

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE.

Dr. Babasaheb Ambedkar Technological University (Established as a University of
Technology in the State of Maharashtra)

(Under Maharashtra Act No. XXIX of 2014)

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National Education Policy (NEP) 2020

For

Department of Electrical Engineering Department

**Structure and Detailed Syllabus for
Open Electives Subjects**

**In line with New Education Policy 2020 (Effective from Academic year
2025-26 for main campus)**

Department of Electrical Engineering Department

Open Electives

In the vertical of Multidisciplinary courses, students need to cover Open Elective Courses (OE) of 08 credits. These 08 credits over semesters III to V, which are included in the basic min.160-max.176 Credits.

It is offered in Second and/or Third year. Refer to Semester wise credit distribution table given below. Faculty-wise baskets of OE are prepared by university which are chosen from faculty other than that of the Major Faculty i.e. in this case Major Faculty is Faculty of Engineering. Other Faculties considered are as follows:

1. Faculty of Management and Commerce
2. Faculty of Law
3. Faculty of Humanities and Arts
4. Faculty of Architecture and Planning
5. Faculty of Health Sciences
6. Faculty of Science

Students need to take up three-four courses of 08 credits over semesters III to V.

Elective Type	Subject Codes	Subject full name	Subject nature	Subject type	Subject credit
Faculty of Architecture and Planning	24UD1ARPOEM05B	Building Materials and Composites	THEORY	ELECTIVE	2
Faculty of Architecture and Planning	24UD1ARPOEM05D	Modern Indian Architecture	THEORY	ELECTIVE	2
Faculty of Architecture and Planning	24UD1ARPOEM05F	Contemporary Architecture and Design	THEORY	ELECTIVE	2
Faculty of Architecture and Planning	24UD1ARPOEM05A	Architectural Approaches to Decarbonization of Buildings	THEORY	ELECTIVE	3
Faculty of Architecture and Planning	24UD1ARPOEM05C	Building Materials as a Cornerstone to Sustainability	THEORY	ELECTIVE	3
Faculty of Architecture and Planning	24UD1ARPOEM05E	Sustainable Architecture	THEORY	ELECTIVE	3
Faculty of Health Sciences	24UD1HSCOEM05A	Basics of Health Promotion and Education Intervention	THEORY	ELECTIVE	2
Faculty of Health Sciences	24UD1HSCOEM05B	Research Methods in Health Promotion	THEORY	ELECTIVE	3
Faculty of Health Sciences	24UD1HSCOEM05C	Introduction to Psychology	THEORY	ELECTIVE	3
Faculty of Humanities and Arts	24UD1HAROEM05B	Folk and Minor Art in India	THEORY	ELECTIVE	2
Faculty of Humanities and Arts	24UD1HAROEM05C	Sustainable Happiness	THEORY	ELECTIVE	2
Faculty of Humanities and Arts	24UD1HAROEM05D	Soft Skill Development	THEORY	ELECTIVE	2
Faculty of Humanities and Arts	24UD1HAROEM05A	Developing Soft Skills and Personality	THEORY	ELECTIVE	2
Faculty of Humanities and Arts	24UD1HAROEM05E	Introduction to Market Structures	THEORY	ELECTIVE	3
Faculty of Humanities and	24UD1HAROEM05F	Human Resource Development	THEORY	ELECTIVE	3

Arts					
Faculty of Humanities and Arts	24UD1HAROEM05G	Educational Leadership	THEORY	ELECTIVE	3
Faculty of Humanities and Arts	24UD1HAROEM05H	Sustainable Development Goals	THEORY	ELECTIVE	3
Faculty of Humanities and Arts	24UD1HAROEM05I	Gender & Violence	THEORY	ELECTIVE	5
Faculty of Law	24UD1LAWOEM05A	Introduction to Law on Electricity	THEORY	ELECTIVE	2
Faculty of Law	24UD1LAWOEM05D	Conflict Management through Mediation	THEORY	ELECTIVE	2
Faculty of Law	24UD1LAWOEM05E	Biodiversity Protection , Farmers and Breeders Rights	THEORY	ELECTIVE	2
Faculty of Law	24UD1LAWOEM05B	New Labour Codes of India	THEORY	ELECTIVE	3
Faculty of Law	24UD1LAWOEM05C	Right to Information and Good Governance	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05A	Advanced Algorithmic Trading and Portfolio Management	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05B	Business Analytics & Text Mining Modeling using Python	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05E	Econometric Modelling	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05J	Fundamentals of Digital Marketing & e-Commerce	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05K	Corporate Communication	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05L	Basic Principle of Finance and Economy	THEORY	ELECTIVE	2
Faculty of Management and Commerce	24UD1MACOEM05C	Commodity Derivatives & Risk Management	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05D	E-Business	THEORY	ELECTIVE	3

Faculty of Management and Commerce	24UD1MACOEM05F	Introduction to Marketing Essentials	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05G	Security Analysis & Portfolio Management	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05H	Equity Stock Market	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05I	Total Quality Management	THEORY	ELECTIVE	3
Faculty of Management and Commerce	24UD1MACOEM05M	Marketing for entrepreneurship	THEORY	ELECTIVE	3
Faculty of Science	24UD1SCIOEM05B	Introduction to Quantum Computing: Quantum Algorithms and Qiskit	THEORY	ELECTIVE	1
Faculty of Science	24UD1SCIOEM05C	Quantum Information and Computing	THEORY	ELECTIVE	2
Faculty of Science	24UD1SCIOEM05F	CO2 Capture, Sequestration and Utilization	THEORY	ELECTIVE	2
Faculty of Science	24UD1SCIOEM05G	Waste to Energy	THEORY	ELECTIVE	2
Faculty of Science	24UD1SCIOEM05A	Quantum Computing	THEORY	ELECTIVE	3
Faculty of Science	24UD1SCIOEM05D	Dynamics of Classical and Quantum Fields	THEORY	ELECTIVE	3
Faculty of Science	24UD1SCIOEM05E	Introduction to MATLAB	THEORY	ELECTIVE	3
Faculty of Science	24UD1SCIOEM05H	History of Science & Technology	THEORY	ELECTIVE	3
Faculty of Science	24UD1SCIOEM05I	Algebra I	THEORY	ELECTIVE	5

List of Open Electives for Faculty of Management and Commerce

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Advanced Algorithmic Trading and Portfolio Management	4 Hrs/Week	8	2	IIT Kanpur	Prof. Abhinava Tripathi	https://nptel.ac.in/courses/110104169
2	Business Analytics & Text Mining Modeling using Python	4 Hrs/Week	8	2	IIT Roorkee	Prof. Gaurav Dixit	https://nptel.ac.in/courses/110107129
3	Commodity Derivatives & Risk Management	4 Hrs/Week	12	3	IIT Kharagpur	Prof. Prabina Rajib	https://nptel.ac.in/courses/110105168
4	E-Business	4 Hrs/Week	12	3	IIT Kharagpur	Prof. Mamata Jenamani	https://nptel.ac.in/courses/110105083
5	Econometric Modelling	4 Hrs/Week	8	2	IIT Roorkee	Prof. Sujata Kar	https://nptel.ac.in/courses/110107153
6	Introduction to Marketing Essentials	4 Hrs/Week	12	3	IIT Roorkee	Prof. Zillur Rahman	https://nptel.ac.in/courses/110107147
7	Security Analysis & Portfolio Management	4 Hrs/Week	12	3	IIT Roorkee	Prof. J. P. Singh	https://nptel.ac.in/courses/110107154
8	Equity Stock Market		6	3	Indian Institute of Management Bangalore (IIMB)	P C Narayan	

List of Open Electives for Faculty of Law

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Introduction to Law on Electricity	4 Hrs/Week	8	2	IIT Kharagpur	Prof. Uday Shankar	https://nptel.ac.in/courses/129105004
2	New Labour Codes of India	4 Hrs/Week	12	3	IIT Kharagpur	Prof. KD Raju	https://nptel.ac.in/courses/129105006
3	Right to Information and Good Governance	4 Hrs/Week	12	3	National Law School of India University	By Prof. Sairam Bhat	https://nptel.ac.in/courses/129106001
4	Conflict Management through Mediation	4 Hrs/Week	8	2	Vice Chancellor, National University of Study and Research in Law, Ranchi (NUSRL)	Prof. (Dr.) Ashok R. Patil	https://nptel.ac.in/courses/129106008
5	Biodiversity Protection , Farmers and Breeders Rights	4 Hrs/Week	8	2	IIT Kharagpur	By Prof. Padmavati Manchikanti , Prof. Narendran Thiruthy	https://nptel.ac.in/courses/129105008

List of Open Electives for Faculty of Humanities and Arts

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Developing Soft Skills and Personality	4 Hrs/Week	8	2	IIT Kanpur	Prof. T. Ravichandran	https://nptel.ac.in/courses/109104107
2	Folk and Minor Art in India	4 Hrs/Week	8	2	IIT Kanpur	Prof. Shatarupa Thakurta Roy	https://nptel.ac.in/courses/109104106
3	Sustainable Happiness	4 Hrs/Week	8	2	IIT Kharagpur	By Prof. Atasi Mohanty	https://nptel.ac.in/courses/109105493
4	Soft Skill Development	4 Hrs/Week	8	2	IIT Kharagpur	Prof. Priyadarshi Patnaik, Prof. V.N. Giri, Prof. D. Suar	https://nptel.ac.in/courses/109105110
5	Introduction to Market Structures	4 Hrs/Week	12	3	IIT Guwahati	Prof. Amarjyoti Mahanta	https://nptel.ac.in/courses/109103187
6	Human Resource Development	4 Hrs/Week	12	3	IIT Kharagpur	Prof. KBL Srivastava	https://nptel.ac.in/courses/109105121
7	Educational Leadership	4 Hrs/Week	12	3	IIT Kharagpur	Prof. Atasi Mohanty	https://nptel.ac.in/courses/109105122

List of Open Electives for Faculty of Architecture and Planning

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Architectural Approaches to Decarbonization of Buildings	4 Hrs/Week	12	3	School of Planning and Architecture, Vijayawada, An Institute of National Importance under the Ministry of Education, Govt. of India	Prof. Iyer Vijayalaxmi Kasinath	https://nptel.ac.in/courses/124106454
2	Building Materials and Composites	4 Hrs/Week	8	2	IIT Kharagpur	Prof. Sumana Gupta	https://nptel.ac.in/courses/124105013
3	Building Materials as a Cornerstone to Sustainability	4 Hrs/Week	12	3	School of Planning and Architecture, Vijayawada, An Institute of National Importance under the Ministry of Education, Govt. of India	Prof. Iyer Vijayalaxmi Kasinath	https://nptel.ac.in/courses/124106455
4	Modern Indian Architecture	4 Hrs/Week	8	2	IIT Roorkee	Prof. P.S. Chani	https://nptel.ac.in/courses/124107161
5	Sustainable Architecture	4 Hrs/Week	12	3	IIT Roorkee	Prof. Avlokita Agrawal	https://nptel.ac.in/courses/124107011
6	Contemporary Architecture and Design	4 Hrs/Week	8	2	IIT Roorkee	Prof. Saptarshi Kolay	https://nptel.ac.in/courses/124107005

List of Open Electives for Faculty of Health Sciences

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Basics of Health Promotion and Education Intervention	4 Hrs/Week	8	2	IIT Kharagpur	Dr. Arista Lahiri, Dr. Sweety Suman Jha, Prof. (Dr.) Chandrashekhar Taklikar, Prof.(Dr.) Madhumita Dobe	https://nptel.ac.in/courses/127105232
2	Research Methods in Health Promotion	4 Hrs/Week	12	3	IIT Kharagpur	Dr. Arista Lahiri, Dr. Sweety Suman Jha, Prof.(Dr.) Madhumita Dobe	https://nptel.ac.in/courses/127105237

List of Open Electives for Faculty of Science

Sr. No.	Course Name	Teaching Scheme	Duration (Weeks)	Credits	Institute Offering Course	Name of Professor/ Resource person	Link
1	Quantum Computing	4Hrs/Week	12	3	IIT Kanpur	Prof. Debabrata Goswami	https://onlinecourses.nptel.ac.in/noc19_cy31/preview#:~:text=Building%20up%20on%20the%20digital,the%20laws%20of%20quantum%20mechanics.
2	Introduction to Quantum Computing: Quantum Algorithms and Qiskit	4Hrs/Week	4	1	IIT Madras, IBM Research, IBM Systems	Prof. Prabha Mandayam, Prof. Anupama Ray, Prof. Sheshashaye Raghunathan	https://onlinecourses.nptel.ac.in/noc24_cs67/preview
	Quantum Information and Computing	4Hrs/Week	8	2	IIT Bombay	Prof. Dipan Ghosh Department of Physics	https://archive.nptel.ac.in/courses/115/101/115101092/
	Dynamics of Classical and Quantum Fields	4Hrs/Week	12	3	IIT Guwahati	Prof. Girish S. Setlur	https://onlinecourses.nptel.ac.in/noc22_ph29/preview

Detailed syllabus for Open Elective Courses in
Faculty of Management and Commerce

Advanced Algorithmic Trading and Portfolio Management

Week 1: Introduction to R Programming, R Fundamentals, Basic mathematical and logical operations with R, working with different data-types in R, wrangling with dataframes, Exploratory data analysis and data visualization with R.

Week 2: Introduction to Portfolio Construction : Risk-return framework in financial markets, risk diversification with portfolios, portfolio optimization in mean-variance framework, concept of market risk and beta, Portfolio Possibility curve, Efficient frontier, Minimum Variance portfolios, Introduction to risk-free lending and borrowing

Week 3: Asset Pricing Models: Capital Asset Pricing Model (CAPM), Capital Market Line, Security Market Line, Fallings of CAPM, Single-Index and Multi-Index models, Expected Risk and Return with Index models, 3-Factor Fama-French Model

Week 4: Portfolio Management and Performance Evaluation: Portfolio Management strategies, Active vs Passive Portfolio Management, Value vs Growth investing, One- parameter performance measures Timing & Selection performance measures, application of asset pricing models in performance management

Week 5: Introduction to Algorithmic Trading: Technical analysis and trend determination, Dow Theory, Moving averages, Momentum indicators, Classical price patterns.

Week 6: Advanced time-series regression algorithms: ARMA/ARIMA models, Mean reverting trading strategies with vector error correction models and cointegration, model risk management, back testing, model validation, and stress testing with R

Week 7: Advanced time-series algorithms for financial risk-management: Value-at-risk, Expected Shortfall, ARCH/GARCH models, implementation with R

Week 8: Advanced topics: Alternative versions of CAPM, Delineating Efficient Frontier, Performance Evaluation with Multi-index models, Portfolio construction, optimization, back-testing, and visualization with R

Business Analytics & Text Mining Modeling using Python

Week 1: Introductory overview of Text Mining

- Introductory Thoughts
- Data Mining vs. Text Mining
- Text Mining and Text Characteristics
- Predictive Text Analytics
- Text Mining Problems
- Prediction & Evaluation
- Python as a Data Science Platform

Python for Analytics

- Introduction to Python Installation
- Jupyter Notebook Introduction

Week 2: Python Basics

- Python Programming Features
- Commands for common tasks and control
- Essential Python programming concepts & language mechanics

Built in Capabilities of Python

- Data structures: tuples, lists, dicts, and sets

Week 3: Built in Capabilities of Python

- Functions, Namespaces, Scope, Local functions, Writing more reusable generic functions

Week 4: Built in Capabilities of Python

- Generators
- Errors & Exception Handling
- Working with files

Numerical Python

- N-dimensional array objects

Week 5: Numerical Python

- Vectorized array operations
- File management using arrays
- Linear algebra operations
- Pseudo-random number generation
- Random walks

Python pandas

- Data structures: Series and DataFrame

Week 6: Python pandas

- Applying functions and methods
- Descriptive Statistics
- Correlation and Covariance

Working with Data in Python

- Working with CSV, EXCEL files
- Working with Web APIs

Week 7: Working with Data in Python

- Filtering out missing data, Filling in the missing data, removing duplicates
- Perform transformations based on mappings
- Binning continuous variables
- Random sampling and random reordering of rows
- Dummy variables
- String and text processing
- Regular expressions
- Categorical type

Data Visualization using Python

- Matplotlib Library
- Plots & Subplots

Week 8: Text mining modeling using NLTK

- Text Corpus
- Sentence Tokenization
- Word Tokenization
- Removing special Characters
- Expanding contractions
- Removing Stopwords
- Correcting words: repeated characters
- Stemming & lemmatization
- Part of Speech Tagging
- Feature Extraction
- Bag of words model
- TF-IDF model
- Text classification problem
- Building a classifier using support vector machine

Commodity Derivatives & Risk Management

Week 1: Commodity Derivatives Trading & Commodity Exchanges, Commodity Contracts, Trading platform for Major Commodity Exchanges: Open Outcry vs. Electronics. Kerb Trading.

Week 2: Commodity Indices creation, Collateralized vs. uncollateralized index, commodity index based on contract side.

Week 3: Introduction to Futures & Forwards, Pricing & valuation, Futures Pricing Valuation for Storable/non Storable Commodity.

Week 4: Contango/Backwardation, Hedge Ratio, Pricing & Valuation of Commodity Options.

Week 5: Introduction to Options, Swaps, Exchange of Futures for Physicals, Pricing & Valuation.

Week 6: Commodity Price risk for Agricultural committee, Seasonality in prices, Contango, backwardation

Week 7: Commodity Price risk in Crude Oil & Natural Gas, LOOP Storage contracts Week

8: Gold & Silver, Base Metal Commodity Derivatives.

Week 9: Electricity Derivatives Pricing and Trading. Week 10:

Carbon Credit Derivatives, Pricing & Trading. Week 11:

Weather Derivatives.

Week 12: Miscellaneous Derivatives: Freight, Water, Property and Non-Farm Payroll Index, Salmon, Bitcoin Derivatives.

E-Business

Week 2: Making Functional Areas E-Business Enabled : Value chain and supply chain, inter and intra organizational business processes, ERP.

Week 3: Making Functional Areas E-Business Enabled : E-Procurement.

Week 4: Making Functional Areas E-Business Enabled : E-marketing, E-Selling, E-Supply Chain Management.

Week 5: Technologies for E-Business: Internet and Web based system.

Week 6: Technologies for E-Business: Security and payment systems.

Week 7: Technologies for E-Business: Supply chain integration technologies (EDI, RFID, Sensors, IoT, GPS, GIS).

Week 8: Technologies for E-Business: Supply chain integration technologies (Web services and cloud).

Week 9: Decision Support in E-Business: Web analytics.

Week 10: Decision Support in E-Business: Customer behavior modeling. Week

11: Decision Support in E-Business: Auctions.

Week 12: Decision Support in E-Business: Recommender systems.

Econometric Modelling

Week 1	:	Introduction
Week 2	:	Overview of Classical Linear Regression Model
Week 3	:	Multiple regression analysis and diagnostic tests
Week 4	:	Statistical inference and hypothesis testing
Week 5	:	Univariate Time Series Modelling
Week 6	:	Models with Binary Dependent and Independent Variables
Week 7	:	Multivariate Models
Week 8	:	Modelling Long Run Relationships

Introduction to Marketing Essentials

Week 1: Creating Customer Relationships and Value Through Marketing, TheNew Realities of Marketing, Developing Successful Marketing and Organizational Strategies.

Week 2: Organizing and Managing the Marketing Department, Developing a Marketing

Strategy, Understanding the Marketing Environment, Ethical Behavior, and Social Responsibility, Understanding Consumer Behavior.

Week 3: Understanding Consumer Behavior (Continued), Understanding Organizations as Customers.

Week 4: Understanding and Reaching Global Consumers and Markets, Marketing Research: From Customer Insights to Actions.

Week 5: Market Segmentation, Targeting, and Positioning, Crafting Customer Value Proposition, Sustainable Competitive Advantage and Communicating Positioning.

Week 6: Developing New Products and Services

Week 7: Developing New Products and Services(Continued), Managing Successful Products, Services, and Brands.

Week 8: Managing Successful Products, Services, and Brands (Continued), Pricing Products and Services.

Week 9: Managing Marketing Channels and Supply Chains, Retailing and Wholesaling.

Week 10: Integrated Marketing Communications and Direct Marketing, Advertising, Sales Promotion, and Public Relations, Using Social-Media to Connect with Consumers.

Week 11: Using Social-Media to Connect with Consumers (Continued), Personal Selling and Sales Management, Implementing Interactive and Multichannel Marketing.

Week 12: Managing Growth: Addressing Competition and Driving Growth, Building Customer Loyalty, Socially Responsible Marketing.

Security Analysis & Portfolio Management

Week 1: Concept of Investment, Investment Objectives and Constraints, Investment Classification. Financial Markets & Instruments, their role & classification. Regulation of Securities Markets, Primary & Secondary Markets, Trading, Clearing and Settlement procedures, Market Indices.

Week 2: Concept & Measures of Risk and Return, Portfolio Risk & Return, Reduction of Risk through Diversification.

Week 3: Concept of Intrinsic Valuation, Cash Flow based Equity Stock Valuation Models. Value Added & Asset based valuation. Use of Multiples & Relative Value.

Week 4: Fundamental Analysis for Determination of Inputs to Equity Valuation, Cash Flow &

Profitability Forecasting, EIC Framework, Economic Forecasting Methods, Industry Analysis, Industry Life Cycle, Structural Analysis.

Week 5: Company Analysis, Publicly accessible Corporate Information, Tools of Financial Statement Analysis.

Week 6: Financial Statement Analysis including Impact of Changes in Accounting Policies, Depreciation Methods, Revaluation of Fixed Assets, Foreign Exchange Transactions, Amortization of Preliminary and Preoperative Expenses, R&D Expenditure, Valuation of Inventory, Treatment of Leases etc.

Week 7: Measures of Bond Returns, YTM & Holding Period Yields, Bond Valuation, Spot & Forward Interest Rates, Term Structure & Yield Curves, Interest Rate Sensitivities, Duration & Elasticities. Key Rates & Bucket Rates.

Week 8: Efficient Market Hypothesis, Technical Analysis: Dow Theory, Types of Charts, Price Patterns, Trend Lines, Trend Channels, Support and Resistance Levels, Relative Strength Analysis, Moving Averages, Breadth of the Market, Volume, Momentum.

Week 9: Portfolio optimization in the mean variance framework: two security case, various combinations of risky & risk-free assets, implications of the results, concept of efficient frontier. Concept of Utility & Indifference Curves, Optimal Portfolio Selection.

Week 10: The multi-security case of portfolio optimization, Tracing of the full efficient frontier with/without the existence of risk-free asset.

Week 11: Single Index & Capital Asset Pricing Model, Systematic and Unsystematic Risk, Beta of a Portfolio, CML & SML, Arbitrage Pricing Theory, Comparison of CAPM and APT, Applications of APT.

Week 12: Active & Passive Portfolio Management, Portfolio Revision of Equity Portfolios, Measuring and Evaluating Portfolio Performance, Measures of Return on Active Portfolios, Buying the Index Approach. Fixed Income Portfolio Management. Active vs Passive Strategies, Portfolio Management Using Derivatives.

Equity Stock Market

Week 1: Overview of Equity Stock Markets

- Overview and Planner for Week 1
- Financial Markets: An Overview
- Equity Stock Market: An Overview
- Estimating the Price of Equity Stocks
- Equity Stock Market: Market Mechanism
- Equity Stock Market: Indices and Regulatory Mechanism
- Summary and Additional Reading

Week 2: Underlying Theories Governing Equity Stock Markets

- Overview and Planner for Week 2
- Fundamental Analysis
- Technical Analysis
- Fundamental vs. Technical Analysis
- Moving Averages
- Dow Theory
- Elliot Wave Theory
- Summary and Additional Readings

Week 3: Equity Risk and Portfolio Theories

- Overview and Planner for Week 3
- Equity Risk : An Overview
- Introduction to Portfolio Theory
- Portfolio Theory - CAL and CML
- Portfolio Theory - SML and CAPM
- Evaluating Equity Portfolio using Sharpe Ratio, Treynor Ratio and Jensen's Alpha
- Summary and Additional Readings

Week 4: Hedging Using Derivatives in Equity Stock Markets

- Overview and Planner for Week 4
- Derivatives in Equity Market
- Hedging Using Stock Futures
- Hedging Using Index Futures
- Hedging Using a Single Option
- Multiple Options and Trading
- Strategies
- Summary and Additional Readings

Week 5: VaR, Margins, Private Equity Market and Venture Capital

- Overview and Planner for Week 5
- VaR (Value at Risk)
- Computing and Enforcing Margins

- Private Equity Market
- Venture Capital
- Summary and Additional Readings

Detailed syllabus for Open Elective Courses in

Faculty of Law

Introduction to Law on Electricity

- Week 1 : Introduction of the Electricity Law; Constitutional Design; Brief Description of Pre-2003 Act and Post - 2003 Act
- Week 2 : Energy Security and Energy Mix and the Role of the Electricity Act; Relevance of National Electricity and Tariff Policies.
- Week 3 : De-licensing of Generation and Captive Power Plant
- Week 4 : Transmission and Load Dispatch Centre
- Week 5 : Open Access and Tariff
- Week 6 : Trading of Electricity and Trading Market
- Week 7 : Distribution and Universal Service Obligation
- Week 8 : Interest of Consumer and Redressal of the Grievances; Renewable Energy and 2003 Act including Renewable Purchase Obligations; Net and Gross Metering.

New Labour Codes of India

Week 1:

1. Introduction
2. Government Policies
3. History of Labour Laws in the Country
4. History: Previous Social Legislations in India (Cont...)
5. National Labour Commission Reports

Week 2:

6. Evolution of Trade Unions in India
7. Constitutional Freedom to Form Association and Unions
8. International Labour Organization on Trade Unions
9. Trade Union – Definition, Registration, Cancellation, Management of Funds
10. Trade Union – Recognition, Immunities

Week 3:

11. Industrial Dispute – Introduction, Definitions
12. Resolution of Industrial Disputes
13. Concept of Workmen, Contract of service, Contract for service
14. Strike
15. Lock-out

Week 4:

16. Lay-Off
17. Retrenchment
18. Closure of Undertakings
19. Industrial Employment (Standing Orders)
20. Disciplinary Action and Procedures

Week 5:

21. The Code on Wages 2019 – An Introduction
22. Minimum Wages, Floor Wages, Central and State Advisory Board
23. Payment of Wages, Deductions & Recovery, Fines
24. Equal Remuneration
25. Bonus

Week 6:

- 26.C131: Minimum Wage Fixing Convention, 1970
- 27.C026: Minimum Wage – Fixing Machinery Convention, 1928; C099: Minimum Wage Fixing Machinery (Agriculture) Convention, 1951
- 28.C095: Protection of Wages Convention, 1949
- 29.C100: Equal Remuneration Convention, 1951: International Instruments on Equality of Pay
- 30.C173: Protection of Workers' Claims (Employer's Insolvency) Convention, 1992; C111: Discrimination (Employment and Occupation) Convention, 1992

Week 7:

31. Code on Social Security, 2020 – Introduction
32. Definitions under Social Security Code, 2020
33. Social Security Organizations (SSO)
34. Employee's Compensation and Benefits
35. The Concept of arising out of and in the course of employment

Week 8:

36. Employees State Insurance
37. Different Benefits under the ESI Scheme
38. Employee's Provident Fund
39. Gratuity
40. Maternity Benefit

Week 9:

41. Social Security in case of Building and other Construction Workers
42. Social Security for Unorganized sector and Platform workers
43. Bonded Labour System Abolition and Regulation
44. Child Labour Prohibition
45. Plantation Labour

Week 10:

46. Occupational Safety, Health and Working Conditions Code, 2020 – Introduction, Definitions
47. Occupational Safety and Health
48. Health Safety and Working Conditions, Welfare Provisions
49. Regulation of Working Hours and the Concept of Decent Work
50. Duties of Employer and Employees, Special Provisions relating to Employment of Women, Hours of Works, Annual Leave with Wages, Maintenance of Registers

Week 11:

51. The Meaning of Factory, Manufacturing Process, Approval and Licensing of Factories
52. Role of Inspector-cum-facilitator and Other Authorities
53. Social Security Fund, Offences and Penalties
54. Contract Labour and Proposed ILO Convention
55. Inter-State Migrant Workers

Week 12:

56. Mines Workers
57. Beedi and Cigar Workers (Kerala & West Bengal Legislations)
58. Audio-Visual workers, Cine-workers and Dock workers
59. The Effective Abolition of Child Labour (ILO: C029, C105, C138 & C182)
60. The Governance Convention of ILO Labour Standards

Right to Information and Good Governance

Week 1: History and Background to RTI Week 2:

- Legislating RTI
- Official Secrets Act and RTI
- Role of NGOs and activist in RTI
- Mis-use of RTI
- Important SC and HC judgments in RTI

Week 3: Constitution and RTI

Week 4: Salient Features of RTI-1 Week

5: Salient features of RTI-2

Week 6: Powers and Functions of Information Commission Week

7: Public Authority

Week 8: Exempted Information Week 9:

RTI & Its interface

- Public Records Act
- Whistleblowers Protection Act

- Judiciary and RTI

Week 10:

- Ecological perspective on RTI
- Lessons from RTI: Sakaala: Public Service Guarantee Act

Week 11: RTI: A comparative perspective

- Comparative Constitutional and Comparative FOI regime
- RTI in Srilanka

Week 12: How to Draft RTI Application and Appeals: Do it yourself

Conflict Management through Mediation

Week 1: Introduction

- Basic Introduction
 - Historical Perspective and Evolution in India
 - Legal Recognition of Mediation in India
 - Conflict and Conflict Management
- (Relevant Case Laws)

Week 2: Concept of Mediation

- Basic Principles of Mediation
 - Types of Mediation
 - Advantages of Mediation
- (Relevant Case Laws)

Week 3: Comparison of Judicial Process and Various ADR Processes

- A comparative Analysis of Judicial Process with modes of Alternate Dispute Resolution like Arbitration, Mediation, Conciliation, Negotiation and Lok Adalats.
- Illustrations to understand the difference and identify suitable conditions for ADR.

Week 4: Process of Mediation

- Pre-litigation Mediation
 - Post-litigation Mediation
 - Stages of Mediation
 - Challenges
 - The Mediation Act, 2023
- (Relevant Case Laws)

Week 5: Mediators

- Role of Mediators
 - Ethics
 - Communication in Mediation
- (Relevant Case Laws)

Week 6: Mediation under Consumer Protection Act, 2019

- Introduction of the Mediation under Consumer Protection Act, 2019
- Chapter V- Mediation
- Consumer Protection (Mediation) Rules, 2020
- Consumer Protection (Mediation) Regulations, 2020 (Relevant Case Laws)

Week 7: Mediation under other related laws

- Mediation under the Commercial Courts, 2015, Family Court Act, 1984, the Banking Ombudsman Scheme, 2006 and the Companies Act, 2013
- United Nations Convention on International Settlement Agreements Resulting from Mediation, 2018 (the "Singapore Convention on Mediation")
- Online Mediation including ODR Report
- ODR Policy of NITI Aayog (Relevant Case Laws)

Week 8: Drafting and Enforcement

- Enforcement of Mediation Outcome
- Drafting Mediation Settlement

Biodiversity Protection, Farmers and Breeders Rights

Week 1: Concept and Scope of biodiversity protection

1. Concept and Scope of biodiversity protection
2. Types of biodiversity, mega-biodiverse centers,
3. Type of bio-resources, conservation mechanisms
4. International resources/centers of conservation
5. Traditional Resource rights, ecosystem measures

Week 2: Protection of Biological diversity: International mandate

1. Overview of International framework
2. Convention on Biodiversity - Objectives and Articles
3. International Regime on ABS
4. Biodiversity and Climate Change
5. Biobanks – Governance issues

Week 3: Protection of Biological Diversity -Indian position

1. The Biological Diversity Act, 2002
2. Regulatory authorities in India – NBA & SBB
3. Biodiversity Management Committees
4. People Biodiversity Registers
5. ABS Regulation and Benefit Sharing Procedures in India

Week 4: CBD, TRIPS and other treaties relevant to biodiversity protection – Interrelationship and Developments

1. Trade regime and Biodiversity
2. Comparison of Biodiversity Laws of countries
3. TRIPS-CBD relation
4. CBD and relation to other international treaties related to environment and organization of related bodies
5. Interrelationship and new Developments

Week 5: Biodiversity and Intellectual Property Rights

1. Biodiversity and Interface with IPR
2. Challenges related to Bio piracy - Case Studies
3. Patenting Biodiversity – Recent trends and Developments
4. Disclosure Requirements in Patent – Comparative Perspective
5. Regulatory Law – Comparative Perspective

Week 6: Plant Breeding and breeders' right v the farmers' right

1. Concept, Definitions and Criteria for Plant Variety Protection.
2. Protection of Plant Varieties and Farmers' Right 2001 - Major provisions of the Act
3. Plant Variety protection in US, EU, Japan, China etc.,
4. International Union for protection of new plant varieties (UPOV)
5. Farmers' Rights – other country models

Week 7: Biodiversity Governance and Compliance Procedures – Comparative Perspective

1. Principles of Biodiversity Governance
2. Compliance Procedures and Linkage with IPR
3. Compliance Procedures under International Framework
4. Compliance Procedures in India
5. Compliance Procedures in EU

Week 8: Biodiversity and Human Wellbeing

1. Biodiversity and Interrelationship with Life
2. Sustainable Development Agenda
3. Biodiversity, ecosystem functioning, ecosystem services
4. Biodiversity and Human Happiness
5. Nature Protects if She is Protected

Detailed syllabus for Open Elective Courses in

Faculty of Humanities and Arts

Developing Soft Skills and Personality

Week 1: Lecture 1: Introduction: A New Approach To Learning

Lecture 2: Planning and Goal-Setting

Lecture 3: Human Perceptions: Understanding People

Lecture 4: Types Of Soft Skills: Self-Management Skills

Lecture 5: Aiming For Excellence: Developing Potential And Self-Actualisation

Lecture 6: Need Achievement and Spiritual Intelligence

Week 2: Lecture 7: Conflict Resolution Skills: Seeking Win-Win Solution

Lecture 8: Inter-Personal Conflicts: Two Examples

Lecture 9: Inter-Personal Conflicts: Two Solutions

Lecture 10: Types Of Conflicts: Becoming A Conflict Resolution Expert

Lecture 11: Types Of Stress: Self-Awareness About Stress

Lecture 12: Regulating Stress: Making The Best Out Of Stress

Week 3: Lecture 13: Habits: Guiding Principles

Lecture 14: Habits: Identifying Good and Bad Habits

Lecture 15: Habits: Habit Cycle

Lecture 16: Breaking Bad Habits

Lecture 17: Using The Zeigarnik Effect For Productivity And Personal Growth

Lecture 18: Forming Habits Of Success

Week 4: Lecture 19: Communication: Significance Of Listening

Lecture 20: Communication: Active Listening

Lecture 21: Communication: Barriers To Active Listening

Lecture 22: Telephone Communication: Basic Telephone Skills

Lecture 23: Telephone Communication: Advanced Telephone Skills

Lecture 24: Telephone Communication: Essential Telephone Skills

Week 5: Lecture 25: Technology And Communication: Technological Personality

Lecture 26: Technology And Communication: Mobile Personality?

Lecture 27: Topic: Technology And Communication: E-Mail Principles

Lecture 28: Technology And Communication: How Not To Send E-Mails!

Lecture 29: Technology And Communication: Netiquette

Lecture 30: Technology And Communication: E-Mail Etiquette

Week 6: Lecture 31: Communication Skills: Effective Communication

Lecture 32: Barriers To Communication: Arising Out Of Sender/Receiver's

Personality

Lecture 33: Barriers To Communication: Interpersonal Transactions
Lecture 34: Barriers To Communication: Miscommunication
Lecture 35: Non-Verbal Communication: Pre-Thinking Assessment-1
Lecture 36: Non-Verbal Communication: Pre-Thinking Assessment-2

Week 7: Lecture 37: Nonverbal Communication: Introduction And Importance

Lecture 38: Non-Verbal Communication: Issues And Types
Lecture 39: Non-Verbal Communication: Basics And Universals
Lecture 40: Non-Verbal Communication: Interpreting Non-Verbal Cues
Lecture 41: Body Language: For Interviews
Lecture 42: Body Language: For Group Discussions

Week 8: Lecture 43: Presentation Skills: Overcoming Fear

Lecture 44: Presentation Skills: Becoming A Professional
Lecture 45: Presentation Skills: The Role Of Body Language
Lecture 46: Presentation Skills: Using Visuals
Lecture 47: Reading Skills: Effective Reading
Lecture 48: Human Relations: Developing Trust And Integrity

Folk and Minor Art in india

Week 1: Changing definition of Folk and Minor Art

- Timeline and Regions: General Mapping
- Traditional Roots: Elements and Principles
- Timelessness : Primitive Connection
- Evolution in Purpose: Ritualistic to Propagative
- Contemporary Practice

Week 2: Classification and Connections: Traditional Roots

- Available literary recourses
- Mythical Associations
- Idea of Nationalism in the Context of Folk art
- Idea of Modernism In the context of Folk Art
- Relevance of the Art Practice

Week 3: Contextualization and Decontextualization

- Concept of Communication for Social Purpose
- Aesthetic Perspective
- Secularity and Religious Plurality
- Ethnographic perspective on the study of Folk Art and Culture
- About the Exponents who brought the culture under the limelight

Week 4: Contextualization and Decontextualization

- School of Art in Madhubani Painting
- Art as a Feminine Preserve vs the Male painters of Madhubani
- Yamapata, Pytkar and other art practice of Jharkhand Yamapata by the Jadopatias
- Sohari Painters and their Art
- Patachitra of Bengal and Odisha

Week 5: Continuum of the Practice: Ancient Centres and Contemporary

- Case study 1 Stylistic Variety in Bengal
- Case study 2 Stylistic Variety in Odisha
- Case study 3 Stylistic Variety in Andhra Pradesh
- Exponents and their Contributions
- Hypothesis on Possible Stylistic influences

Week 6: Characteristics of Contemporary Collection

- Thematic Analysis
- Iconic Analysis
- Semiotic Analysis
- Effect of narratives: Qualitative Evaluation
- Individual Expression in Contemporary Art

Week 7: Cultural Condition: Colonial and Post colonial Ideologies

Social Formation during Preindependence

New Aesthetics: early Prints and Battala Prints

Artist Block Makers and Hybrid Aesthetics of Urban Folk Art

Kalighat Painting to Haripura Posters: A synergy

Jamini Roy: Accommodating Vernacular Idiom in Academic Practice

Week 8: Coexistence and Collaborations with Mainstream Art

Strategies for Future and Sustainability: Vision and Revision

Alternative Context: place of folk art in Contemporary Lifestyle

Ancient literary sources and canonization: Scholarly Comments

Need of Paradigm Shift

Conclusion

Sustainable Happiness

Week 1: Unit I-Sustainable Happiness-

A Sustainable sense of Self

- a. Sustainable Wellbeing
- b. Happiness & Collective Wellbeing
- c. Sustainable Happiness Theory (Catherine O'Brien)
- d. Happy Classrooms & Green Schools

Week 2: Unit II- Pedagogy of Sustainable Happiness-

- a. Education for Sustainable Happiness
- b. Learning a Path not a Goal
- c. Contemplative learning for Sustainable Transformations
- d. Happiness Curriculum: Need for Responsive pedagogy
- e. Education for Sustainable Environment/ Ecosystem

Week 3: Unit III- Sustainable Happiness at Work

- a. Positive Work culture & HR wellbeing
- b. Positive Cognitive & Emotional states & processes in the Workplace
- c. Pro-Social behavior & Mental health wellbeing
- d. Continuous Professional development
- e. Building Resilient Organizations
- f. Interplay of Sustainability& Happiness at Work

Week 4: Unit IV- Sustainable Organizations

- a. Corporate Social Responsibility & Sustainability
- b. Leveraging Workplace Diversity,
- c. Work Ethics, Equity & Inclusion Initiatives

- d. Sustainability Policies & Practices
- e. Sustainable Employee Training , happiness & wellbeing

Week 5: Unit V- Sustainable Leadership

- a. Sustainability & Leadership
- b. Transforming Self & Others
- c. Sustainability Competences
- d. Sustainable Lifestyle, Work-life balance & Wellbeing practices
- e. Nurturing knowledge & positive attributes for In-house Sustainable Leadership grooming

Week 6: Unit VI- Positive Psychology & Sustainable Happiness

- a. Positive character strengths for Sustainable Happiness
- b. Positive & Creative organizations
- c. Nurturing talent & Career growth
- d. Strength-based development in practice (Nudging)
- e. Habits of Mind & Life skills for Sustainable Happiness
- f. Sustainable Consumption, & Conservation of Resources

Week 7: Unit-VII - Sustainable Wellbeing-

- a. Challenges & Opportunities
- b. Need for sustainable learning & practices
- c. Creativity and Innovation
- d. Consumer Wellbeing & Socio-cultural Sustainability
- e. Convergence of Triple Bottom-line-Sustainable Ecology, Economy & Just Societies

Week 8: Unit VIII- Sustainable Happiness & UNESCO SDGs

- a. Education for Sustainable Development (ESD) for achieving UNESCO Sustainable Development Goals (17 SDGs),
- b. ESD for Organizational Sustainability
- c. ESD for Social Transformation
- d. Value Creation through ESG (Environment-Society-Governance) Services & Strategy
- e. Implementing ESD & ESG for Sustainable Collective Happiness/Wellbeing

Soft Skill Development

Week 1: Communication skills 1: The basics

Topics to be covered:

- i. Understanding the communicative environment-I
- ii. Understanding the communicative environment-II
- iii. What to listen for and why
- iv. When to speak and how
- v. Starting and sustaining a conversation

Week 2: Communication skills 2 : Presentation and interaction

- i. What to present and how – I
- ii. What to present and how – II
- iii. Multimedia presentation: Understanding the basics
- iv. Communication styles
- v. Speaking in groups

Week 3: Communication skills 3: Visual, nonverbal and aural communication

- i. The world of visual culture
- ii. Visual perception
- iii. The aural: Its relevance and impact
- iv. The body and the way it communicates
- v. The face, its expressions and what it says

Week 4: Interpersonal communication 1: Individuals, groups and cultures

- i. Building Relationships
- ii. Understanding Group Dynamics- I
- iii. Understanding Group Dynamics- II
- iv. Groups, Conflicts and their Resolution
- v. Social Network, Media and Extending Our Identities

Week 5: Interpersonal communication 2: Emotional and social skills

Week 6: Developing key traits 1: Creativity, critical thinking and problem solving

Week 7: Developing key traits 2: Motivation, persuasion, negotiation and leadership

- i. Motivating oneself
- ii. The art of persuasion-I
- iii. The art of persuasion-II
- iv. From persuasion to negotiation
- v. Leadership and motivating others

Week 8: Essential and vocational skills: survival strategies

- i. Managing time
- ii. Managing stress
- iii. Resilience
- iv. Work-life balance
- v. Applying soft-skills to workplace

Introduction to Market Structures

Week-1: Introduction to Industrial Organization, Consumer behavior and Derivation of Demand curve

Week-2: Production and Cost curves

Week-3: Competitive Market

Week-4: Monopoly

Week-5: Game Theory: Static games of complete information (Nash equilibrium)

Week-6: Dynamic games of complete information (Subgame perfect Nash equilibrium)

Week-7: Cournot Competition

Week-8: Bertrand Competition Week-

9: Stackelberg Games Week-10:

Product Differentiation Week-11:

Entry Deterrence Week-12: Bundling and Tying

Human Resource Development

Week 1: Introduction to Human Resource Development: Emergent of HRD, Critical HRD roles, challenges for HRD

Week 2: HRD in global perspective, HRD- Performance link, Strategic perspective of HRD Week

3: HRD Process Model: identification of HRD needs and Design and development of HRD programmes

Week 4: HRD Process Model: Methods of Implantation, Evaluation of HRD programmes Week

5: Employee coaching and performance management: Coaching to improve poor performance, coaching analysis, coaching discussion, coaching skills

Week 6: HRD interventions: Mentoring for employee development: Role of mentoring in development, understanding the role and responsibilities of mentor, mentee, implementing the mentoring process, mentoring relationship,

Week 7: Employee counseling for HRD: Overview of counseling programmes, employee assistance programme, stress management, employee wellness and health promotion

Week 8: Competency framework of HRD: why competency mapping? Understanding the competency mapping framework, steps in competency mapping

Week 9: Career Planning, management, and development: Career development stages and activities, role of individual and organization in career planning, Issues in career management

Week 10: Intellectual capital (IC), its measurement and management: Components of IC, measurement models of IC, IC index and challenges for HR

Week 11: HRD, Organizational Learning, and learning organizations

Week 12: The future of HRD and HRD Ethics: Research, practice and education of HRD for innovation and talent development and management, Role of HRD in developing ethical attitude and behavior and development, Ethical problems with HRD roles

Educational Leadership

Week 1: Educational Management & Leadership: Issues & challenges Week

2: Professional Development & the Reflective Practitioner Week 3:

Professional Ethics & Values in Teaching

Week 4: Key Challenges for Educational Leaders: Grooming Capable & Authentic Educational Leaders

Week 5: Emotional Intelligence & Educational Leadership

Week 6: Leadership for Managing Diversity & Inclusion in Education

Week 7: Educational Leadership in a changing World : 21st Century Challenges

Week 8: Innovative Pedagogy ,Technology & Turnaround Leadership : The Stakeholders' Perspectives

Week 9: New Normal Education, Digital Pedagogy & Online classes, Online Assessment, Evaluation & Feedback Challenges & Opportunities

Week 10: Adult Learning/Andragogy Concept, Process & Outcomes, Critical Self-reflection & Contemplative Learning, National Education Policy 2020 , MOOCs Sustainability Competences

Week 11: Transformative Learning: Theory and Practice, Paradigm shift for Indian Education system

Week 12: UNESCO Sustainable Development Goals(SDGs)- (SDG 4 and 4.7), Quality Education, Inclusive Education, Education for Sustainable Development(ESD) Global citizenship, Sustainable Leadership, Relationship building, Multi-stakeholder partnerships,

Detailed syllabus for Open Elective Courses in

Faculty of Architecture and Planning

Architectural Approaches to Decarbonization of Buildings

Week 1:

Module 1- Green House Gas Emission

1. Introduction to Green House Gases
2. GHG- Global Scenario and Indian Scenario
3. Strategies to reduce GHG emissions
4. Challenges and future trends in reducing GHGs in building industry

Week 2:

Module 2- India's stand on Decarbonization

5. India's current scenario -Economic & social characteristics on decarbonization
6. India's Environmental & energy strategy towards decarbonization
7. Strategic Low Emissions Development Transitions
8. India's approach to long low carbon development

Week 3:

Module 3- Embodied Energy and Embodied Carbon

9. Adaptation and Resilience to Climate Change
10. What is Embodied Energy and Embodied Carbon
11. Strategies to reduce Embodied Carbon in Built Environment
12. Impact, challenges and future trends in Embodied Carbon

Week 4:

Module 4- Operational Energy and Operational Carbon

13. Introduction to Operational energy and Operational carbon
14. Energy Benchmarking and Standards
15. Impact of Reducing Operational Energy and Carbon
16. Impact, challenges and future trends in operational energy and carbon reduction

Week 5:

Module 5- Architectural and Planning Strategies for Low Energy Consumption – Part 1

17. Passive architecture - Planning strategies
18. Factors Influencing Orientation
19. Passive architecture – Building Form
20. Passive architecture - Planning strategies

Week 6:

Module 6- Architectural and Planning Strategies for Low Energy Consumption – Part 2

- 21. Passive architecture - Planning strategies
- 22. Passive architecture with appropriate Planning strategies – Case study
- 23. Passive architecture with appropriate Planning strategies – Case study
- 24. Carbon neutrality through Passive Architecture - Openings

Week 7:

Module 7- Landscaping and Carbon Neutrality

- 25. Carbon neutrality through Passive Architecture - Openings
- 26. Carbon Neutral architectural design with Vegetation
- 27. Role of Landscaping in Carbon Neutrality with respect to climate - Part 1
- 28. Role of Landscaping in Carbon Neutrality with respect to climate- Part 2

Week 8:

Module 8- Renewable and Non-renewable Building Materials

- 29. Design with Plant Life - Strategies
- 30. Renewable and Non Renewable Materials – Part 1
- 31. Renewable and Non Renewable Materials – Part 2
- 32. Case study examples- Buildings using Renewable and Non Renewable BM

Week 9:

Module 9- Low energy Building Envelope

- 33. Case study examples- Buildings using Renewable and Non Renewable BM
- 34. Low Energy Envelope
- 35. Static vs. Dynamic Building Envelopes
- 36. Dynamic Low Energy Building Envelope – Case study- Part 1

Week 10:

Module 10- Natural Daylighting as a Strategy – Part 1

- 37. Dynamic Low Energy Building Envelope – Case study- Part 2
- 38. Strategies and future of Low Energy envelopes
- 39. Natural Daylighting in Buildings
- 40. Systems, technologies, and architecture-Daylight strategies

Week 11:

Module 11- Natural Daylighting as a Strategy – Part 2

- 41. Strategies for Natural Lighting
- 42. Efficient Daylighting in Buildings- Case Study- Part 1
- 43. Efficient Daylighting in Buildings- Case Study- Part 2
- 44. Embodied Carbon Value for Various Materials (Indian Context)

Week 12:

Module 12- Recap and Concluding lecture

- 45. Embodied Carbon Value for Various Materials (Indian Context)
- 46. Impact of Building Materials on Embodied Carbon
- 47. Material Considerations for Specific Elements
- 48. Recap and Conclusion

Building Materials and Composites

Week 1: Clay products and alternatives like Fly-ash, CEB, CSEB

Week 2: Stone, stone tiles and stone dust blocks Wood and engineered wood **Week**

3: Glass and glazing systems, ceramic tiles, vitrified tiles, insulation **Week 4:** Fine aggregate, Coarse aggregate, Cement, Concrete

Week 5: Precast items – flooring, roofing, walling system, HBC, AAB

Week 6: Ferrous and non-ferrous metals

Week 7: Bitumen as damp proofing materials, Paints

Week 8: Plastics, Composites, nanotechnology applications

Building Materials as a Cornerstone to Sustainability

Week 1:

Carbon Negative Building Materials – Traditional Building Materials

1. Introduction – Building materials- classification and their significance in Green Buildings.
Traditional Building materials and their characteristics (Carbon Negative BM)
2. Carbon Sequestration by Building Materials
3. Traditional Building Materials – Mud
4. Stone, Thatch

Week 2:

5. Bamboo
6. Binders- Lime, Cowdung
7. CLT,
8. Straw bale, Laterite Quarry waste

Week 3:

Alternate Building Materials

9. Introduction - Alternate Building Materials
10. Flyash concrete, Phosphogypsum
11. Furnace Slag
12. Fibre Reinforced Concrete

Week 4:

- 13. CWD
- 14. Aerated Concrete
- 15. Hempcrete, Papercrete
- 16. Alternate aggregates
- 17. Milk Paints, Recycled Plastics

Week 5:

Innovative Building Materials

- 18. Introduction – environmentally friendly, reliable and durable Building Materials
- 19. Permeable Concrete
- 20. Nanocellulose composite brick
- 21. Agro bricks (Date Palm Fibres, Rice Husk, Rice Husk Ash)

Week 6:

- 22. Agro bricks (Date Palm Fibres, Rice Husk, Rice Husk Ash)
- 23. Fabrick- cotton and textile ash bricks: Sustainable and Green Advanced Building Materials
- 24. Introduction -Advanced Building materials
- 25. Light Transmitting bricks

Week 7:

- 26. Mycelium composite brick
- 27. Geopolymer concrete
- 28. Bioluminous paints
- 29. Living Bricks for Carbon Sequestration

Week 8:

- 30. Ecobind tiles
- 31. Co2 absorbing concrete: Smart Building Materials
- 32. Introduction- Characteristics of smart materials in comparison to common architectural materials
- 33. Types of Smart Materials

Week 9:

- 34. Application of smart materials on building components - Facade systems - smart windows
- 35. Control of solar radiation transmitting through the building envelope Suspended particle panels - Liquid crystal panels – Photochromics, Electrochromics
- 36. Control of solar radiation transmitting through the building envelope Suspended particle panels Thermotropic, Thermochochromics
- 37. Control of conductive heat transfer Exterior and exterior radiation (light) sensors Photovoltaics

Week 10:

- 38. Solid fuel cells
- 39. Controls / actuators: Shape memory alloys
- 40. Control of interior heat generation by Heat capacity of interior material Phase-change materials
- 41. Relative size, location and color of source Light-emitting diodes (LEDs) Lumen/watt energy conversion: Electroluminescents

Week 11:

- 42. Lighting systems - Optimization of lighting systems
- 43. Adhesion-changing smart materials - Photo-adhesive smart materials
- 44. Titanium Di Oxide Products,
- 45. Thermochromics

Week 12:

- 46. Magnetorheological and electrorheological
- 47. Thermotropic, Shape memory
- 48. Phototropics
- 49. Mechanochromics, Chemochromics

Modern Indian Architecture

Week 1: Introduction, Pre-Independence, Pre-Independence to Independence- Part 1

Week 2: Pre-Independence to Independence- Part 2, Revivalism, The First Generation 1945 - 1970- Part 1 to 3

Week 3: The First Generation 1945 - 1970- Part 4 to 7, Impact of Western Architects: Le Corbusier- Part 1

Week 4: Impact of Western Architects: Le Corbusier- Part 2 to 4, Impact of Western Architects: Louis I. Kahn- Part 1 to 2

Week 5: Impact of Western Architects: Louis I. Kahn- Part 3 to 4, Impact of Western Architects: Walter Gropius, Introduction to Critical Regionalism, Critical Regionalism: Climate Responsive Perspective- Part 1

Week 6: Critical Regionalism: Climate Responsive Perspective- Part 2 to 4, Critical Regionalism: Other Contexts

Week 7: Structure in Modern Indian Architecture, Points-Blocks and High-Rises, Housing in India- Part 1

Week 8: Housing in India- Part 2, Women in Modern Indian Architecture, Search for a new Architecture

Sustainable Architecture

- Week 1:** Fundamentals of sustainability, definitions, historical development of the concept of sustainability and sustainable development, Sustainable architecture as a subset of sustainable development.
- Week 2:** Impacts of built environment on natural environment, Sustainable Development, Agenda 21, UN Goals
- Week 3:** Characteristics of sustainable architecture, fundamentals of passive designing and climatology, thermal comfort, visual comfort, acoustic comfort
- Week 4:** Sustainable buildings, parameters of sustainable buildings, Green buildings, indicators of green buildings, Terminologies related to sustainable buildings- carbon footprint, life cycle analysis,
- Week 5:** Site development- site selection, UHI, Public Transport, vegetation, development footprint, storm water runoff, SRI
- Week 6:** Water – estimating the use, reductions in consumption, recycling, reuse, landscape requirement, strategies and technology for water conservation
- Week 7:** IEQ- day lighting, views, CFC free, ventilation, comfort, VOC free
- Week 8:** Materials and Resources- segregation, recycling, reduction in waste, reuse of materials and building, renewability
- Week 9:** Energy- energy efficiency, energy conservation, ECBC, renewable energy, M&V
- Week 10:** Codes and compliances – ECBC, NBC, other rating systems prevalent in india
- Week 11:** Vernacular architecture and sustainability, culture and sustainability
- Week 12:** Software use for Energy compliance- Design Builder, Climate Consultant etc

Contemporary Architecture and Design

- Week 1:** Preamble of Contemporary Architecture Architecture during Post Industrial Revolution Characteristics of Modern Architecture.
- Week 2:** Phases of Modern Architecture.
- Week 3:** Phases of Modern Architecture Characteristics of Post-Modern Architecture Phases of Post-Modern Architecture.
- Week 4:** Phases of Post-Modern Architecture Works of master architects from contemporary era.
- Week 5:** Phases of Modern Architecture” Brutalism" Phases of Modern Architecture Metabolism Phases of Modern Architecture Late Modern Architecture Modernism in Visual Design Modernism in Industrial Design.
- Week 6:** Genesis of Post- Modern Design Language Characteristics of Post-Modern Architecture and Design Phases of Post- Modern Architecture Historicism Phases

of Post- Modern Architecture High-tech Architecture Phases of Post- Modern Architecture Neo-modern.

Week 7: Phases of Post- Modern Architecture Critical regionalism Phases of Post- Modern Architecture Critical regionalism Phases of Post- Modern Architecture Deconstructivism Phases of Post- Modern Architecture Deconstructivism Postmodernism in Visual Design.

Week 8: Post-modernism in Industrial Design Works of master architects Modern era Works of master architects Modern era Works of master architects Post- Modern era Works of master architects Post- Modern era.

Detailed syllabus for Open Elective Courses in Faculty of Health Sciences

Basics of Health Promotion and Education Intervention

Week 1: Concepts of health promotion including history

Week 2: Health behavior, health communication and Health Literacy

Week 3: Information Education Communication (IEC), Behavior Change Communication (BCC), and Social and Behavior Change Communication (SBCC), and their applications in different settings (including role of social determinants of health)

Week 4: Need assessment for health promotion (including health behavior models)

Week 5: Planning and implementing a HPE intervention

Week 6: Designing of messages and pretesting

Week 7: Materials and methods

Week 8: Evaluation of HPE intervention

Research Methods in Health Promotion

Week 1: Introduction to Research Methods in Health promotion

Week 2: Theories and Models in Health Promotion and Health Behavior - part I **Week 3:**

Theories and Models in Health Promotion and Health Behavior - part II **Week 4:**

Quantitative Techniques in Health Promotion: Research designs

Week 5: Qualitative methods in Health Promotion

Week 6: Mixed methods techniques in Health Promotion

Week 7: Study Tool development in Health Promotion **Week**

8: Designing interventions in Health Promotion **Week 9:** BCC and SBCC

Week 10: Community-Based Participatory Research in context to Health Promotion

Week 11: Data analysis in Health Promotion

Week 12: Research Proposal Writing and Reporting the Research Findings

**Detailed syllabus for Open Elective Courses in
Faculty of Science**

Quantum Computing

Course Plan:

- Quantum Measurements Density Matrices
 - Positive-Operator Valued Measure
 - Fragility of quantum information: Decoherence
 - Quantum Superposition and Entanglement
 - Quantum Gates and Circuits
 - No cloning theorem & Quantum Teleportation
 - Bell's inequality and its implications
 - Quantum Algorithms & Circuits
 - Deutsch and Deutsch–Jozsa algorithms
 - Grover's Search Algorithm
 - Quantum Fourier Transform
 - Shore's Factorization Algorithm
 - Quantum Error Correction: Fault tolerance
 - Quantum Cryptography
 - Implementing Quantum Computing: issues of fidelity
 - Scalability in quantum computing
 - NMR Quantum Computing
 - Spintronics and QED approaches
 - Linear Optical Approaches
 - Nonlinear Optical Approaches
 - Limits of all the discussed approaches
 - How promising is the future?

Books and references

1. Michael A. Nielsen and Issac L. Chuang, "Quantum Computation and Information", Cambridge (2002).

2. Riley Tipton Perry, “Quantum Computing from the Ground Up”, World Scientific Publishing Ltd (2012).
3. Scott Aaronson, “Quantum Computing since Democritus”, Cambridge (2013).
4. P. Kok, B. Lovett, “Introduction to Optical Quantum Information Processing”, Cambridge (2010).

Introduction to Quantum Computing: Quantum Algorithms and Qiskit

Course Plan:

Week 1: Introduction and IBM Quantum Perspective, Q Mission in India – Invited talk, Quantum Computing Applications, Quantum Computing Basics

Week 2: IBM Quantum Composer and Quantum Lab using Qiskit

Week 3: Quantum Algorithms-I (Oracles, Deutsch Jozsa), Quantum Algorithms-II (Grover's Algorithm with Hands-on)

Week 4: Quantum Error Correction, NISQ era Quantum Algorithms (VQE/QAOA and industrial applications)

Books and references

1. Qiskit Textbook: <https://qiskit.org/textbook/preface.html>
2. YouTube Quantum learning series:
<https://www.youtube.com/playlist?list=PLOFEBzvs-Vvp2xg9-POLJhQwtVktlYGbY>
3. Quantum Computation and Quantum Information, Textbook by M. A. Nielsen and I. Chuang, Cambridge University Press (2010).

Quantum Information and Computing

Course Plan:

Week 1: Why Quantum Computing?, Postulates of Quantum Mechanics – I, Postulates of Quantum Mechanics – II, Qubits and Bloch Sphere

Week 2: Basic Quantum Gates, Quantum Circuits , No Cloning Theorem and Teleportation , Dense coding

Week 3: Density Matrix-I, Density Matrix – II, Projective measurement, POVM, EPR and Bell's Inequalities-I, Bell's Inequalities – II

Week 4: Deutsch Algorithm , Deutsch-Jozsa Algorithm , Simon Problem , Grover's Search Algorithm – I , Grover's Search Algorithm –II , Grover's Search Algorithm –III , Grover's Search Algorithm –IV

Week 5: Quantum Fourier Transform –I , Quantum Fourier Transform –II , Period Finding, Method of Continued Fraction , Shor's Factorization Algorithm ,

Week 6: Quantum Error Correction Codes , Quantum error Correction Codes

Week 7: Classical Information Theory , Shannon Entropy -I , Shannon entropy-II , Von Neumann Entropy-I , Von Neumann Entropy –II

Week 8: Classical Cryptography , RSA Algorithm , Quantum Cryptography – BB 84 protocol , B-92 and Eckart protocol , Practical realization of a quantum computer-I , Practical Realization of Quantum Computer -II

Dynamics of Classical and Quantum Fields

Course Plan

Week 1: Review of Lagrangian mechanics and the Hamiltonian formulation.

Week 2: Symmetries and Noether's theorem.

Week 3: The Electromagnetic Field and Stress Energy Tensor.

Week 4: Elasticity Theory and Fluid Mechanics.

Week 5: Toward Quantum Fields: Scalar and Spinor Fields.

Week 6: Concept of Functional Integration.

Week 7: Quantum Mechanics Using Lagrangians: Path Integrals.

Week 8: Creation and Annihilation Operators in Fock Space.

Week 9: Quantum Fields on a Lattice.

Week 10: Green Functions: Matsubara and Nonequilibrium.

Week 11: Coherent State Path Integrals.

Week 12: Non-local operators in Quantum Many Body Physics.

Books and references

1. Girish S. Setlur, Dynamics of Classical and Quantum fields: An Introduction. CRC Press (2013)
2. Itzykson C., Zuber J.B., Quantum Field Theory, Dover Publications (2012)
3. Peskin and Schroeder, Introduction to quantum field theory, Addison-Wesley (1995)
4. L. D. Landau and E. M. Lifshitz, Classical Theory of Fields: Course of Theoretical Physics, vol.2 (4th edn.), Butterworth Heinemann (1975)
5. E. N. Economou, Green's functions in Quantum Physics, Springer Series in Solid State Sciences – vol 7 (2006)