ELECTRICAL ENGINEERING

INFORMATION THEORY, CODING AND CRYPTOGRAPHY

PROF. RANJAN BOSE
Department of Electrical Engineering
IIT Delhi

Types of Course : Rerun|Elective|UG/PG **INTENDED AUDIENCE:** B.E/B.Tech,M.E/M.Tech **PRE-REQUISITES:** Basic exposure to linear algebra and probability theory, as well as, a course in digital communications.	**COURSE DURATION:** 12 Weeks (30 Jul'18 -19 Oct'18) **EXAM DATE:** 28 Oct 2018

INDUSTRIES APPLICABLE TO: Telecommunication companies, internet companies, information security companies.

ABOUT THE COURSE:

Information theory, coding and cryptography are the three load-bearing pillars of any digital communication system. In this introductory course, we will start with the basics of information theory and source coding. Subsequently, we will discuss the theory of linear block codes (including cyclic codes, BCH codes, RS codes and LDPC codes), convolutional codes, Turbo codes, TCM and space time codes. Finally, we will introduce the basics of secure communications by focusing on cryptography and physical layer security. Wherever possible, applications of the theory in real world scenarios have been provided. The underlying aim of this course is to arouse the curiosity of the students.

ABOUT THE INSTRUCTOR:

Ranjan Bose received his B.Tech. degree in electrical engineering from the Indian Institute of Technology (IIT), Kanpur, India in 1992 and the M.S. and Ph.D. degrees in electrical engineering from the University of Pennsylvania, Philadelphia, USA in 1993 and 1995, respectively. He worked at Alliance Semiconductor Inc., San Jose, CA, as a Senior Design Engineer from 1996 to 1997.

COURSE LAYOUT:

Week 1: Introduction to Information Theory Lecture,Entropy,Mutual Information, Conditional and Joint Entropy Lecture-Measures for Continuous Random Variable, Relative Entropy

Week 2: Variable Length Codes, Prefix Codes -Source Coding Various source coding techniques: Huffman, Arithmetic, Lempel Ziv, Run Length

Week 3: Optimum Quantizer,Practical Application of Source Coding: JPEG Compression -Introduction to Super Information -Channel Models and Channel Capacity

Week 4: Noisy Channel Coding Theorem Gaussian Channel and Information Capacity of MIMO channels
Week 5: Introduction to Error Control Coding -Introduction to Galois Field- Equivalent Codes, Generator Matrix and Parity Check Matrix
Week 6: Systematic Codes, Error Detections and Correction- Erasure and Errors, Standard Array and Syndrome Decoding -Probability of Error, Coding Gain and Hamming Bound
Week 7: Hamming Codes, LDPC Codes and MDS Codes: Introduction to Cyclic Codes -Generator Polynomial, Syndrome Polynomial and Matrix Representation
Week 8: Fire Code, Golay Code, CRC Codes and Circuit Implementation of Cyclic Codes - Introduction to BCH Codes: Generator Polynomials - Multiple Error Correcting BCH Codes, Decoding of BCH Codes
Week 9: Introduction to Reed Solomon (RS) Codes -Introduction to Convolutional Codes -Trellis Codes: Generator Polynomial Matrix and Encoding using Trellis
Week 10: Vitrebi Decoding and Known good convolutional Codes -Introduction to Turbo Codes Lecture 30: Introduction to Trellis Coded Modulation (TCM)
Week 11: Ungerboek's design rules and Performance Evaluation of TCM schemes -TCM for fading channels and Space Time Trellis Codes (STTC) -Introduction to Space Time Block Codes (STBC)
Week 12: Real Orthogonal Design and Complex Orthogonal Design -Generalized Real Orthogonal Design and Generalized Complex Orthogonal Design -Introduction to Cryptography: Symmetric Key and Asymmetric Key Cryptography
Week 13: Some well-known Algorithms: DES, IDEA, PGP, RSA, DH Protocol -Introduction to Physical Layer Security: Notion of Secrecy Capacity -Secrecy Outage capacity, Secrecy Outage probability, Cooperative jamming

CIVIL ENGINEERING

FIRE PROTECTION, SERVICES AND MAINTENANCE MANAGEMENT OF BUILDING

PROF. B BHATTACHARJEE
Department of Civil Engineering
IIT Delhi

TYPE OF COURSE : New|Core/Elective|UG/PG **INTENDED AUDIENCE :** B.E/B.Tech,M.E/M.Tech,M.S **PRE-REQUISTIES:** BE/BSc. Level Physics & Mathematics	**COURSE DURATION:** 12 weeks (30Jul'18-19 Oct'18) **EXAM DATE :** 28 OCT 2018

INDUSTRY APPLICABLE TO: All Industry involved in Building design and construction. L&T, TERI etc. CPWD and all other PWDs. Dr. Fix it Institute

COURSE OUTLINE:

The objectives of this course is to expose the students to the concepts functional design of building for thermal aspects and energy efficiency; especially in tropical climates i.e. in Indian context. Further objective is to make the student capable of performing fenestration design for natural ventilation and day lighting & design of space for external and internal noise control.

ABOUT THE INSTRUCTOR:

B.Bhattacharjee, B.Tech(IIT KGP:1978), M.Tech. (IIT D:1982) and Ph.D. (I ITD:1990) Field Experience: M/s Gammon India Limited:1978-80. Professor BishwajitBhattacharjee is working with the Department of Civil Engineering, Indian Institute of Technology Delhi, New Delhi (India). His research interests pertain to the domains of building science, sustainable construction, concrete technology, and health monitoring of structures etc. His publications in these areas are well cited. He is also a recipient of the Indian Concrete Institute of Life Time Achievement Award. He has been teaching a similar course in IITD for last 31 years (Building Science [3-0-0])

COURSE PLAN:

Week 1: Fire Protection: Process of combustion in fire, Effect of fire load & ventilation condition on enclosure fire, growth and decay of fire in enclosure

Week 2: Concepts of fire resistant and severity, Effect of fire on materials. Simple Design of elements for given fire resistance.

Week 3: Planning, Fire detection & suppression systems, Smoke venting

Week 4: Lifts & Vertical Transportation: arrangement of lifts and Design for optimum service condition.

Week 5: Building Services as a system, Capacity of storage and sizing, control system etc. & intelligent building.

Week 6: HVAC System: Design Consideration. Basic psychometrics, Air conditioning process & system. Methods of Air Conditioning.

Week 7: Water Supply, Hydraulic design, Storage Distribution, Component of cold & hot water supply system.

Week 8: Waste water & Drainage systems: Fixture units & Design of system and elements of electrical services.

Week 9: Definition, Role of building maintenance in construction process Maintenance generators, Expression of Standards, selection of level of maintenance and fixing standards.

Week 10: Planned maintenance: Planning vis-a-visadhoc maintenance, schedule & contingency maintenance, levels of planning, planned inspection, etc

Week 11: Maintenance cycle, maintenance profile, repair & replacement models, statistical methods, decision models, optimal renewal cycle, budgeting etc

Week 12: Effect of design on maintenance, Diagnosis, appraisal, structural defects & various methods of repair

RAC PRODUCT DESIGN

PROF. SANJEEV JAIN
Department of Mechanical Engineering
IIT Delhi

TYPE OF COURSE: New| Elective| UG/PG **INTENDED AUDIENCE:** B.E/B.Tech,M.E/M.tech,M.S, PhD **PREREQUISITES:** Applied Thermodynamics and Basic Heat and Mass Transfer.	**COURSE DURATION:** 4 weeks (13 Aug'18 -07 Sep'18) **EXAM DATE :** 07 Oct 2018

INDUSTRY SUPPORT: Refrigeration and Air Conditioning Industries such as Carrier, Trane, LG, Samsung, Voltas, Blue star, Emerson, Danfoss etc.

ABOUT THE COURSE:

This course will lead to an understanding of refrigeration and air-conditioning products, the components within these products, familiarity with selection parameters for the components and an appreciation of environmental impact of design choices. The course includes a case study to illustrate the process of design leading to a successful product in market.

ABOUT THE INSTRUCTOR:

Sanjeev Jain is a Professor of Mechanical Engineering at IIT Delhi, India. He worked in industry for a few years before joining IIT Delhi faculty in 1996. His research interest include Solar cooling, Building energy efficiency, natural refrigerants, decentralized energy systems, recent interest in understanding of mind and cognition.

COURSE LAYOUT:

Week 1: Introduction to the design process in general and for Ref. & AC in particular. Applied Thermodynamics as a design tool. Refrigerants and their properties, energy efficiency and environmental considerations, Practical aspects

Week 2: Ref. system Components & their Types: compressors, condensers, evaporators, expansion devices. Working principle of the components and unique features

Week 3: Selection of components for an intended design. Balancing the diversity of design objectives and optimization. Appreciation of the diverting in operating parameters in real applications and incorporation of controls and safety Components

Week 4: Product design - New product launch – Performance testing, reliability, safety, Case studies etc

COMPUTER ENGINEERING

COMPUTER ARCHITECTURE

PROF. SMRUTI RAJAN SARANGI
Department of Computer Science &Engineering
IIT Delhi

TYPE OF COURSE: Rerun | Elective | UG **INTENDED AUDIENCE:**Anyone can learn **PREREQUISITES:**C Programming	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

ABOUT THE COURSE

This is an introductory computer architecture course for beginners. We will start out with a discussion on binary representations, and a discussion on number systems (1's complement and 2's complement). Then, the course will move on to discuss assembly languages, and computer arithmetic. Once, we are done with the fundamentals, we shall look at the design of a simple processor, concepts of pipelining, and the design of a modern memory system.

COURSE INSTRUCTOR:-

Dr. Smruti R. Sarangi is an Associate Professor in the Computer Science and Engineering department at IIT Delhi. He has a Ph.D in computer science from the University of Illinois at Urbana Champaign, USA, and a B.Tech from IIT Kharagpur. Prior to his appointment as a faculty member in IIT Delhi in 2011, he spent 5 years working for IBM Research Labs, and Synopsys Research. He has published 60 papers in prestigious international conferences and journals, and holds 5 US patents. He is a member of the IEEE and ACM.

COURSE LAYOUT

Weekly:-Lessons/Topics
Topic 1. Introduction to Computing
Topic 2. Number Systems
Topic 3. Floating Point Numbers
Topic 4. Assembly Language – I
Topic 5. Assembly Language – II
Topic6. Algorithms for Binary Addition
Topic7. Algorithms for Multiplication and Division
Topic8. Processor Design

Topic9. Pipelining – I
Topic10. Pipelining – II
Topic11. Memory Systems – Caches
Topic12. Virtual Memory

MATHEMATICS

INTRODUCTION TO PROBABILITY THEORY AND STOCHASTIC PROCESS

PROF. S. DHARAMARAJA
Department of Mathematics
IIT Delhi

TYPE OF COURSE: New | Core | UG **INTENDED AUDIENCE:** B.E/B.Tech **PREREQUISITES:** A basic course on Calculus and Linear Algebra	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

INDUSTRIES APPLICABLE TO : Fractal Analytics, Genpact, Goldman Sachs, FinMechanics, Deutsche Bank and other finance companies.

ABOUT THE COURSE:-

This course explanations and expositions of probability and stochastic processes concepts which they need for their experiments and research. It also covers theoretical concepts of probability and stochastic processes pertaining to handling various stochastic modelling. This course provides random variable, distributions, moments, modes of convergences, classification and properties of stochastic processes, stationary processes, discrete and continuous time Markov chains and simple Markovianqueueing models.

ABOUT THE INSTRUCTOR:

S. Dharmaraja earned his M.Sc. degree in Applied Mathematics from Anna University, Madras, India, in 1994 and Ph.D. degree in Mathematics from the Indian Institute of Technology Madras, in 1999. From 1999 to 2002, he was a post-doctoral fellow at the Department of Electrical and Computer Engineering, Duke University, USA. From 2002 to 2003, he was a research associate at the TRLabs, Winnipeg, Canada. He has been with the Department of Mathematics, IIT Delhi, since 2003, where he is currently a Professor, Department of Mathematics and joint faculty of Bharti School of Telecommunication Technology and Management. During July 2014 and August 2017, he served as Head, Department of Mathematics. He appointed as 'Jaswinder&Tarvinder Chadha Chair Professor' for teaching and research in the area of Operations Research from May 2010 to July 2015. He has held visiting positions at the Duke University, USA, Emory University, USA, University of Calgary, Canada, University of Los Andes, Bogota, Colombia, National University of Colombia, Bogota, Colombia, University of Verona, Verona, Italy, Sungkyunkwan University, Suwon, Korea and University degliStudi di Salerno, Fisciano, Italy.

COURSE LAYOUT:

Week 1 : Basics of Probability
Week 2 : Random Variable
Week 3 : Moments and Inequalities
Week 4 : Standard Distributions
Week 5 : Higher Dimensional Distributions
Week 6 : Functions of Several Random Variables
Week 7 : Cross Moments
Week 8 : Limiting Distributions
Week 9 : Introduction to Stochastic Processes (SPs)
Week 10 : Discrete-time Markov Chains (DTMCs)
Week 11 : Continuous-time Markov Chains (CTMCs)
Week 12 : Simple Markovian Queuing Models

CIVIL ENGINEERING

Geoenvironmental Engineering (Environmental Geotechnology); Landfills, Slury Ponds & contaminated Sites

PROF. MANOJ DUTTA
Department of Civil Engineering
IIT Delhi

TYPE OF COURSE: Rerun | Elective | UG/PG **INTENDED AUDIENCE:** B.E/B.Tech, M.E/M.Tech,M.S **PREREQUISITES:** 2nd year BE level course on Soil Mechanics or Environmental Science and Engineering.	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

INDUSTRIES APPLICABLE TO :

Geotechnical Consultants, Environmental Consultants, Solid Waste Management Consultants, Pollution Control Boards and Regulatory Authorities, Central & State Ministries of Environment, Central & State Ministries of Urban Development, Municipal Corporations and Urban Local Bodies, Manufacturing Industries & Industrial Development Corporations, Waste Management Industries, Operators and NGOs, Ground Water & Mining Authorities and Industries

COURSE OUTLINE:

The courses discusses the following in detail:

- Concepts and principles of Geoenvironmental Engineering.
- Geotechnical aspects of planning and design of MSW and Hazardous waste Landfills
- Geotechnical aspects of planning and design of slurry ponds - ash ponds and tailing ponds.
- Geotechnical aspects of detection & monitoring of subsurface contamination and control & remediation of contaminated sites.
- Rehabilitation of waste dumps and geotechnical re-use of waste.

UG and PG students of Civil Engineering, Geotechnical Engineering, Environmental Science and Engineering.

ABOUT INSTRUCTOR

Prof. Manoj Datta is currently Professor in Department of Civil Engineering at IIT Delhi. His areas of research include soil mechanics, geotechnical and foundation engineering, geoenvironmental engineering, landfill engineering, ground engineering, stability of slopes, earth dams and offshore soil mechanics.

COURSE PLAN:

Week 1 : Introduction, Sources & Impact of Contamination and Soil-Waste Interaction
Week 2 : Concepts of Integrated SWM &Geoenvironmental Engineering
Week 3: Principles and Planning of Landfills
Week 4: Liners for Landfills
Week 5 : Landfill Covers, Generation and Control of Leachate and Gas from Landfills
Week 6: Stability of Slopes and Settlement of Landfills
Week 7: Solved examples, Monitoring and Detection of Subsurface Contamination
Week 8: Costs, Construction Aspects and Site Selection of Landfills
Week 9: Control, Rehabilitation of Old Dumps and Contaminated Sites
Week 10: Slurry Deposited Waste and their Geotechnical Properties
Week 11: Planning & Design, Incremental Raisings and Failures of Slurry Ponds
Week 12: Environmental Control Measures at Slurry Ponds, Geotechnical Reuse of Waste, End Review.

CONCRETE TECHNOLOGY

PROF. B. BHATTACHARJEE
Department of Civil Engineering
IIT Delhi

TYPE OF COURSE: Rerun | Core | UG/PG **INTENDED AUDIENCE:** BE/ME i.e. B,Tech/M.Tech **PREREQUISITES:** Basic knowledge of Statistical mechanics	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

INDUSTRY APPLICABLE TO : L&T ECC, Ultra Tech Cement, JK Cements, ACC, Star Cement and all other cement companies. CPWD and all other PWDs.

COURSE OUTLINE

The course on "Concrete Technology" focuses on concrete making materials including supplementary cementitious materials. Concrete production process also forms a part of the discussion. Going through the course one would develop first-hand knowledge on concrete production process and properties and uses of concrete as a modern material of construction. The courses will enable one to make appropriate decision regarding ingredient selection and use of concrete.

COURSE INSTRUCTOR

Professor BishwajitBhattacharjee is working with the Department of Civil Engineering, Indian Institute of Technology Delhi, New Delhi (India). His research interests pertain to the domains of cement and concrete technology, building science, sustainable construction, and health monitoring of structures. His publications in these areas are well cited. He is also a recipient of the Indian Concrete Institute's Life Time Achievement Award.

COURSE PLAN:

Week 1: Introduction concrete as a material, ingredients, Production, composition, and properties; cement chemistry.
Week 2: Types of cements; special cements, aggregates :properties, tests and standard
Week 3: Water reducers, air entertainers, set controllers, specialty admixtures – structure properties, and effects on concrete properties; Introduction to supplementary cementing materials and pozzolans.

Week 4: Fly ash, blast furnace slag, silica fume, and met kaolin – their production, properties, and effects on concrete properties; other reactive and inert mineral additives.

Week 5: Basic principles; IS method; ACI method; new approaches based on rheology and particle packing.

Week 6: Batching of ingredients; mixing, transport, and placement; consolidation, finishing, and curing of concrete; initial and final set – significance and measurement; workability of concrete and its measurement

Week 7: Compressive strength and parameters affecting it; Tensile strength – direct and indirect; Modulus of elasticity and Poisson's ratio; Stress strain response of concrete.

Week 8: Modulus of elasticity and Poisson's ratio; Stress strain response of concrete. Creep and relaxation – parameters affecting; Shrinkage of concrete – types and significance; parameters affecting shrinkage; measurement of creep and shrinkage

Week 9: Introduction to durability; relation between durability and permeability;

Week 10: Chemical attack of concrete corrosion of steel rebars; other durability issues

Week 11: Properties and applications of: High strength – high performance concrete, reactive powder concrete; Lightweight, heavyweight, and mass concrete;

Week 12: Self-compacting concrete, fiber reinforced concrete; self-compacting concrete; other special concretes.

ELECTRICAL ENGINEERING

ANALOG ELECTRONIC CIRCUIT

PROF. SHOURIBRATA CHATTERJEE
Department of Electrical Engineering
IIT Delhi

TYPE OF COURSE: New | Core | UG **INTENDED AUDIENCE:** B.E/B.Tech **PREREQUISITES:** Should know basic circuit analysis	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

INDUSTRIES APPLICABLE TO: Texas Instruments, Cypress Semiconductors, SanDisk Technology, Western Digital, STMicroelectronics, Qualcomm, Free scale Semiconductors, Cadence, and Synopsys

COURSE OUTLINE:

This is a basic analog electronics course. The most important objective for electronic circuits is to build an amplifier. This course will develop the principles behind the design of an amplifier. You should be able to design an operational-amplifier independently well before the end of the course. The course will use MOS devices exclusively. Other analog circuit building blocks such as voltage regulators and power amplifiers will also be discussed.

ABOUT INSTRUCTOR:

Shouri Chatterjee received the B.Tech. degree in Electrical Engineering from the Indian Institute of Technology, Madras, in 2000, and the M.S. and Ph.D. degrees in Electrical Engineering from Columbia University, New York, in 2002 and 2005, respectively. From 2005 to 2006, he was a design engineer in the wireless division at Silicon Laboratories Inc., Somerset, NJ. Since November 2006 he has been with the faculty of the department of Electrical Engineering of the Indian Institute of Technology, Delhi, India. Currently he is the NXP/Philips chair professor at IIT Delhi.

COURSE PLAN:

Week 1 : Non-linear circuit analysis, diodes, load line concepts, introduction to the MOSFET
Week 2 : DC operating point, biasing the MOSFET, small signal model of the MOSFET, small signal analysis
Week 3 : Thevenin and Norton models, common source, common gate, common drain Circuits

Week 4 : Source degenerated common source amplifier, cascade and cascaded circuits

Week 5 : Current sources and current mirrors, biasing with current sources, constant gm circuits

Week 6 : Differential amplifiers, common mode and differential mode gains, CMRR, structure of a complete amplifier

Week 7 : Folded cascade differential amplifier, self-biased active-load differential Amplifier

Week 8 : Feedback: examples of feedback amplifiers, current and voltage sensing, current and voltage feedback; op-amps and op-amp circuits

Week 9 : High frequency model of the MOSFET, revision of common-gate, common- source, common-drain circuits; poles and zeros in the transfer function

Week 10 : Poles and zeros of cascade amplifier, Miller theorem, phase margin, unity gain bandwidth, compensation of the cascaded amplifier

Week 11 : Voltage regulators, LDOs, stability of regulators, power supply rejection, bandwidth

Week 12 : Power amplifiers, audio power amplifier, class-A/class-AB/class-B/class-C; push-pull class-AB power amplifier

ELECTRICAL ENGINEERING

NONLINEAR AND ADAPTIVE CONTROL

PROF. SHUBHENDU BHASIN
Department of Electrical Engineering
IIT Delhi

TYPE OF COURSE: New | Elective | PG **INTENDED AUDIENCE:** M.E/M.Tech,M.S,Ph.D **PREREQUISITES:** Nonlinear Systems/Nonlinear Control	**COURSE DURATION:** 4 weeks (13 Aug'18 - 07 Sep'18) **EXAM DATE :** 07 Oct 2018

COURSE OUTLINE:

This is an advanced course on control system design, covering fundamental aspects of adaptive control. A general methodology is developed for systematic design of controllers for systems with parametric uncertainty. It is expected that the students interested in taking this course should have a basic understanding of Lyapunov Stability Theory and working knowledge of MATLAB/Simulink.

ABOUT INSTRUCTOR:

Prof. S. Bhasin is currently an Associate Professor in the Department of Electrical Engineering at IIT Delhi. He is part of the Control and Automation group, and work in the area of nonlinear control and applications. Prior to joining IITD, he did his MS and PhD from the University of Florida, Gainesville, where he was part of the Nonlinear Controls and Robotics Lab. Research Interests: Nonlinear and Adaptive Control, Robotics, Autonomous Systems, Reinforcement Learning Control, Approximate Dynamic Programming

COURSE PLAN:

Week 1 : Introduction to Adaptive Control
Week 2 : Model Reference Adaptive Control
Week 3 : Robust Adaptive Control – 1
Week 4 : Robust Adaptive Control – 2

TEXTILE TECHNOLOGY

YARN MANUFACTURING: PRINCIPLE OF CARDINGAND DRAWING

PROF. R CHATTOPADHYAY
Department of Textile Technology
IIT Delhi

TYPE OF COURSE: New | Core | UG **INTENDED AUDIENCE:** B.E/B.Tech	**COURSE DURATION:** 8 weeks (06 Aug'18 - 28 Sep'18) **EXAM DATE :** 07 Oct 2018

COURSE OUTLINE:

Carding and drawing are two fundamental process in yarn manufacture. In carding the fibre tufts are opened, cleaned and separated thoroughly by fast moving pinned surfaces and then reassembled to form a nice 2D array of fibres which is subsequently transformed into a uniform sliver. Draw frame is essentially a stretching device for sliver used to improve mass irregularity of sliver and parallelization of fibres

ABOUT INSTRUCTOR:

Prof R. Chattopadhyay is Professor at the Department of Textile Technology, Indian Institute of Technology IIT Delhi. He is also an alumnus of this institute. He is involved in teaching, research, consultancy and organising courses for industry and academia. His area of expertise is staple fibre spinning, quality & process control, industrial ropes and product design.

COURSE PLAN:

Week 1 : Objectives of carding process, carding actions , working principle of carding machine, Card feed system, lap and continuous feed systems, design feature of taker-in/ licker-in, waste extraction, opening Intensity

Week 2 : Design feature of cylinder section, construction , design and working of flats, analysis of carding theory , carding force, fibre shedding, Transfer of fibres from cylinder to doffer, Technological significance of doffing arc, doffing of web , web condensation, Package formation: Forms of packaging, coiling, analysis of can drive

Week 3 : Motion transfer in card, draft and production calculations, card setting, significance of setting.

Week 4 : Card clothing: licker-in, cylinder ,doffer clothing; card tooth geometry, Operational load on cylinder , fibre transfer efficiency, carding process.

Week 5 : Autoleveller in card: principle of autolevelling, type of autoleveller, correction length, Fibre configuration in card sliver, mechanism of fibre hook and nep formation, cloudy web, Draw frame: Fundamentals of drafting, draft , ideal drafting, geometrical analysis of fibre movement in drafting

Week 6 : Objectives of drawing, Design features and working mechanism of draw frame. Drafting unit, drawing rollers, Drafting roller arrangement and its significance , package formation, Autoleveller in draw frame, Sliver irregularity and its control

Week 7 : Theory of drafting, Vasileff's model of drafting, drafting wave, Drafting force , draft vs drafting force, Roller setting: analysis of roller setting, influence of roller setting

Week 8 : Drawing process and its influence on fiber configuration in sliver, Draft and production calculation

COMPUTER SCIENCE

Introduction to parallel Programming in Open MP

PROF. YOGISH SABHARWAL
Department of Computer Science & Engineering
IIT Delhi

TYPE OF COURSE: Rerun | Elective | UG/PG **INTENDED AUDIENCE:** B.E/B.Tech,M.E/M.TECH, M.Sc,Ph.D **PREREQUISITES:** Students enrolling for this course should be comfortable with programming in C.	**COURSE DURATION:** 4 weeks (13 Aug'18 - 07 Sep'18) **EXAM DATE :** 07 Oct 2018

INDUSTRIES APPLICABLE TO: IBM, Intel, Amazon, Google, Microsoft, Cray.

COURSE OUTLINE:

This course focuses on the shared memory programming paradigm. It covers concepts & programming principles involved in developing scalable parallel applications. Assignments focus on writing scalable programs for multi-core architectures using OpenMP and C. This is an introductory course in shared memory parallel programming suitable for computer science as well as non-computer science students working on parallel/HPC applications and interested in parallel programming.

ABOUT INSTRUCTOR:

YogishSabharwal is a researcher at IBM Research and serves as an adjunct faculty at IIT Delhi. At IBM, he manages the high performance computing group, that ensures that real-world applications are able to extract the best performance out of HPC systems. He has 70+ papers including 3 best paper awards, 2 best paper nominations and a Gordon Bell finalist. His work has won several competitions organized in the HPC community.

COURSE LAYOUT

Week 1 :Single Processor Architecture and Basic Open MP constructs & functions

Week 2: More Open MP constructs & functions

Week 3 : Basic Linear Algebra using Open MP and Open MP tasks

Week 4:Critical Sections, locks and Matrix Factorization using Open MP

MATHEMATICS

STATISTICAL INFERENCE

PROF. NILLADRI CHATERJEE
Department of Mathematics
IIT Delhi

TYPE OF COURSE: New | Core | UG/PG **INTENDED AUDIENCE:** B.E/B.Tech,B.Sc/M.Sc **PREREQUISITES:** Background of Probability, Basic Knowledge of Data its collection and descriptive statistic	**COURSE DURATION:** 8 weeks (06 Aug'18 - 28 Sep'18) **EXAM DATE :** 07 Oct 2018

ABOUT THE COURSE:

This course aims at giving the foundation knowledge of Probability and Statistical Inference. In particular, it gives details of theory of Estimation and testing of hypothesis. Both theoretical aspect will be discussed and practical problems will be dealt with in great detail. This course will help students and practitioners of statistics at both UG and PG level. This course will also serve as a foundation course for students working on Machine Learning.

ABOUT INSTRUCTOR:

Current position: Professor, Department of Mathematics, Indian Institute of Technology, Delhi. Education: Ph.D. Computer Science, University of London, England(1995), M.Tech. Computer Science, Indian Statistical Institute, Calcutta(1986), M.Stat. Statistics, Indian Statistical Institute, Calcutta(1984), B.Stat. Statistics, Indian Statistical Institute, Calcutta(1982) Ph.D. Thesis: Title : Contributions to time-bounded Problem Solving using Knowledge-based Approach., Supervisor: Prof. J. A. Campbell, Dept. of computer Science, University College London.

COURSE PLAN:

Week 1 : Revision of Probability, Different Discrete and Continuous Distributions

Week 2 : Functions of Random Variables and their distributions, T, Chi-sq, F distributions and their Moments

Week 3 : Introduction of statistics and the distinction between Data and its properties, and probabilistic models

Week 4 : Estimator and methods of estimation, Properties of an estimator: Consistency, Unbiasedness, Efficiency and Sufficiency

Week 5 : Neyman Factorization, Cramer-Rao Bound

Week 6 : Confidence Intervals, Concepts of hypothesis testing, Characteristics of Good Hypothesis, null and Alternative Hypotheses, Types of Errors

Week 7 : Inference on Population mean, Comparing two population means, Inference on Variance, Comparing two population variance

Week 8 : Neyman Pearson Lemma

TEXTILE TECHNOLOGY

SCIENCE OF CLOTHING COMFORT

PROF. APURBA DAS
Department of Textile Technology
IIT Delhi

TYPE OF COURSE: New | Elective | UG/PG **INTENDED AUDIENCE:**: B.E/B.Tech,M.E/M.tech,M.Sc,Ph.D**PREREQUISITES:**Basic courses on Textiles	**COURSE DURATION:** 12 weeks (30 Jul'18 - 19 Oct'18) **EXAM DATE :** 28 Oct 2018

ABOUT THE COURSE:

Clothing comfort is one of the most important attributes of textile materials. A basic understanding of comfort aspects of textile materials would be extremely useful for fibre, yarn and fabric manufacturer, researcher, garment designer, processing industries, garment houses, users of the fabrics for speciality applications and all others related with textile and garment industries. The multidisciplinary nature of the subject, encompassing various concepts of physics, neurosciences, psychological science, material sciences, ergonomics, instrumentation and textile engineering would stimulate the minds for innovation, product design and development and material characterization with scientific approaches.

ABOUT THE INSTRUCTOR:

Prof. Apurba Das is Professor in the Department of Textile Technology, Indian Institute of Technology, Delhi. He has completed his Ph. D. from the same department in the year 1994. He has joined Indian Institute of Technology, Delhi in 2002 as a faculty after serving in the textile industries and in research organization for about 11 years. He has guided many Ph.D., M. Tech., B. Tech. students and presently guiding several Ph.D., M. Tech. and B. Tech. students. He has published more than 260 research papers in journals and conferences, authored and edited 05 books and written chapters in 18 books. He has successfully completed many research and consultancy projects from industries and government funding agencies. He has filed several patent applications. He has developed several instruments for characterization of textile materials. His main areas of teaching and research interest are clothing comfort, sports textiles, nonwovens and technical textiles, filter fabrics, geotextiles, medical bandage, textile composites, and instrumentation. He has international research collaborations with universities

from different countries like, Germany, Poland, Hungary, Slovenia, Italy, Portugal, China, South Korea, Australia, UK, Hong Kong, Croatia etc.

COURSE PLAN:

Week 1 : Introduction to Clothing Comfort
Week 2 : Psychology and Comfort
Week 3 : Neurophysiological Processes in Clothing Comfort
Week 4-5 : Tactile Aspects of Clothing Comfort
Week 6-7 : Thermal Transmission
Week 8-10 : Moisture Transmission
Week 11 : Dynamic Heat and Mass Transmission
Week 12 : Garment Fit and Comfort