desized fabrics

Module 5: Oils, Fats and Waxes

- Oils and Fats
- Waxes and their characterization
- Fatty acids and their composition

Module 6: Scouring

- Mechanism of scouring
- Chemical and bio-scouring of cotton, flax, jute, wool, manmade fibres and their blends
- Scouring Recipes & Process Design
- Testing & Q.C. of scoured textiles

Module 7: Heat-setting

- Mechanism of heat-setting
- Dimensional stability of synthetic fibre
- Structural changes taking place in fibre during heat treatment
- Methods of heat setting
- Heat-setting Process Design

- Testing & Q.C. of heat set fabrics

Module 8: Bleaching

- Mechanism of Bleaching
- Chemistry and mechanism of different bleaching agents: Hydrogen peroxide; Sodium hypochlorite; Sodium Chlorite; bio
- Bleaching of cotton, flax, jute, wool, manmade fibres and their blends
- Bleaching Recipes & Process Design
- Testing & Q.C. of bleached textiles

Module 9: Mercerization & Causticization

- Mechanism and effects of Mercerization
- Yarn and Fabric Mercerization
- Slack & Tension Mercerization both in the cold and hot conditions
- Mercerization machines and their description
- Caustic Weight reduction of Polyester
- Mercerization & Causticization Process Design
- Testing & Q.C. of Mercerized textiles

Module 10: Liquid Ammonia Treatment

- Cotton treated with Liquid Ammonia
- Physical and chemical modification taking place during the process
- Liquid Ammonia treatment machinery and its description
- Testing & Q.C. of Ammonia treated fabrics

Lab Outline

As per course contents

Recommended Books:

1. Cellulosic Dyeing by John Shore, 1995
2. Chemistry and Technology of Fabric Preparation & Finishing by Charles Tomasino, 1992
3. Textile Chemistry by R. H Peters
4. Scouring and Bleaching by E. R. Trotman

Textile Dyeing (3 3 4)

Prerequisites: Chemistry–II, Introduction to Textile Chemical Processing and Chemical Pre-treatment of Textiles

Specific Objectives of the Course:

In this course the students will study in detail the principles and practice of dyeing natural, regenerated, and manmade fibres and their blends. The students will study classification, chemical structure, basic characteristics and basis of selection of different dyes, dyeing by batch, semi-continuous and continuous dyeing methods and overview of the machinery involved. The course also covers theory of dyeing, dyeing machinery and most common problems encountered in case of dyeing with different dyes by different dyeing methods, and their preventative and corrective measures. The course also includes lab practice.

Course Outline

Module 1: Introduction to Dyes and Dyeing

- Brief introduction of dyes and dyeing history
- Essential definitions and terms used in dyeing and their explanation
- Processing flow chart for yarn, woven, denim and knitwear textiles.

Module 2: Dyeing with Direct Dyes

- Structure, classification and properties of direct dyes
- Mechanism of dyeing with direct dyes
- Exhaust/batch-wise, semi-continuous and continuous application of direct dyes
- After-treatment of textiles dyed with direct dyes
- Design of recipe and process for dyeing cellulosics with direct dyes
- Faulty dyeing and their correction

Module 3: Dyeing with Reactive Dyes

- Structure, classification and properties of different types of reactive dyes
- Mechanisms of dyeing with dyes of different reactive groups
- Exhaust/batch-wise, semi-continuous and continuous application of reactive dyes
- After-treatment of textiles dyed with reactive dyes
- Design of recipe and process for dyeing cellulosics with reactive dyes
- Faulty dyeing and their correction

Module 4: Dyeing with Vat and Indigo Dyes

- Structure, classification and properties of vat dyes
- Mechanism of dyeing with vat dyes
- Exhaust/batch-wise, semi-continuous and continuous application of vat dyes
- Dyeing of denim yarn with indigo dyes
- After-treatment of textiles dyed with vat dyes
- Design of recipe and process for dyeing cellulosics with vat dyes
- Faulty dyeing and their correction

Module 5: Dyeing with Sulphur Dyes

- Structure, classification and properties of sulphur dyes,
- Mechanisms of dyeing with sulphur dyes
- Exhaust/batch-wise, semi-continuous and continuous application of sulphur dyes
- After-treatment of textiles dyed with sulphur dyes
- Design of recipe and process for dyeing cellulosics with sulphur dyes
- Faulty dyeing and their correction

Module 6: Selection of Dyes for Cellulose

- Properties of dyes on the basis of their color constitution
- Behavior of different dyes in dyeing processes
- Selection of dyes keeping the color properties, behavior, cost factor and application methods in mind
- Customer requirement consideration and its effect on dye selection

Module 7: Dyeing of Polyester and Acetate Materials

- Structure, classification and properties of disperse dyes
- Mechanisms of dyeing with disperse dyes

- Exhaust/batch-wise, semi-continuous and continuous application of disperse dyes
- After-treatment of textiles dyed with disperse dyes
- Design of recipe and process for dyeing with disperse dyes
- Faulty dyeing and their correction

Module 8: Dyeing Nylon Textiles

- Structure, classification and properties of acid and metal-complex dyes
- Mechanisms of dyeing with acid and metal-complex dyes
- Dyeing methods for dyeing Nylon with acid and metal-complex dyes
- After-treatment of dyed nylon textiles
- Design of recipe and process for dyeing with acid and metal-complex dyes
- Faulty dyeing and their correction

Module 9: Dyeing of Acrylic Textiles

- Structure, classification and properties of basic dyes
- Mechanisms of dyeing with basic dyes
- Dyeing methods for dyeing acrylic with basic dyes
- After-treatment of dyed acrylic textiles
- Design of recipe and process for dyeing with basic dyes
- Faulty dyeing and their correction

Module 10: Dyeing of Wool, Soya and Milk Fibre

- Dyes and mechanisms of dyeing wool, soya and milk fibres
- Dyeing methods for dyeing wool, soya and milk fibres
- After-treatment of dyed wool, soya and milk fibres
- Design of recipe and process for dyeing wool, soya and milk fibres
- Faulty dyeing and their correction

Module 11: Blend Dyeing

- Objective and need of blending
- Discussion of commercially important blends
- Dyeing of P/C blend with disperse/vat and disperse/reactive dyes by different methods
- Different routes adopted in continuous dyeing of p/c blend
- Dyeing of other important blends like poly/viscose, poly/acrylic etc.
- Design of recipes and processes for dyeing different blends
- Faulty dyeing and their correction

Module 12: Theory of Coloration of Textiles

- Relationship between fibre structure and dyes during the dyeing process
- Dyeing Equilibrium: thermodynamic aspects of equilibrium; isotherm and affinities; electrical effects, heat and dyeing entropy
- Kinetics of Dyeing
- Characteristics of dyeing: color fastness

Module 13: Dyeing Machinery

- Introduction to functional design of coloration machines
- Fundamentals of fluid flow, heat transfer and mass transfer
- Fundamentals of fabric transport and fabric control
- Fundamentals of instrumentation and process control

Lab Outline

As per course contents

Recommended Books:

1. Cellulosic Dyeing by John Shore, 1995
2. Dyeing of Textile Materials, by Jose Cegarra, Textilia, 1992
3. Critical Solutions in Dyeing of Cotton Textile Materials by R. Shamey and T. Hussain, 2005
4. Textile Science by E.P.G. Gohl, 1995
5. Chemical Principles of Synthetic Fibre Dyeing by S.M. Burkinshaw, 1995
6. Blends Dyeing by John Shore, 1995
7. Continuous Dyeing of Polyester/Cellulosic Blended Fabric by Sumitomo, 1995
8. Dyeing and Finishing of Polyester Fibres and its Blends, BASF 1990
9. Wool Dyeing, Society of Dyers and Colorists, 1992
10. Theory of Coloration of Textiles, Society of Dyers and Colorists
11. Engineering in Textile Coloration, Society of Dyers and Colorists

Textile Printing (3 3 4)

Prerequisites: Chemistry–II Introduction to Textile Chemical Processing and Chemical Pre-treatment of Textiles

Specific Objectives of the Course:

In this course students will study principles and practice of different methods and styles of printing including block printing, flat screen printing, rotary screen printing, direct style, resist style, discharge style, burn-out printing, flock printing, transfer printing and ink-jet printing. The course covers print design studio, screen making, print past preparation & rheology, printing process and fixation. The students learn printing of fabrics of natural, manmade and blended fibres with pigments and other dyestuffs, role of auxiliaries and the working principles of machinery used for printing and fixation. The course also includes lab practice.

Course Outline

Module 1: Textile Printing Methods

- Block printing
- Roller printing
- Hand screen printing
- Semi-automatic flat screen printing
- Fully automatic flat screen printing
- Rotary screen printing

Module 2: Print Design Studio & Engraving

- Introduction to print design studio
- CAD/CAM
- Rotary screen engraving

Module 3: Rotary Screen Printing Machines

- Mechanical aspects of rotary printing machines
- Design registration, blanket & screen synchronization & friction concepts

Module 4: Printing Substrate

- Pretreatment requirements of the substrate to be printed like singeing, desizing, scouring, bleaching, mercerization etc. & their effect on the final printed goods

Module 5: Production & Properties of Printing Pastes

- Stock printing paste preparation & dispensing
- Properties of ideal thickeners
- Manual dispensing techniques
- IPS (Integrated paste preparation & dispensing systems)
- Print Paste Rheology

Module 6: Printing with Different Colorants

- Pigment printing
- Reactive printing
- Vat printing
- Disperse Printing

Module 7: Textile Printing Styles

- Direct printing
- Resist printing
- Discharge printing
- Burn out printing
- Transfer printing

Module 8: Print Fixation & After-treatment Processes

- Print paste fixation mechanisms & equipments
- Curing
- Ageing
- Steaming
- Washing off process & washing off equipment.

Module 9: Digital Textile Printing

- Image capture & display
- Screen making using digital pattern data
- Digital control systems
- Ink-jet printing
- Variables affecting reproducibility

Module 10: Evaluation of Printed Goods

- Tests performed for checking quality of printing, including washing, light, perspiration fastness, wet & dry crocking, etc.

Module 11: Printing Faults & their Countermeasures

- A study of the faults that may occur during and/or after printing and their countermeasures

Lab Outline

As per course contents

Recommended Books:

1. Textile Printing by W.C. Miles, Society of Dyers and Colorists, 2003

2. Technology of Printing by V.A. Shenai, Society of Dyes and Colorists 1990

Textile Finishing (3 3 4)

Prerequisites: Textile Pre-Treatment, Textile Dyeing, Textile Printing

Specific Objectives of the Course:

In this course, the students will study the classification, rationale, principles, mechanisms, and methods of different mechanical and chemical finishing processes. The students will cover finishes like chemical softening, hand-building finishes, drying and setting, easy-care finishes, water- and oil- repellent finishes, flame retardant finishes, soil release finishes, anti-static finishes, UV protection finishes, antimicrobial finishes, finishes for color fastness improvement, calendaring, emerizing, raising, compressive shrinkage, bio-polishing and other novel finishes. The course also includes lab practice.

Course Outline

Module 1: Introduction to Textile Finishing

- Brief introduction to textile finishing and its classification
- Explanation of primary and secondary effect of finishing
- Flow chart of different routes adopted in the finishing of woven and knitwear fabrics

Module 2: Introduction to Mechanical Finishing

- Need and importance of mechanical finishing
- Different types of processes used in mechanical finishing with respect to end results and customer requirements
- Calendaring
- Sueding/Emerizing/Peaching
- Raising
- Sanforizing
- Compressive shrinkage

Module 3: Application of Chemical Finishes

- Calculation required for the application of chemical finishes
- Explanation of methods involved in the application of chemical finishes like dip and nip method, low wet pick up application method, saturation removal method, spray application method, foam application method and system, wet on wet application method.

Module 4: Chemical Softening

- Objective and need for chemical softening
- Classification of softeners w.r.t. their functionality
- Classification of softeners w.r.t. their nature
- Chemistry of different softeners and their mechanism of application on textiles
- Application methods involved in the processing of substrate with softeners
- Exhaust and continuous application of softeners

- Evaluation of softeners by subjective and objective methods.

Module 5: Hand Building Finishes

- Definitions and terms involved in hand building finishing
- Objective and need of hand building finishes
- Hand building effect and example of textiles with hand building finishes
- Chemistry of hand building finishes and their mechanism
- Evaluation of substrate and troubleshooting for hand building finishes

Module 6: Easy care and Durable Press Finishes

- Objective and need for easy care finishes
- Mechanism of easy care and durable press finishes
- Chemistry involved in durable press finishes
- Application method for resin finishing
- Compatibility of resin with other finishes
- Evaluation of substrate by different testing methods

Module 7: Oil and Water Repellent Finishes

- Objective and need for oil and water repellency
- Mechanism of repellency
- Chemistry of oil and water repellent finishes
- Application method for oil and water repellent finishes on textiles
- Evaluation of textiles treated with repellent finishes

Module 8: Soil Release Finishes

- Objective and need for soil release substrate
- Mechanism of soil release
- Chemistry of soil release finishes
- Application method for soil release finishes on substrate
- Evaluation method of soil release treated substrate
- Troubleshooting for soil release finishes

Module 9: Flame Retardant Finishes

- Objective and need for flame retardency
- Mechanism of flame retardency
- Chemistry of flame retardant finishes
- Application of flame retardant on different type of textiles like cotton, polyester, nylon etc.
- Evaluation of flame retardants
- Troubleshooting for flame retardant finishes

Module 10: Antistatic Finishes

- Objective and need for antistatic finishes
- Mechanism of antistatic finishes
- Chemistry of antistatic finishes
- Application methods and combinability
- Evaluation of antistatic finishes
- Troubleshooting for antistatic finishes

Module 11: Anti-pilling Finishes

- Objective and need for anti-pilling finishes
- Mechanism involved in the formation of pills
- Mechanism of anti-pilling finishes
- Chemistry of anti-pilling finishes

- Evaluation of anti-pilling finishes
- Troubleshooting for anti-pilling finishes and compatibility

Module 12: Non-slip Finishes

- Objective and need for non-slip finishes
- Mechanism of non-slip finishes
- Chemistry of non-slip finishes
- Application methods and combinability
- Evaluation of non-slip finishes
- Troubleshooting for non-slip finishes

Module 13: Finishes to Improve Color Fastness

- Objective and need for improving color fastness
- Mechanism for improving wet fastness
- Mechanism for improving light fastness
- Mechanism for improving crocking and rubbing fastness
- Chemistry involved in different finishes applied to improve fastness

Module 14: Antimicrobial Finishes

- Objective and need for antimicrobial finishes
- Properties of an effective antimicrobial finishes
- Mechanism of antimicrobial finishes
- Chemistry of antimicrobial finishes
- Evaluation of antimicrobial finishes
- Troubleshooting for antimicrobial finishes

Module 15: UV Protection and Bio Finishes

- Objective and need for UV protection and bio finishes
- Mechanism of UV protection and bio finishes
- Different type of enzymes used for textile in finishing
- Chemistry of UV and bio finishes
- Evaluation of substrate applied with UV protection and bio finishes
- Troubleshooting for UV protection and bio finishes

Lab Outline

As per course contents

Recommended Books:

1. Textile Finishing by Derek Heywood, Society of Dyers and Colorists, 2003
2. Chemical Finishing of Textiles by W. D. Schindler and P. J. Hauser, Woodhead Publishing, 2004

Color Science (2 3 3)

Prerequisites: Chemistry-II, Introduction to Textile Chemical Processing; Chemical Pre-treatment of Textiles

Specific Objectives of the Course:

In this course the students study fundamentals of color perception, description, notation, communication and measurement. The course covers topics such as

elements of color perception, standard illuminants, specification of color, Munsell system, CIELAB system, color difference, pass/fail system, shade sorting, strength analysis of dyes from solution, relative dye strength and tone analysis, assessment of whiteness and degree of yellowness, anatomy of color measuring instruments, and principles of computer color matching. The course also includes lab practice exercises in color matching.

Course Outline

Module 1 Introduction

- Importance of color in textiles
- Application of color science in textiles
- Elements of color perception: light, object, observer
- Standard illuminants
- Major types & characteristics of textile objects
- Visual perception and defective color vision

Module 2 Specification of Color

- Subjective methods of color specification
- Objective methods of color specification
- Opponent color coordinates and the L a b Concept
- Lightness Chroma and Hue
- Some Practical Application based On the L a b C h System

Module 3 Measurement of Color

- Anatomy of a Spectrophotometer: Illumination, Optics, Sample Presentation and Viewing Geometry, Monochromation, Photodetection
- Major types of spectrophotometers: desktop spectrophotometer; portable spectrophotometer; on line spectrophotometer
- Effect of viewing geometry, sample size, specular component and different instruments on color
- How to select a spectrophotometer for process house?
- Color quality control system
- Recipe prediction and related programs
- Color analysis methods and systems in textile mills
- Color analysis hardware and software in various color systems
- Review of recent developments in measurement, communication, management and analysis of color
- Application of color measuring systems
- Color management systems

Module 4 Measurement of Color Difference

- Acceptability and Perceptibility
- Different color difference formulae
- Which color difference Formula?
- Grey Scale and color Difference
- Practical experience in shade evaluation
- Setting up tolerance limits

Module 5 Assessment of Whiteness and Degree of Yellowness

- Formulae for Computing Whiteness Indices

- Which Whiteness Formula?
- Yellowness Index

Module 6 Shade Sorting

- Why shade sorting?
- How shade sorting differs from pass-fail?
- Shade sorting according to 555 system

Module 7 Strength Analysis of Dyes from Solution

- Lambert-Beer Law
- Practical Applications of Beer's Law
- Determining Strength Ratios from a Mixture of Dyes
- Transmission Measurements of modern color system
- Relative dye strength and tone analysis
- Comparison of different methods & practical examples

Module 8 Computer Color Matching

- Theory of Computer Color Matching
- Accuracy of Match Prediction
- Preparation of Database
- Sampling of Dye
- Calibration Dyeing
- Data Verification and Rectification
- Measurement of Reflectance
- Processing Variables
- Compatibility of Dyes
- Variations in Dye Strength
- Batch Correction
- Tristimulus Color Matching
- Utilisation of Leftover Dyes
- Benefits from Computer Color Matching

Module 9 Reproducibility & Right First Time Dyeing

- Factors affecting reproducibility and right first time dyeing

Lab Outline

As per course contents

Recommended Books:

1. Computer Colour Analysis by A.D. Sule
2. Measurement of Colour by W.D. Wright
3. Textile Science by E.P.G. Gohl
4. Instrumental Colour Formulation by James Park
5. Colour and its Application by F.W. Culolow
6. Colour in Theory and Practice by H.D. Murrey
7. Colour in Business and Industry by Dean B Judd
8. Assorted Colour Literature by Datacolor, Macbeth, Hunterlab, X-Rite

Mechanical Engineering Fundamentals (2 3 3)

Prerequisites:

Specific Objectives of the Course:

Course Outline

- Engineering Drawing
- Theory of machines
- Fluid mechanics
- Material properties
- Workshop practices
- Pneumatic and hydraulic systems

Lab Outline

As per course contents

Recommended Books

1. General Engineering Workshop Practices by Odham
2. Workshop Technology by W A Chapmen
3. Heat Transfer by J Holman
4. Thermodynamics by R S Khurmi

Electrical and Electronic Systems (3 3 4)

Prerequisites:

Specific Objectives of the Course:

Course Outline

- Ohm's law
- Kirchoff's laws/ Source transformations
- Power matching
- Thevenin theorem
- Loop and nodal analysis
- Introduction to embedded system concepts with typical examples to study and modify
- Introduction to modularity as a design method for controlling complexity
- Use of simple Micro-controller development board for practical embedded systems problems
- Programmable logic controllers, programmable logic arrays, micro-controllers and micro-processors

Lab Outline

As per course contents

Recommended Books:

1. Basic Engineering Circuits Analysis by J. David Irwin and R. Mark Nelms
2. Examples in Electrical Calculations
3. Electrical Machinery Fundamentals by Stephen J.Chapman
4. University Physics by Young and Freedman
5. A Text Book of Electrical Technology by B.L Theraja and A.k Theraja
6. Electronic Devices and Circuits by T.F Bogart
7. Electronics in Industry by Robert Chute
8. Industrial Control Devices by Mathew Mendal
9. Digital Principles and Applications by Leach and Malvino

Project Design – I (1 6 3)**Prerequisites:****Specific Objectives of the Course:**

Methodologies for product/process development, Introduction to Engineering as a discipline & profession Emphasis on engineering design, interdisciplinary teamwork, & problem solving from a general engineering perspective. The design process including initial specification, design constraints, sources of information and design strategy. Development of fact-finding ability in areas unfamiliar to the student. Analysis of existing designs and the development of improved or new designs.

Recommended Books:

1. Research Methodology
2. Product development

Project Design – II (1 6 3)**Prerequisites:****Specific Objectives of the Course:**

Application of textile engineering principles using team approach to design, construct and analyze novel engineering solutions to textile industry problems. Evaluation of design to assess the impact on worker, industry and society.

Recommended Books:

1. Research Methodology
2. Product development

RECOMMENDATIONS:

1. Most of the textile engineering departments of public and private sector universities need improvements. The education in the field of textile engineering cannot be imparted without practical experiments and hands-on practices. Additional funds should be provided to equip the laboratories. For major-based core (depth) subjects laboratory work is to be deemed mandatory.
2. The use and application of CAD/CAM and simulation software tools should be introduced to students for design work at appropriate level. Furthermore, students should be assigned self learning exercises to develop a sense of learning.
3. The senior design projects should involve analysis, design and practical work. The examination for the project should include open-house formal presentations by the students. Representative, from the industries should also be invited for evaluation of students.
4. There should be very strong interaction among the universities on academic matters and a liaison with industry.
5. All universities should arrange internship training for a period of 6 weeks in the local industry for their undergraduate engineering students. The training may be held in the third academic year.
6. Subject to the availability of faculty, universities may offer various courses in the field of social science.
7. The teaching faculty should be encouraged to attend short courses, seminars and workshops within the country and abroad. This activity should be supported so that a faculty member may avail such an opportunity biyearly.
8. The committee firmly believes that the economic development of Pakistan is strongly linked to the self-sufficiency and mastery in the field of textiles. It is therefore recommended that the universities must host concerted R&D pursuits in various areas of textile engineering.
9. The proposed curriculum covers a set of courses, consisting of non-engineering, foundation, core based breadth and interdisciplinary subjects. These subjects are essential for all textile engineering students. In addition to this a set core based depth subjects have been proposed, which are electives and determine the following specializations of the textile engineering:
 - Yarn Manufacturing
 - Fabric Manufacturing
 - Textile Chemical Processing
 - Textile Clothing Manufacturing

The universities may choose electives as such for a specialization in textile engineering or make necessary changes in them to meet the requirements of degree program on the recommendations of their board of studies.

**ISLAMIC STUDIES (Compulsory)
COURSE PROFILE**

S.NO	TITLES	DETAIL
1	Name of Course	Islamic Studies(Compulsory)
2	No. of Credit Hours	2 Credit Hours
3	Nature of Course	Compulsory at Graduation Level
4	Total Teaching Weeks	18
5	Objectives of the Course	This course is aimed at: 1-To provide Basic information about Islamic Studies 2-To enhance understanding of the students regarding Islamic Civilization 3-To improve Students skill to perform prayers and other worships 4-To enhance the skill of the students for understanding of issues related to faith and religious life
6	Components of Teaching of the Course	

LEVEL OF COURSE	GRADUATION
NAME OF DEGREE	BS
NAM OF COURSE	ISLAMIC STUDIES
SEMESTER	AS PER REQUIREMENT OF THE UNIVERSITY
NO. OF CREDIT	2
TOTAL TEACHING HOURS	AS PER HEC REQUIRMENTS
NO. OF PERIODS PER WEEK	2
TOTAL TEACHING PERIOD OF COURSE	18 WEEKS

UNIT NO.1: INTRODUCTION TO QURANIC STUDIES

- 1) Basic Concepts of Quran
- 2) History of Quran
- 3) Uloom-ul -Quran

UNIT No.2 : STUDY OF SELLECTED TEXT OF HOLLY QURAN

- 1) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
- 2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi

- (Verse No-1-18)
- 3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
 - 4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
 - 5) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

UNIT No.3 : STUDY OF SELLECTED TEXT OF HOLLY QURAN

- 1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
- 2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
- 3) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

UNIT NO.4: SEERAT OF HOLY PROPHET (S.A.W) I

- 1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
- 2) Life of Holy Prophet (S.A.W) in Makkah
- 3) Important Lessons Derived from the life of Holy Prophet in Makkah

UNIT NO.5: SEERAT OF HOLY PROPHET (S.A.W) II

- 1) Life of Holy Prophet (S.A.W) in Madina
- 2) Important Events of Life Holy Prophet in Madina
- 3) Important Lessons Derived from the life of Holy Prophet in Madina

UNIT NO.6: INTRODUCTION TO SUNNAH

- 1) Basic Concepts of Hadith
- 2) History of Hadith
- 3) Kinds of Hadith
- 4) Uloom –ul-Hadith
- 5) Sunnah & Hadith
- 6) Legal Position of Sunnah

UNIT NO.7 SELLECTED STUDY FROM TEXT OF HADITH

UNIT NO.8 INTRODUCTION TO ISLAMIC LAW & JURISPRUDENCE

- 1) Basic Concepts of Islamic Law & Jurisprudence
- 2) History & Importance of Islamic Law & Jurisprudence
- 3) Sources of Islamic Law & Jurisprudence
- 4) Nature of Differences in Islamic Law
- 5) Islam and Sectarianism

UNIT NO.9: ISLAMIC CULTURE & CIVILIZATION

- 1) Basic Concepts of Islamic Culture & Civilization
- 2) Historical Development of Islamic Culture & Civilization
- 3) Characteristics of Islamic Culture & Civilization
- 4) Islamic Culture & Civilization and Contemporary Issues

UNIT NO.10: ISLAM & SCIENCE

- 1) Basic Concepts of Islam & Science
- 2) Contributions of Muslims in the Development of Science
- 3) Quranic & Science

UNIT NO.11: ISLAMIC ECONOMIC SYSTEM

- 1) Basic Concepts of Islamic Economic System
- 2) Means of Distribution of wealth in Islamic Economics
- 3) Islamic Concept of Riba
- 4) Islamic Ways of Trade & Commerce

UNIT NO.12: POLITICAL SYSTEM OF ISLAM

- 1) Basic Concepts of Islamic Political System
- 2) Islamic Concept of Sovereignty
- 3) Basic Institutions of Govt. in Islam

UNIT NO.13: ISLAMIC HISTORY

- 1) PERIOD OF KHLAFT-E-RASHIDA
- 2) PERIOD OF UMMAYYADS
- 3) PERIOD OF ABBASIDS

UNIT NO.14 : SOCIAL SYSTEM OF ISLAM

- 1) BASIC CONCEPTS OF SOCIAL SYSTEM OF ISLAM
- 2) ELEMENTS OF FAMILY
- 3) ETHICAL VALUES OF ISLAM

REFERENCE BOOKS:

- 1) HAMEED ULLAH MUHAMMAD, "**EMERGENCE OF ISLAM**" , IRI, ISLAMABAD
- 2) HAMEED ULLAH MUHAMMAD, "**MUSLIM CONDUCT OF STATE**"
- 2) HAMEED ULLAH MUHAMMAD, "**INTRODUCTION TO ISLAM**"
- 3) MULANA MUHAMMAD YOUSAF ISLAHI,"
- 4) Hussain Hamid Hassan, "**An Introduction to the Study of Islamic Law**" leaf Publication Islamabad, Pakistan.
- 5) Ahmad Hasan, "**Principles of Islamic Jurisprudence**" Islamic Research Institute, international Islamic University, Islamabad (1993)
- 6) Mir Waliullah, "**Muslim Jrisprudence and the Quranic Law of Crimes**" Islamic Book Service (1982)
- 7) H.S. Bhatia, "**Studies in Islamic Law, Religion and Society**" Deep & Deep Publications New Delhi (1989)
- 8) Dr. Muhammad Zia-ul-Haq, "**Introduction to Al Sharia Al Islamia**" Allama Iqbal Open University, Islamabad (2001)

COURSES FOR SOCIAL SCIENCE**Sociology and Development**

(For Engineers)

Objectives: The main objective of this course is to apprise potential engineers about social factors that contribute towards enhancing their professional performance for the good of society and the country. This course is culture specific and has to be taught within the context of local and national socio-economic environment. The engineers are expected to supervise several people in different capacities and their understanding about human behaviour is critical for their optimum performance. Modification of human behaviour or getting work done from sub-ordinates and seniors remain a major challenge for all the professional engineers. This course will enhance understanding about the determinants of human behaviour, which ultimately will result in improved individual efficiency.

1. Introduction to Sociology

- 1.1 What is sociology?
- 1.2 Nature, Scope, and Importance of Sociology
- 1.3 Social Interactions
- 1.4 Social Groups
- 1.5 Social Institutions

2. Culture and Related Concepts

- 2.1 Definition of Culture
- 2.2 Types of Culture
- 2.3 Elements of Culture
- 2.4 Role of Culture in Organization
- 2.5 Socialization and Personality

3. Interpersonal Relations

- 3.1 Interpersonal Behaviour
- 3.2 Formation of Personal Attitudes
- 3.3 Language and Communication
- 3.4 Motivations and Emotions
- 3.5 Public Opinion

4. Social Stratification

- 4.1 Factors of Social Stratification
- 4.2 Caste and class
- 4.3 Power, Prestige, and Authority
- 4.4 Social Mobility
- 4.5 Migration

5. Human Ecology

- 5.1 Ecological Processes
- 5.2 Ecosystem and energy
- 5.3 Ecosystem and Physical Environment
- 5.4 Solid Waste Disposal
- 5.5 Pollution

6. Population Dynamics

- 6.1 World Population Growth and Distribution
- 6.2 Population Dynamics in Pakistan
- 6.3 Causes and Consequences of Urbanization

6.4 Population Policy in Pakistan

6.5 Population and Development

7. Community Development

7.1 Meaning, Scope, and Subject Matter of Community Development

7.2 Processes of Community Development

7.3 Community Development Programs in Pakistan

7.4 Community Organization and Related Services

7.5 Cooperation and Conflict in Community Development

8. Deviance and Crime

8.1 Crime as a Social and Cultural Phenomenon

8.2 Crime and Social Organization

8.3 Organized Crime

8.4 Culture Based Crime

8.5 Economics of Crime

9. Sociology of Change and Development

9.1 What is Social Change and Development?

9.2 Dynamics of Social Change

9.3 Role of NGOs in Development

9.4 World System and Development

9.5 Gender and Development

Recommended Readings

1. Allport, G. W. (1985). The Historical Background of Modern Social Psychology. New York, Random House.
2. Bernard, A. and T. Burgess (2004). Sociology, Cambridge University Press.
3. DuBrin, A. J. (2007). Human Relations: Interpersonal Job Oriented Skills. New York, Prentice Hall.
4. Gardezi, H. N., Ed. (1991). Understanding Pakistan: The Colonial Factor in Societal Development. Lahore, Maktaba Fikr-o-Danish.
5. Hafeez, S. (1991). Changing Pakistan Society. Karachi, Royal Book Company. Gardezi, H. N., Ed. (1991).
6. Jones, G. W. (2005). "Why are Population and Development Issues not Given Priority?" Asia-Pacific Population Journal **20**(1).
7. Macionis, J. J. (1999). Sociology 7th Edition, National Book Foundation, Islamabad
8. Maser, C. (1997). Sustainable Community Development: Principles and Concepts. Florida St. Lucie Press.
9. Nelson, N. and S. Wright (1995). Power and Participatory Development: Theory and Practice. London, Intermediate Technology Publications.
10. Syed, S. H. (2003). The State of Migration and Multiculturalism in Pakistan: The Need for Policy and Strategy. Islamabad, UNESCO: 1-30.
11. Utton, A. E. (1976). Human Ecology, West View Press.
12. Webster, A. (1990). Introduction to Sociology of Development. London, Nacmillan Education Ltd.
13. Weiss, A. M. (2001). Power and civil society in Pakistan, Oxford University press.

SOCIAL ANTHROPOLOGY

(For Engineers)

Objectives: The students are expected to learn anthropological skills for application by professional engineers and other related practitioners. Societal growth needs are to be understood within our own cultural environment. Such a body of applied knowledge will result in improving the professional performance of would-be engineers. As culture and society play an important role towards all human activities, this course will help students relate technical skills to the societal needs and requirements.

I Introduction

1. Anthropology and Social Anthropology
2. Fields of Anthropology
3. Anthropological Research Methods
4. Social Anthropology and other Social Sciences
5. Significance of Social Anthropology

II Culture

1. Definition, Properties and Taxonomy
2. Evolution of Growth and Culture
3. Evolution of Man: Religious and Modern Perspectives
4. Evolution of Culture
5. Culture and Personality

III Evolution and Growth of Culture

1. Evolution of Man
2. Schools of Thought in Cultural Anthropology
3. Acculturation
4. Enculturation
5. Ethnocentrism and Xenocentrism

IV Language and Culture

1. Communication
2. Structural Linguistics
3. Historical Linguistics
4. Relationship between Language and Culture
5. Ethnography

V Economic System

1. Global Economic System
2. The Allocation of Resources
3. The Conversion of Resources
4. The Distribution of Goods and Services
5. Poverty and Inequality

VII Marriage and Family

1. Marriage and Mate Selection
2. The Family: Types and Functions
3. Kinship System
4. Structure and Function of Family
5. Gender Relations

VIII Political Organization

1. Political Sociology
2. Origin of Political Organization and Organizational System

3. Types of Political Organizations
4. Power Politics and Factionalism in Pakistan
5. Resolution of Conflict

IX Religion and Magic

1. The Universality of Religion
2. Comparative Religions
3. Religion and Society
4. Religious Beliefs and Practices
5. Witchcraft and Sorcery

XI Culture Change

1. Forms of Art
2. Expressive Culture
3. Process of Cultural Change
4. Cultural Change in the Modern World
5. Cultural Change in Pakistani society

Recommended Books

1. Ahmad, Akbar S. 1990. *Pakistani Society, Karachi, Royal Books Co.*
2. Bernard, H. Russel. 1994. *Research Methods in Anthropology, Qualitative and Quantitative Approaches. London: Sage Publications*
3. Bodley, John H. 1994. *Cultural Anthropology, California: Mayfield Publishing Co.*
4. Brogger, Jan. 1993. *Social Anthropology and the Lonely Crowd. New Delhi: Reliance Publishing*
5. Ember, Carol R. & Ember Melvin. 2005. *Anthropology, 11th ed. Englewood Cliffs: Prentice Hall, Ince. Harper and Row*
6. Harris Marvin. 1987. *Cultural Anthropology. New York: Harper and Row*
7. Harris Marvin. 1985. *Culture, People, nature; An Introduction to General Anthropology, London: Harper and Row*
8. Haviland, W. A. (2005). *Anthropology: The Human Challenge. New York, Thomson Learning Inc.*
9. Hertzler J. O. 1981. *The Social Structure of Islam. Cambridge: Cambridge University Press.*
10. Keesing, Roger m. 1998. *Cultural Anthropology: A contemporary perspective. 3rd ed. New York: Harcourt Brace College Publishers.*
11. Kottak, Conard Phillip. 2002. *Anthropology: The Exploration of Human Diversity. 9th ed. Boston: McGraw Hill Higher Education.*
12. Kennedy, Charles H. 1992. *Pakistan London: Westview Press,.*
13. Marron, Stanley. 1057. *Pakistani Society and Culture. New Heaven*
14. Wilson, Richard A. 1996. *Human Rights, Culture and Context: Anthropological Perspective. London: Pluto Press.*

Psychology courses for B.Sc/B.E in Engineering Programme

Course-I **Understanding Psychology and Human Behaviour** 3 credit hrs

- What is Psychology?
- Nature, Scope and Application with Special Reference to Pakistan
- Different Schools of Psychology

- Methods of Psychology
- Learning
- Intelligence and Artificial Intelligence
- Personality and its Assessment
- Understanding Maladjustive Behaviour
- Positive Emotional States and Processes
- Stress Management and Anger Management

Books Recommended

1. Atkinson R.C., & Smith E.E. (2000), Introduction to Psychology (13th ed.), Harcourt Brace College Publishers.
2. Fernald, L.D., & Fernald, P.S. (2005), Introduction to Psychology, USA: WMC Brown Publishers.
3. Hergenhahn, B.R. (2001). An Introduction to the History of Psychology, New York: Wadsworth.
4. Goodwin, C.J, (2000) Research in Psychology: Methods and Design, (3rd ed.), New York: John Wiley & Sons.
5. Synder, C.R., & Lopez, S.J. (2007) Positive Psychology, USA, Sage Publications.
6. Allen, B.P. (1997), Personality Theories: Development, Growth and Diversity, (2nd Ed.), Boston: Allyn & Bacon.
7. Cohen, R.J., & Swerdlik, M.E. (2005) Psychological Testing & Assessment (6th ed.), New York: McGraw-Hill.
8. Corcini, R., (2000). Current Psychotherapies. London: Thompson & Co Publishers.
9. Comer, R.J. (2004). Abnormal Psychology, USA: Freeman & Company.
10. Schwartz, B., Wassernman, E., & Robbins, S. (2002), Psychology of Learning and Behaviour, 5th Ed. Norton and Company.

Course II **Professional Psychology** 3 credit hrs

- Introduction to Professional Psychology
- Psychological Testing
- Educational Psychology
- Industrial/Organizational Psychology
- Social Psychology
- Health Psychology
- Clinical Psychology
- Positive Psychology
- Legal, Ethical, and Professional Issues.

Books Recommended

1. Crow, L., & Crow, A. (2000) Educational Psychology, New Delhi: Euroasia Publishing House Ltd.
2. Spiegel, P.K., & Koocher, G.P. (1998), Ethics in Psychology, New York: Oxford University Press
3. Snyder, C.R., & Lopez, S.J. (2000), Handbook of Positive Psychology, New York: Oxford University Press.
4. Compton, W.C. (2005), Introduction to Positive Psychology, USA, Thomson Wadsworth.
5. Debra, L.N. & James Compbell Quick, (2000) Organizational Behaviour (3rd ed), Cincinnati: South Western.
6. Fred Luthans, Alexander, D.S. & Edwin, A. Locke (2000) (Eds), Handbook of Principles of Organizational Behaviour, London: Blackwell.
7. Brannon, L.& Reist, J. (2000), Health Psychology: An Introduction to Behaviour and Health (4th ed.), USA Wadsworth.
8. Donohue, W. & Ferguson, K. (Eds), (2003), Handbook of Professional Ethics for Psychologists; Issues, Questions and Controversies, London: Sage Publications.
9. Meyers, D. (2005), Social Psychology, 8th Ed. McGraw Hill Inc.
10. Cooper, J. & Hogg, M. (2003) Handbook of Social Psychology, Sage Publications
11. Halgin, R.P., Whitbourne, S.K., & Halgin, R. (2004), Abnormal Psychology: Clinical Perspectives on Psychological Disorders, New York: McGraw Hill.
12. Thorndike R.L., & Hage, E.P. (1995), Measurement and Evaluation in Psychology and Education (4th Ed), New York, MacMillan.

PROFESSIONAL ETHICS

Course Description:

Prerequisite: None

Corequisite: None

This course introduce contemporary and controversial ethical issues facing the business community. Topics include moral reasoning, moral dilemmas, law and morality, equity, justice and fairness, ethical standards, and moral development. Upon completion, students should be able to demonstrate an understanding of their moral responsibilities and obligations as members of the workforce and society.

Course Objectives:

At the completion of the course requirements, the student will be able to:

- a. Define business ethics
- b. Describe the evolution of business ethics
- c. Describe major ethical perspectives
- d. Understand and apply n ethical decision-making framework
- e. Understand social responsibility from several dilemensions
- f. Understand how the organization influences ethical decision-making

- g. Examine how significant others influence ethical decision-making
- h. Develop an effective ethics programme.
- i. Understand international business ethics.

Course Outline:

An Overview of Business Ethics: Business Ethics Defined, Social Responsibility, and Business Ethics, The Development of Business Ethics, Why study Business Ethics?, Framework for Studying Business Ethics.

Ethical issues in Business: Foundation of Ethical Conflict, Classifications of Ethical, Issues, Ethical Issues Related to Participants and Functional Areas of Business, Recognizing an Ethical Issue.

Applying Moral Philosophies to Business Ethics: Moral Philosophy Defined, Moral Philosophy Perspectives.

Social Responsibility: The Economic Dimension, The legal Dimension, The Ethical Dimension, the Philanthropic Dimension.

An Ethical Decision-Making Framework: Ethical Issue Intensity, Individual Factors: Stages of Cognitive Moral Development, Corporate Culture, Significant others, Opportunity, Business Ethics Evaluations and Intentions, Using the Ethical Decision-Making Framework to Improve Ethical Decisions.

How the Organization Influences Ethical Decision Making: Organizational Structure and Business Ethics, the role of Corporate Culture in Ethical Decision-Making, Group Dimensions of Organizational Structure and Culture, Implications of Organizational Relationships for Ethical Decisions.

The Role of Opportunity and Conflict: Opportunity, Conflict.

Development of an Effective Ethics Programme: An Effective Ethical Compliance, Programme, Codes of Ethics and Compliance Standards, High-Level Manager's Responsibility for Ethical Compliance Programme and the Delegation of Authority, Effective Communication of Ethical Standards, Establishing Systems to Monitor, Audit, and Enforce Ethical Standards, Continuous Improvement of the Ethical Compliance Programme, The Influence of Personal Values in Business Ethics Programmes, The Ethical Compliance Audit.

International Business Ethics: Ethical Perceptions and International Business, Culture As a Factor in Business, Adapting Ethical Systems to a Global Framework: Cultural Relativism, the Multinational Corporation, A universal Set of Ethics, Ethical Issues Around the Globe.

Text Books:

- Ferrell, O.C., and Fraedrich, John, Ethical Decision Making and Cases, New York: Houghton Mifflin.

ORGANIZATIONAL BEHAVIOUR

3 Credit Hrs

- Introduction to Organizational Behaviour
 - Organizational Disciplines and topics
 - Psychological Perspective
 - Social-Psychological Perspectives
- Structure and Control in Organization
 - Introduction
 - Bureaucracy
 - Managerial Work
 - Contingency theory
 - Organizational Design
- Individual and Work Learning
 - Learning Theories
 - Learning and Work
- Stress
 - Types of Stress and Work
 - Occupational Stress Management
- Individual Differences
 - Personality and its factors
 - Personality dimensions and social learning
 - Intelligence
- Motivation and Job Satisfaction
 - Needs at Work
 - Theories of Motivation and job satisfaction
 - Correlates of Job satisfaction
 - Correlates of Job satisfaction
- Group and Work
 - Social Interaction
 - Dramaturgy and impression Management
 - Social Skill
- Group and Inter group Behaviour
 - Group Structure & Norms
 - Group Processes
 - Hawthorne Studies
- Leadership
 - Leadership as an attribute
 - Leadership Style
- Patterns of Work
 - Work-the classical approach

- Marx, Weber, & The critique of labor
- Foucault & Disciplinary Power
- Conflict and Consent in Work
 - The labor Process debate
 - Work place control and resistance
 - Industrial conflict and industrial relations
- Organizational culture
 - Organizational culture and strategic management
 - Exploring organizational culture
 - Evaluating concept of culture

Books Recommended:

1. Fincham, R., & Rhodes, P. (2003), Principles of Organizational Behaviour, 3rd Oxford.
2. Noe, R., Hollenbeck, J. Gerhart, B., & Wright, P. (2006), Human Resource Management, 5th ed., McGraw Hill.
3. Newstrom John W. (2007), Organizational Behaviour, (12th Ed), McGraw Hill.
4. Luthan Fred, (2005), Organizational Behaviour, McGraw Hill Inc.
5. Robins, Stephen, (2005), Organizational Behaviour, McGraw Hill Inc.

INTRODUCTION TO SOCIOLOGY

3 Credit Hrs

- The Nature of Sociology
 - The study of social life
 - Exploring the global village
 - Sociology as a science
 - The Sociological imagination
 - The development of Sociology
 - Pioneers of Sociology
 - Nature, scope and subject matter of Sociology
 - Brief historical development of Sociology
 - Society and community
 - Relationship with other social sciences
 - Social Interaction Processes
- Social groups
 - Definition and functions
 - Types of social groups
- Social institutions
 - Definition
 - Structure and function of social institutions
 - Inter-relationships among various social institutions

- Culture and related concepts
 - Definition and aspects of culture
 - Elements of culture
 - Organization of culture
 - Other concepts, cultural relativism, sub cultures, ethnocentrism, culture lag

- Socialization and personality
 - Role and status
 - Socialization
 - Culture and personality

- Deviance and social control
 - Definition and types of deviance
 - Juvenile delinquency
 - Formal and information methods of social control

- Social stratification
 - Approach to study social stratification
 - Caste class and race as basics of social stratification

- Major perspectives in Sociology
 - Functionalist perspective
 - Conflict perspective
 - Interactionstic perspective

- Social Control and deviance
 - Agencies of social control

- Social stratification
 - Determinants of social stratification
 - Social mobility, types and definition
 - Dynamics of social mobility

- Concept of social movement
 - Theories of social movement
 - Social and cultural change

- Social and cultural change
 - Definition of social change
 - Dynamics of social change
 - Impact of globalization on society and culture
 - Resistance to change

- Collective behaviour
 - Definition
 - Characteristics
 - Causes
 - Types

- Social movements
- Mob and crowd behaviour

Books Recommended

1. Neulreck, Kenneth, J. 2005, *Sociology: Diversity, Conflict and Change*, Boston
2. Barnard, Andy. 2004. *Sociology*, Cambridge University Press
3. Giddens, Anthony, 2004, *Sociology* 4th edition, Cambridge Polity Press
4. Albrow, Martin, 2003, *Sociology*, London Routledge.
5. Richard, T. Schaefer, 2003, *Sociology* 5th edition, McGraw Hill College
6. Kendall, Diana, 2004. *Sociology in our Times*, 4th ed, Wadsworth
7. Tyler Melissa, Wallace Claire & Abbott Pamela, 2005, *An Introduction to Sociology*, 3rd ed. Routledge.

CRITICAL THINKING

3 Credit Hrs

- The Power of Critical Thinking
 - Claims and Reasons
 - Reasons and Arguments
 - Arguments in the Rough
- The Environment of Critical Thinking
 - Perils of Haunted Mind
 - Self and the Power of the Group
 - Subjective and Social Relativism
 - Skepticism
- Making Sense of Arguments
 - Arguments Basics
 - Patterns
 - Diagramming Arguments
 - Assessing Long Arguments
- Reasons for Belief and Doubt
 - Conflict Experts and Evidence
 - Personal Experience
 - Fooling Ourselves
 - Claims in the News
- Faulty Reasoning
 - Irrelevant Premises
 - Genetic Fallacy, Composition, Division
 - Appeal to the Person, Equivocation, Appeal to Popularity
 - Appeal to Tradition, Appeal to Ignorance, Appeal to Emotion
 - Red Herring, Straw Man
- Unacceptable Premises
 - Begging the Question, False Dilemma

- Slippery Slope, Hasty Generalization
- Faulty Analogy
- Deductive Reasoning: Propositional Logic
 - Connectives and Truth Values
 - Conjunction, Disjunction, Negation
 - Conditional, Checking for Validity
 - Simple Arguments, Tricky Arguments
 - Streamlined Evaluation
- Deductive Reasoning: Categorical Logic
 - Statements and Classes
 - Translations and Standard Form
 - Terms, Quantifiers
 - Diagramming Categorical Statements
 - Sizing up Categorical Syllogisms
- Inductive Reasons
 - Enumerative Induction
 - Sample Size, Representativeness, Opinion Polls
 - Analogical Induction
 - Casual Arguments, Testing for Causes
 - Casual Confusions
- Inference to the Best Explanation
 - Explanations and Inference
 - Theories and Consistency
 - Theories and Criteria
 - Testability, Fruitfulness, Scope, Simplicity
 - Conservatism
- Judging Scientific Theories
 - Science and Not Science
 - The Scientific method, Testing Scientific Theories
 - Judging Scientific Theories
 - Copernicus versus Ptolemy, Evolution Versus Creationism
 - Science and Weird Theories
 - Making Weird Mistakes
 - Leaping to the Weirdest Theory, Mixing What Seems with What is
 - Misunderstanding the Possibilities
 - Judging Weird Theories
 - Crop Circles, Talking with the Dead

BOOKS RECOMMENDED

1. Vaughn Lewis, 2005, The Power of Critical Thinking, Oxford University Press.
2. Paulsen David W., Cederblom Jerry:2000, Critical Reasoning, Wadsworth
3. Restall Greg. 2005, Logic: An Introduction, Routledge

INTRODUCTION TO PHILOSOPHY

3 Credit Hrs

- Definition and Nature of Philosophy
- Theory of Knowledge
 - Opinion and Knowledge
 - Plato, the Republic Selection
 - Knowledge through Reason
 - Descartes Meditation on First Philosophy
 - Knowledge through Experience
 - Hume an Inquiry concerning Human Understanding (Selection)
 - Experience Structured by the Mind
 - Kant Critique of Pure Reason (Selection)
 - Knowing and Doing
 - James Pragmatism (Selection)
 - Knowledge and Emotion
 - Jaggar Love and Knowledge (Selection)
- Philosophy of Religion
 - Proving that Existence of God
 - Anselm, Aquinas, Paley, Dawkins (Selection)
 - Justifying Religious Beliefs
 - Pascal Pensees (Selection)
 - James The will to Believe Selection
 - Freud the Future of An Illusion (Selection)
 - Confronting the Problems of Evil
 - Mackie Evil and Omnipotence (Complete)
 - Hick Philosophy of Religion (Selection)
- Metaphysics
 - Idealism and Materialism
 - Berkeley Three Dialogues Between Hylas and Pholonous (Selection)
 - Armstrong Naturalism, Materialism and First Philosophy (Selection)
 - The Mid-Body Problem
 - Descartes Meditations on First Philosophy (Selection)
 - O'Hear Introduction to the Philosophy of Science (Selection)
 - Dennett The Origins of Selves (Complete)
 - Pali Canon (Selection)
 - Penelhum Religion and Rationality (Selection)
- Freedom to Choose
 - Libertarianism
 - James The Dilemma of Determinism (Selection)
 - Taylor Metaphysics (Selection)
 - Determinism
 - Hospers Meaning and Free Will (Selection)
 - Skinner Walden Two (Selection)
 - Compatibilism
 - Stace Religion and the Modern Mind (Selection)
 - Radhakrishnan Indian Philosophy (Selection)

- Ethics
 - Fulfilling Human Nature
 - Aristotle Nicomachean Ethics (selection)
 - Loving God
 - Augustine The Morals of the Catholic Church and the City of God (Selection)
 - Following Natural Law
 - Aquinas Summa Theologiae (Selection)
 - Doing One's Duty
 - Kant Fundamental Principles of the Metaphysics of Morals (Selection)
 - Maximizing Utility
 - Mill Utilitarianism (Selection)
 - Turning Values of Upside Down
 - Nietzsche Human, All too Human and Beyond Good and Evil (Selection)
 - Creating Ourselves
 - Sartre Existentialism is a Humanism (Selection)
 - Hearing the Feminine Voice
 - Gilligan In a Different Voice (Selection)
 - Baier What do Women Want in a Moral Theory (Selection)

- Political and Social Philosophy
 - The State as Natural
 - Plato the Republic (Selection)
 - Aristotle Politics (Selection)
 - The State as a Social Contract
 - Hobbes Philosophical Rudiments Concerning Government and Society (Selection)
 - Locke the Second Treatise of Government (Selection)
 - Liberty of the Individual
 - Mill On Liberty (Selection)
 - Alienation in Capitalism
 - Marx Economic and Philosophic Manuscripts of 1844 (Selection)
 - Justice and Social Trust
 - Rawls A Theory of Justice (Selection)
 - Nozick Anarchy, State, and Utopia (Selection)
 - Held Rights and Goods (Selection)
 - Women in Society
 - Wollstonecraft A Vindication of the Rights of Women (Selection)
 - De Behaviour The Second Sex (Selection)
 - The Value of Philosophy
 - Russel The Problems of Philosophy (Selection)
 - Midgley Philosophical Plumbing (Selection)

BOOKS RECOMMENDED

1. Abel Donald C., Stumpf Samuel Enoch, 2002. Elements of Philosophy: An Introduction, 4th Ed. McGraw Hill.
2. Scruton Roger, 2001. A short History of Modern Philosophy, 2nd ed. Routledge.

MANAGEMENT COURSES

ENTREPRENEURSHIP

Course Objective:

Entrepreneurship is an important component in the process of economic development. The purpose of this course is to analyse the theories of entrepreneurship and to go for case studies of successful entrepreneurs.

Course Contents:

Introduction: The concept of entrepreneurship, The economist view of entrepreneurship, The sociologist view, Behavioural approach, Entrepreneurship and Management

The Practice of Entrepreneurship: The process of entrepreneurship, Entrepreneurial Management, The entrepreneurial business, Entrepreneurship in service institutions, The new venture

Entrepreneurship and Innovation: The innovation concepts, Importance of innovation for entrepreneurship, Sources of innovative opportunities, The innovation process, Risks involved in innovation

Developing Entrepreneur: Entrepreneurial profile, Trait approach to understanding entrepreneurship, Factors influencing entrepreneurship, The environment, Socio cultural factors, Support systems

Entrepreneurship Organization: Team work, Networking organization, Motivation and compensation, Value system

Entrepreneurship and SMES: Defining SMEs, Scope of SMEs, Entrepreneurial managers of SME, Financial and marketing problems of SMEs

Entrepreneurial Marketing: Framework for developing entrepreneurial marketing, Devising entrepreneurial marketing plan, Entrepreneurial marketing strategies, Product quality and design

Entrepreneurship and Economic Development: Role of entrepreneur in the economic development generation of services, Employment creation and training, Ideas, knowledge and skill development, The Japanese experience

Case Studies of Successful Entrepreneurs

Text Books:

- Paul Burns and Jim Dew Hurst: Small Business and Entrepreneurship
- P.N. Singh: Entrepreneurship for Economic Growth
- Peter F. Drucker: Innovation and Entrepreneurship Peter F. Drucker
- John B. Miner: Entrepreneurial Success

PRINCIPLES OF MANAGEMENT

Course Objectives:

This is a rudimentary course for the students of business administration. The focus of attention will be given to learning fundamental principles of management and of managing people and organization in a historical as well as contemporary world. Students are expected to develop analytical and conceptual framework of how people are managed in small, medium and large public and private national and international organizations.

Course Contents:

- Introduction, overview and scope of discipline
- The evolution and emergence of management thought
- Management functions
- Planning concepts, objectives, strategies and policies
- Decision making
- Organizing; departmentalization, line/staff authority, commitments and group decision making
- Staffing: principles of selection, performance, career planning
- Leading: Motivation, leadership, communication
- Controlling: the system and process and techniques of controlling
- Management and Society: future perspective

Text Books:

- Stephen P. Robins, Mary Coulter: Management
- H. Koontz Odonnell and H. Weihrich: Management
- Mc Farland: Management: Foundation and Practice
- Robert M. Fulmer: The New Management

Pakistan Studies (Compulsory)

(As Compulsory Subject for Degree Students)

Introduction / Objectives

The course has been designed as a compulsory subject for the students studying for Bachelor’s degree, general or professional. The course is of 3 credit hours carrying 100 marks (recommended). The teaching work is comprised of three dimensions: Historical Perspective (20%); Government and Politics (40%); and Contemporary Pakistan (40%).

The course framework is issue-oriented. It has many dimensions, the historical and ideological background of Pakistan the process of governance and national development as well as the issues arising in the modern, age and posing challenges to Pakistan. The course has been designed with a vision that Pakistan Studies should open a window to future.

Course Outline

1. Historical Perspective

- a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
- b. Factors leading to Muslim separatism
- c. People and Land
 - i. Indus Civilization
 - ii. Muslim advent
 - iii. Location and Geo-Physical features.

2. Government and Politics in Pakistan

Political and constitutional phases:

- a. 1947-58
- b. 1958-71
- c. 1971-77
- d. 1977-88
- e. 1988-99
- f. 1999 onward

3. Contemporary Pakistan

- a. Economic institutions and issues
- b. Society and social structure
- c. Ethnicity
- d. Foreign policy of Pakistan and challenges
- e. Futuristic outlook of Pakistan

Books Recommended

1. Burki, Shahid Javed. *State & Society in Pakistan*, The Macmillan Press Ltd 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.
5. Wilcox, Wayne. *The Emergence of Banglades.*, Washington: American Enterprise, Institute of Public Policy Research, 1972.
6. Mehmood, Safdar. *Pakistan Kayyun Toota*, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
7. Amin, Tahir. *Ethno - National Movement in Pakistan*, Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence. *Enigma of Political Development*. Kent England: WmDawson & sons Ltd, 1980.
9. Zahid, Ansar. *History & Culture of Sindh*. Karachi: Royal Book Company, 1980.
10. Afzal, M. Rafique. *Political Parties in Pakistan*, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. Sayeed, Khalid Bin. *The Political System of Pakistan*. Boston: Houghton Mifflin, 1967.
12. Aziz, K.K. *Party, Politics in Pakistan*, Islamabad: National Commission on Historical and Cultural Research, 1976.
13. Muhammad Waseem, *Pakistan Under Martial Law*, Lahore: Vanguard, 1987.
14. Haq, Noor ul. *Making of Pakistan: The Military Perspective*. Islamabad: National Commission on Historical and Cultural Research, 1993.

Annexure - D

**COMPULSORY COURSES IN ENGLISH FOR BE/BSc IN
ENGINEERING DISCIPLINE**

Semester – I

Functional English

Objectives: To enhance language skills and develop critical thinking

Course Contents

Basics of Grammar
Parts of speech and use of articles
Sentence structure, Active and passive voice
Practice in unified sentence
Analysis of phrase, clause and sentence structure
Transitive and intransitive verbs
Punctuation and spelling

Comprehension

Answers to questions on a given text

Discussion

General topics and every day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

Listening

To be improved by showing documentaries/films carefully selected by subject teachers)

Translation skills

Urdu to English

Paragraph writing

Topics to be chosen at the discretion of the teacher

Presentation skills

Introduction

Note: Extensive reading is required for vocabulary building

Recommended books:

1. **Functional English**
 - a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
 2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- b) Writing
1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- c) Reading/Comprehension
1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
- d) Speaking

Semester II

Communication Skills

Objectives: To enable the students to meet their real life communication needs

Course Contents

Paragraph writing

Practice in writing a good, unified and coherent paragraph

Essay writing

Introduction

CV and job application

Translation skills

Urdu to English

Study skills

Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills

Letter / memo writing and minutes of the meeting, use of library and internet resources

Presentation skills

Personality development (emphasis on content, style and pronunciation)

Note: documentaries to be shown for discussion and review

Recommended books:

Communication Skills

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.

b) Writing

1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 45-53 (note taking).
2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
2. Reading and Study Skills by John Langan
3. Study Skills by Richard Yorke.

Semester III

Technical Writing and Presentation Skills

Objectives: To enhance language skills and develop critical thinking

Course Contents

Presentation skills

Essay writing

Descriptive, narrative, discursive, argumentative

Academic writing

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical Report writing

Progress report writing

Note: Extensive reading is required for vocabulary building

Recommended books:

Technical Writing and Presentation Skills

- a) Essay Writing and Academic Writing
 1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
 2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
 3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.
- b) Presentation Skills
- c) Reading
The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharon. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).