

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VIII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB801 IT Project Management

Course Outcome(s):

Students will be able to

- Learn activities involved in IT projects management.
- Apply agile process to project management.
- Plan application development using Scrum.
- Develop abilities to use DevOps in projects.
- Develop understanding of Containers use in projects.

UNIT – I

Project Overview and Feasibility Studies- Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal.

UNIT – II

Project Scheduling: Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.

Cost Control and Scheduling: Project Cost Control (PERT/Cost), Resource Scheduling & Resource Leveling

UNIT – III

Project Management Features: Risk Analysis, Project Control, Project Audit and Project Termination

Agile Project Management: Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL).

UNIT – IV

Scrum: Various terminologies used in Scrum (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum.

UNIT – V

DevOps: Overview and its Components, Containerization Using Docker, Managing Source Code and Automating Builds, Automated Testing and Test Driven Development, Continuous Integration, Configuration Management, Continuous Deployment, Automated Monitoring.

Other Agile Methodologies: Introduction to XP, FDD, DSDM, Crystal

Text Book(s):

1. Mike Cohn, “Succeeding with Agile: Software Development Using Scrum”, Addison Wesley, 2009
2. Pearson, Robert C. Martin, Juli, James Shore, “The Art Of Agile Development”, O'Reilly, 2013
3. John Hunt, “Agile Software Construction”, 1st Edition, Springer, 2005

4. Somerville, “Software Engineering”, 10th edition (Chapter 3, Chapters 22 to 26), Pearson, 2017
5. Deepak Gaikwad, Viral Thakkar, “DevOps Tools from Practitioner's Viewpoint”, Wiley, 2019
6. James Turnbull, “The Docker Book”, 2019

Reference Book(s):

1. Roman Pichler, “Agile Product Management with Scrum”.
2. Ken Schwaber, “Agile Project Management with Scrum” (Microsoft Professional)
3. Andrew Stellman, Jenifer Greene, “Head First Agile”, Oreilly, 2017
4. Peggy Gregory, Casper Lassenius, Xiaofeng Wang Philippe Kruchten (Eds.), “Agile Processes in Software Engineering and Extreme Programming”, 22nd International Conference on Agile Software Development, XP 2021 Virtual Event, June 14–18, 2021, Proceedings, Springer
5. Joseph Phillips, IT Project Management: On Track from Start to Finish, 3rd Edition, McGraw-Hill, 2010
6. Clinton Keith, “Agile Game Development”, Addison Wesley, 2010
7. Scott M Graffius, “Agile Scrum: Your Quick Start Guide with Step-by-Step Instructions”, CreateSpace, 2016

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VIII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB802-(A) Behavioral Economics

Course Outcome(s):

The student will be able to:

- Gain an understanding on models in behavioral economics in relation with social sciences.
- Understand the basics of choice theories along with cognitive neurosciences.
- Demonstrate an understanding on beliefs, heuristics, biases and choices under uncertainty.
- Analyse intertemporal choices and the applications.
- Evaluate and analyse strategic choice, anomalies and its applications.

UNIT – I

Introduction: The neoclassical/standard model and behavioral economics in contrast; historical background; behavioral economics and other social sciences; theory and evidence in the social sciences and in behavioral economics; applications – gains and losses, money illusion, charitable donation.

UNIT – II

Basics of choice theory: Revisiting the neoclassical model; utility in economics and psychology; models of rationality; connections with evolutionary biology and cognitive neuroscience; policy analysis – consumption and addiction, environmental protection, retail therapy; applications – pricing, valuation, public goods, choice anomalies

UNIT – III

Beliefs, heuristics and biases: Revisiting rationality; causal aspects of irrationality; different kinds of biases and beliefs; self-evaluation and self-projection; inconsistent and biased beliefs; probability estimation; trading applications – trade in counterfeit goods, financial trading behavior, trade in memorabilia

Choice under uncertainty: Background and expected utility theory; prospect theory and other theories; reference points; loss aversion; marginal utility; decision and probability weighting; applications – ownership and trade, income and consumption, performance in sports.

UNIT – IV

Intertemporal choice: Geometric discounting; preferences over time; anomalies of inter-temporal decisions; hyperbolic discounting; instantaneous utility; alternative concepts – future projection, mental accounts, heterogeneous selves, procedural choice; policy analysis – mobile calls, credit cards, organization of government; applications – consumption and savings, clubs and membership, consumption planning

UNIT – V

Strategic choice: Review of game theory and Nash equilibrium – strategies, information, equilibrium in pure and mixed strategies, iterated games, bargaining, signalling, learning; applications – competitive sports, bargaining and negotiation, monopoly and market entry. Individual preferences; Choice anomalies and inconsistencies; social preferences; altruism; fairness; reciprocity; trust; learning; communication; intention; demographic and cultural aspects; social norms; compliance and punishment; inequity aversion; policy analysis – norms and markets, labor markets, market clearing, public goods; applications – logic and knowledge, voluntary contribution, compensation design.

Text Book(s):

1. N. Wilkinson and M. Klaes, An introduction to Behavioral Economics, Bloomsbury Publishing, 3rd edition, 2017.
2. Paul A. Samuelson, William D. Nordhaus, Sudip Chaudhuri and Anindya Sen, "Economics", 19th edition, Tata McGraw Hill, 2010.
3. M.L.Trivedi, "Managerial Economics: Theory & Applications", Tata McGraw-Hill Education, 4th Edition, 2002.
4. Robert H. Frank, 2014, "Microeconomics and Behaviour", McGraw-Hill, 9th Edition, 2014.
5. Philip Corr, Anke Plagnol, "Behavioral Economics: The Basic", Routledge, 1st edition, 2018.

Reference Book(s):

1. Tobias F. R., The Behavioral Economics of Inflation Expectations: Macroeconomics Meets Psychology, Cambridge University Press, 1st, 2020.
2. William Boyes and Michael Melvin, "Textbook of Economics", DTECH, 6th Edition, 2004.
3. N. Gregory Mankiw, "Principles of Economics", Thomson learning, 3rd Edition, 2003.
4. Richard Lipsey and Alec Charystal, "Economics", Oxford, University Press, 12th Edition, 2011
5. Bazerman, Max and Don Moore. Judgment in Managerial Decision Making, 2012. 8th Edition, John Wiley & Sons.
6. Kahneman, Daniel. Thinking, Fast and Slow, 2011, New York: Farrar, Straus and Giroux

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VIII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB802-(B) Computational Finance & Modeling

Course Outcome(s):

The student will be able to:

- Understand existing financial models in a quantitative and mathematical way.
- Apply these quantitative tools to solve complex problems in the areas of portfolio management, risk management and financial engineering.
- Explain the approaches required to calculate the price of options.
- Identify the methods required to analyse information from financial data and trading systems

UNIT – I

Numerical Methods and Models: Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance: examples of exact solutions including Black Scholes and its relatives, finite difference methods including algorithms and question of stability and convergence, treatment of near and far boundary conditions, the connection with binomial models, interest rate models, early exercise, and the corresponding free boundary problems, and a brief introduction to numerical methods for solving multi-factor models.

UNIT – II

Black-Scholes framework: Black-Scholes PDE: simple European calls and puts; put-call parity. The PDE for pricing commodity and currency options. Discontinuous payoffs - Binary and Digital options. The Greeks: theta, delta, gamma, vega & rho and their role in hedging. The mathematics of early exercise - American options: perpetual calls and puts; optimal exercise strategy and the smooth pasting condition. Volatility considerations - actual, historical, and implied volatility; local vol and volatility surfaces. Simulation including random variable generation, variance reduction methods and statistical analysis of simulation output. Pseudo random numbers, Linear congruential generator, Mersenne twister RNG. The use of Monte Carlo simulation in solving applied problems on derivative pricing discussed in the current finance literature. The technical topics addressed include importance sampling, Monte Carlo integration, Simulation of Random walk and approximations to diffusion processes, martingale control variables, stratification, and the estimation of the “Greeks.”

UNIT – III

Financial Products and Markets: Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange, and commodities. Options contracts and strategies for speculation and hedging.

UNIT – IV

Application areas: Pricing of American options, pricing interest rate dependent claims, and credit risk. The use of importance sampling for Monte Carlo simulation of VaR for portfolios of options.

UNIT – V

Statistical Analysis of Financial Returns: Fat-tailed and skewed distributions, outliers, stylized facts of volatility, implied volatility surface, and volatility estimation using high frequency data. Copulas, Hedging in incomplete markets, American Options, Exotic options, Electronic trading, Jump Diffusion Processes, High-dimensional covariance matrices, Extreme value theory, Statistical Arbitrage.

References:

1. R. Seydel: Tools for Computational Finance, 2nd edition, Springer-Verlag, New York, 2004.
2. P. Glasserman: Monte Carlo Methods in Financial Engineering, Springer-Verlag, New York, 2004.
3. W. Press, S. Teukolsky, W. Vetterling and B. Flannery, Numerical Recipes in C: The Art of Scientific Computing, 1997. Cambridge University Press, Cambridge, UK. Available online at: <http://www.nr.com/>.
4. Lewis: Option Valuation under Stochastic Volatility, Finance Press, Newport Beach, California, 2000.
5. Pelsser: Efficient Methods for Valuing Interest Rate Derivatives, Springer-Verlag, New York, 2000.
6. M. Capinski and T. Zastawniak, Mathematics of Finance: An Introduction to Financial Engineering, Springer, 2010
7. S. M. Ross, An Elementary Introduction to Mathematical Finance, Cambridge University Press, 2011.
8. D. Ruppert, Statistics and Data Analysis for Financial Engineering
9. R. Carmona: Statistical Analysis of Financial Data in S-Plus
10. N. H. Chan, Time Series: Applications to Finance
11. R. S. Tsay, Analysis of Financial Time Series
12. J. Franke, W. K. Härdle and C. M. Hafner, Statistics of Financial Markets: An Introduction

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VIII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB802-(C) Industrial Psychology

Course Outcome(s):

Students will be able to

- Become conversant about the major content areas of Industrial Psychology (i.e., job analysis, recruitment, selection, employment law, training, performance management, and health/well-being issues in the workplace).
- Gain further comfort with statistical concepts in the context of making personnel decisions to reinforce content learned in introductory statistics course.
- Gain practical experience by completing a series of hands-on projects involving job analysis, selection decisions, training programs, and employee well-being.
- Deepen their understanding of tests and measurements so that you can collect accurate information and make sound data-based decisions.
- Prepare for other focused seminar courses in Industrial/Organizational Psychology or Human Resource Management.

UNIT-I

Introduction: I/O Psychology-definition. Research Methods, Statistics, and Evidence-based Practice, Introduction & Legal Context of Industrial Psychology, Job Analysis & Competency Modelling, Job Evaluation & Compensation, Job Design & Employee Well-Being, Recruitment.

UNIT-II

Assessments and Screening Methods: Identifying Criteria & Validating Tests and Measures, Screening Methods, Intensive Methods.

UNIT-III

Performance Evaluation: Performance Goals and Feedback, Performance Coaching and Evaluation, Evaluating Employee Performance.

UNIT-IV

Employee Motivation: Employee Motivation, Satisfaction and Commitment, Fairness and Diversity.

UNIT-V

Leadership: Leadership, Organizational Climate, Culture, and Development, Teams in Organizations, the Organization of Work Behavior;

Stress Management: Demands of Life and Work.

Text Book(s):

1. Landy, F. J. and Conte, J. M., Work in the 21st Century, Oxford Blackwell Publishing, 4th edition, 2013.
2. Aamodt, M. Industrial/Organizational Psychology: An Applied Approach, 2015, 8th Edition, Wadsworth Publishing Co
3. Elmes, D., Kantowitz, B., & Roediger, H, "Research methods in psychology", Cengage

Learning, 9th Edition, 2011.

4. TV.Rao, "Performance Management towards Organizational Excellence", Sage, 2nd Edition, 2016.
5. Stephen Robbins, Tim Judge, Neharika Vohra, "Organizational Behaviour", Pearson, 18th Edition, 2019.
6. Pratibha Goyal , Alok Chakrawal , "Stress Management", Studera Press, 1st Edition, 2016

Reference Book(s):

1. Muchinsky, Paul M (2000).: Psychology Applied To Work, 6th edition, Thomson Asia Pvt. Ltd
2. Miner, John B (1992): Industrial - Organizational Psychology, McGraw-Hill Inc.
3. Breakwell, G.M., Smith, J.A., &Wright, D.B, "Research methods in psychology", Sage, 4th Edition, 2012.

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Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB803-(A) Enterprise Systems

Course Outcome(s):

Students will be able to

1. Understand basic elements of Enterprise systems.
2. Understand implementation stages and processes of an ERP system.
3. Understand the process of integrating legacy systems and other current IT systems with an ERP system
4. Develop skills in understanding architecture and non-functional requirements in developing Enterprise system development and their deployment
5. Understand future trends in Enterprise architectures.

UNIT – I

Introduction to Modern Enterprise Systems: Introduction to enterprise systems. Elements of enterprise systems – Business Information system, Decision support systems, Knowledge management systems, Financial and human resource systems. Kinds of Enterprise systems- B2C and B2B models.

Components of Enterprise systems: Channels (Mobile, web, desktop, partner integration), Data management, workflow, Controlling and Auditing, Accounting etc.

Sample Enterprise systems: ERP, SCM, CRM, Product Life cycle management (PLM), HR Systems (HRM), GL systems.

UNIT – II

Key characteristics Enterprise systems: Distributivity, Managed redundancy, Exception processing, Collaboration, Data transformation.

Enterprise System architectures: Batch processing, Monolithic, client server, ecommerce, service oriented, microservice, and cloud architectures.

Introduction to Enterprise Application architectures: Layer Architecture, Event driven Architecture, Service oriented Architecture, Microservice architecture, Plug-in architecture.

UNIT – III

Application architecture Patterns: Layering, Organizing domain logic, Mapping to database, Web Presentation, Concurrency.

Enterprise Application Integration: Introduction to Enterprise Integration, different integration styles. Elements of messaging-based Integration.

Enterprise Integration patterns: Modern service integration techniques. Introduction to WSDL, SOAP. Introduction RESTful webservices integration. Differences between SOAP and REST.

UNIT – IV

Deployment of Enterprise applications: Key requirements in deployment - Stability, capacity, Security, availability, Network, Availability, and Transparency (Basic Introduction only).

Concepts of Cloud computing, cloud platforms and their role in Enterprise systems: Core Concepts – Types of Cloud: Private, public, and Hybrid clouds. Advantage of cloud computing – Scaling, Availability, and cost. Disadvantages – Technology overload, Security, Monitoring and troubleshooting, Testing, Latency etc. Cloud service models: - Infrastructure, platform, Software as a Service in Cloud Computing. Major public clouds: Google cloud, AWS, Azure.

UNIT – V

Application development and deployment in cloud – Dockers, micro services, Kubernetes, Serverless. Continuous Integration/Continuous Delivery

Introduction to Enterprise Architecture: Importance of Enterprise Architecture. Enterprise architecture models. Zachman Framework, TOGAF Framework

Enterprise Architecture Case study: To be identified

Text Book(s):

1. Ralph Stair, George Reynold, “Principle of Information Systems”, 10 ed.
2. Martin Fowler et al, “Pattern of Enterprise Application Architecture”, Addison-Wesley, 2012
3. Gregor Hohpe, Bobby Woolf, Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions,
4. Mark Richards, Software Architecture patterns, 2015, O’Reilly.
5. Sam Newman, “Building Microservices”, 2015, O’Reilly.
6. David Farley, Jez Humble, “Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation”, Jan 2016

Reference Book(s):

1. Brendan Burns, Designing Distributed Systems, O’Reilly, 2016
2. Enterprise Integration Patterns - Messaging Patterns Overview
3. Software architecture in Practice 3rd Edition- 2014

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VIII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB803-(B) Advance Finance

Course Outcome(s):

Students will be able to

- To provide understanding of essential terms, concepts and principles of strategic financial management
- To build the required skills and ability to apply principles of strategic financial management for corporate decision making
- To develop skills in students to use the techniques of planning and analysis

UNIT – I

Sources of Funds (including regulatory framework): Types of securities - Issuing the capital in market - Pricing of issue - Valuation of Stocks and bonds.

Evaluation of Lease Contracts: Leasing – Importance, Types, Tax Considerations, and Accounting Considerations – Evaluation of Lease from the point of view of Lessor and Lessee – Lease versus Buy Decision.

UNIT – II

Dividend Decisions: Traditional Approach, Dividend Relevance Model, Miller and Modigliani Model, Stability of Dividends, Forms of Dividends, Issue of bonus shares, Stock Split

UNIT – III

Restructuring

Corporate Restructuring: Mergers and Acquisitions- Types of Mergers, Evaluation of Merger Proposal, Take-overs, Amalgamation, Leverage buy-out, management buy-out, Corporate Failure and Liquidation.

Financial Restructuring: Share Split –Consolidation -Cancellation of Paid-up Capital -Other Mechanisms

UNIT – IV

Working Capital Management: Working Capital Management: Working Capital Planning - Monitoring and Control of Working Capital -Working Capital Financing –Managing the Components of Working Capital-Cash Management -Receivable Management -Inventory Management.

UNIT – VII

Introduction to derivatives: Basics of Futures, Forwards, Options, Swaps -Interest rate Payoff Diagrams, Pricing of Futures, Put Call Parity, Option Pricing using Binomial Model and Black Scholes Model -Use of Derivatives for Risk-Return Management- Credit Default Swaps.

Text Book(s):

1. Brealey, Myers and Allen, Principles of Corporate Finance

Reference Book(s):

1. Jonathan Berk, Peter DeMarzo, and Ashok Thampi, Financial Management, Pearson Education in South Asia,
2. Damodaran, Corporate Finance Theory and Practice, John Wiley & Sons
3. Rajiv Srivastava and Anil Misra, Financial Management, Oxford University Press
4. James C Van Horne, and John M. Wachowicz, Fundamentals of Financial Management, PHI
5. Kevin K. Boeh and Paul W. Beamish, Mergers and Acquisitions: Text and Cases, Sage Publications
6. John C Hull, Fundamentals of Futures and Options Markets, Cambridge University Press

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CB803-(C) Image Processing and Pattern Recognition

Course Outcome(s):

- Understand theoretical foundation and concepts of Digital Image Processing.
- Apply the knowledge of different image enhancement, and image registration techniques.
- Provide mathematical foundations for digital manipulation of images.
- Describe the fundamental concepts of various feature extraction techniques and recognize the image scene from image feature.
- Acquire the concepts of color image processing.

UNIT-I

Introduction: Image processing systems and its applications. Basic image file formats

Image formation: Geometric and photometric models; Digitization - sampling, quantization; Image definition and its representation, neighbourhood metrics.

UNIT-II

Intensity transformations and spatial filtering: Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.

UNIT-III

Segmentation: Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform.

UNIT-IV

Image/Object features extraction: Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties.

UNIT-V

Registration: Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.

Colour image processing: Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation.

Morphological Filtering Basics: Dilation and Erosion Operators, Top Hat Filters

Text Book(s):

1. Gonzalez & Woods, "Digital Image Processing", 3rd ed., Pearson education, 2008
2. Jain Anil K., "Fundamentals Digital Image Processing", Prentice Hall India, 2010

Reference Book(s):

1. Milan Sonka, Vaclav Hlavav, Roger Boyle, "Image Processing, Analysis and Machine Vision", 2nd ed., Thomson Learning, 2001
2. Rangaraj M. Rangayyan, "Biomedical Image Analysis", CRC Press, 2005
3. Pratt W.K, "Digital Image Processing", 3rd ed., John Wiley & Sons, 2007
4. Rafael C Gonzalez and Richard E Woods, "Digital Image Processing", 3rd Edition, Pearson Education
5. Maria Petrou and Panagiota Bosdogianni, "Image Processing: The Fundamentals", John Wiley & Sons, Ltd.
6. K. R. Castleman, "Digital Image Processing", Prentice Hall, Englewood Cliffs.
7. Blake and A. Zisserman, "Visual Reconstruction", MIT Press, Cambridge.
8. N. Netravali and B. G. Haskell, "Digital Pictures", Plenum Press.
9. Watson, "Digital Images and Human Vision", MIT Press, Cambridge.