SCHEME AND DETAILED SYLLABUS

FOR

(6th SEMESTER)

OF

B.TECH FOUR YEAR DEGREE COURSE

IN

INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

National Institute of Technology Raipur

Chhattisgarh – 492010

SCHEME AND DETAILED SYLLABUS

FOR

(6th SEMESTER)

OF

B.TECH FOUR YEAR DEGREE COURSE

IN

INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

National Institute of Technology Raipur

Chhattisgarh – 492010

राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर
NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
(Institute of National Importance)
G.E. Road, Raipur – 492010 (CG)

Phone: (0771) 225 42 00
Fax: (0771) 225 46 00
Email: director.nitrr@rediffmail.com
Website: www.nitrr.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme (Third Year)

National Institute of Technology Raipur												
Course of Study and Scheme of Examination							**B. Tech. 6th Semester**				**Total Marks**	**Credits**
S. No.	**Subject Code**	**Subject Name**	**Periods per Week**			**TA**	**Examination Scheme**					
			L	**T**	**P**		**MSE/MTR**		**ESE/ESVE**			
							Theory	**Prac.**	**Theory**	**Prac.**		
1	Program Core (IT106101IT)	Compiler Design	3	1	0	**20**	**30**		**50**		**100**	4
2	Program Core (IT106102IT)	Artificial Intelligence	3	1	0	**20**	**30**		**50**		**100**	4
3	Program Core (IT106103IT)	Computer Graphics	3	1	0	**20**	**30**		**50**		**100**	4
4	Program Elective (IT1062XXIT)	Program Elective-II (Reference Table 3)	3	0	0	**20**	**30**		**50**		**100**	3
5	Open Elective (IT1063XXIT)	Open Elective-II (Reference Table 4)	3	0	0	**20**	**30**		**50**		**100**	3
6	Laboratory (IT106401IT)	Artificial Intelligence Lab	0	0	2	**40**		**20**		**40**	**100**	1
7	Laboratory (IT106402IT)	Computer Graphics Lab	0	0	2	**40**		**20**		**40**	**100**	1
												20

Reference Table:3 (Program Elective - II)		
S. No.	**Subject Code**	**Subject Name**
1	IT106201IT	Cryptography and Network Security
2	IT106202IT	Advanced Database Management System
3	IT106203IT	Cyber Law

Reference Table:4 (Open Elective - II)		
S. No.	**Subject Code**	**Subject Name**
1	IT106301IT	Machine Learning
2	IT106302IT	Graph Theory
3	IT106303IT	Computational Geometry

Compiler Design

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-1-0, (4)	Core	IT106101IT

[Pre-requisites: Mathematics, Brief knowledge of programming languages, Data Structure, and Algorithm Design]

Course Objectives

1. The Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers.
2. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

Course Content

Unit 1: Introduction

Introduction to Compiler, single and multi-pass compilers, Translators, Phases of Compilers,Compiler writing tools, Bootstrapping, Back patching. Finite Automata and Lexical Analyzer: Role of Lexical Analyzer, Specification of tokens, Recognition of tokens, Regular expression, Finite automata, from regular expression to finite automata transition diagrams, Implementation of lexical analyzer Tool for lexical analyzer LEX, Error reporting.

Unit2: Syntax Analysis and Parsing Techniques

Context free grammars, Bottom-up parsing and top down parsing. Top down Parsing: elimination of left recursion, recursive descent parsing, Predicative Parsing, Bottom Up Parsing: Operator precedence parsing, LR parsers, Construction of SLR, canonical LR and LALR parsing tables, Construction of SLR parse tables for Ambiguous grammar, the parser generator – YACC, error recovery in top down and bottom up parsing.

Unit 3: Syntax Directed Translation & Intermediate Code Generation

Synthesized and inherited attributes, dependency graph, Construction of syntax trees, bottom up and top down evaluation of attributes, S-attributed and L-attributed definitions, Postfix notation; Three address codes, quadruples, triples and indirect triples, Translation of assignment statements, control flow, Boolean expression and Procedure Calls.

Unit4: Runtime Environment& Code Optimization and Generation

Storage organization, activation trees, activation records, allocation strategies, Parameter passing symbol table, dynamic storage allocation.

Basic blocks and flow graphs, Optimization of basic blocks, Loop optimization, Global data flow analysis, Loop invariant computations. Issue in the design of Code generator, register allocation, the target machine, and simple Code generator.

Course Materials

Required Text: Text books

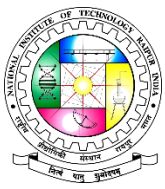
1. Compilers-Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi and Ullman J.D.Addison Wesley.
2. Principle of Compiler Design, Alfred V. Aho, and J.D. Ullman, Narosa Publication.

Optional Materials: Reference Books

1. Compiler design in C, A.C. Holub, PHI.
2. Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, GalgotiaPublication.
3. Compiler Design, Kakde.

Artificial Intelligence

[6thSemester, Third Year]



Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-1-0, (4)	Core	IT106102IT

[Pre-requisites: Data Structures, Discrete Structures]

Course Objectives

1. Acquire advanced Data Analysis skills.
2. Stay Industry relevant and grow in your career.
3. Apply AI methods, techniques, and tools for the automation in real time systems.

Course Content

Unit 1: General Issues and Overview of AI

The AI problems: what is an AI technique; Level of model, criteria for success, Characteristics of AIapplications, Intelligent Agents,Problem Solving, State Space Search, Production systems, Problem characteristics, Production System characteristics, Issues in thedesign of search program, Data driven and goal driven search, Exhaustive searches: Depth first &Breadth first search. Case study: Sophia the first Humanoid robot.

Unit 2: Problem Solving through Searching

Heuristics & Heuristic function, Heuristic Search – Generate & test, Hill climbing; Branch and Boundtechnique; Best first search & A* algorithm, AND/OR Graphs, Problem reduction and AO* algorithm,Constraint Satisfaction problems, Means End Analysis, Adversarial search: Game Playing, Minimax search procedure, Alpha-Beta cut-offs, Additional Refinements.

Unit 3: Knowledge and Reasoning

Introduction to knowledge representation-Propositional calculus, First Order Predicate Calculus,conversion to clause form, Unification Theorem proving by Resolution, Natural Deduction,InferenceMechanisms, Knowledge representation issues-Representation and mapping,Approaches to Knowledge representation, Frame Problem, Structured knowledge representation,Semantic Networks, Frame representation and Value Inheritance, Conceptual Dependency andScripts, Introduction to Agent based problem solving,Source of Uncertainty, Probabilistic Reasoning and Uncertainty, Probability theory, Bayes Theorem, Non-MonotonicReasoning. Case Study: Industrial AI Robots.

Unit 4: Applications of AI&Expert Systems

Natural language processing: overview, Basic steps followed for the NLP, concept of NLP, Parsing,machine translation, Planning Overview - An Example Domain: The Blocks Word, Component of Planning Systems, Goal Stack Planning (linear planning); Non-linear Planning using constraintposting. Learning, Rote Learning; Learning by Induction, Learning in Problem Solving, Explanation based learning and Discovery, Introduction to LISP and PROLOG, Introduction toExpertSystems, characteristics, Architecture of Expert Systems, Development of Expert System, Software Engineering and Expert System, Expert System Life Cycle model, Expert System Shells; Knowledge Acquisition; Case Study: Autonomous Vehicles.

Course Materials

Required Text: Textbooks

1. Elaine Rich and Kevin Knight: Artificial Intelligence- Tata McGraw Hill.
2. Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norvig, Pearson Education, 2nd Edition.
3. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems- Prentice Hall ofIndia.
4. Joseph C Giarratano, Gary D Riley: Expert System Principles & Programming, 4th Edition.

Optional Materials: Reference Books

1. Nils J.Nilsson: Principles of Artificial Intelligence- Narosa Publishing house.
2. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
3. Artificial Intelligenece by Gopal Krishna, Janakiraman.

Computer Graphics

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-1-0, (4)	Core	IT106103IT

[Pre-requisites: Computer Programming]

Course Objectives

1. Understanding two- and three-dimensional representation of objects
2. Understanding models to represent real world objects onto screen.

Course Content

Unit 1: Overview of Graphics System

Basics of Computer Graphics, I/O devices, Raster scan & Random scan system, line and circle generation methods, Filled area primitive, solid area filling algorithms.2-D Transformation, basic geometric transformations, Transformation in homogeneous coordinate system, Line Clipping algorithms; Cohen-Sutherland algorithm, Midpoint subdivision algorithm, Cyrus beck algorithm,

Unit 2: Three dimensional transformations and Curve Design

3-D transformations, Projection: parallel projection, perspective projection, Vanishing points. Polygon Clipping
Parametric curves, Need for cubic parametric curves c0, c1, c2 continuity, Bezier curves, Generation though ernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, BSplineCurves: Properties of B-spline curves, Finding Knot vectors-uniform and open uniform, Nonuniform, rational B-splines, Beta splines, Subdividing curves, Drawing curves using forward differences.

Unit 3: Hidden Surface Removal &Fractals

Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Bufferor depth buffer algorithm, Painters algorithm (Depth sorting method), Binary space partitioning trees, Scan-line algorithm, Warnock's algorithm. Fractals: self-similar fractals-fractal dimension, Generation of Terrain-random mid point displacement, Grammar based models, Self-squaring fractals. Soild Modelling: Generation through sweep techniques, Constructive sold geometry,.

Unit 4 : Shading, Color Issues and Animation

Illumination model, Computing reflection vector, Gouraud and Phog shading, Texture mapping &their characteristics, Handling shadows, Radiosity, Lambert's Law, Modelling transparency, Colorissues: color model for Images, Additive and Subtractive colour models, Wavelength spectrum, CIE colour standards. Animation: Procedural animation, morphing, creating key frames, steps for creating animation, Frame by Frame animation.

Course Materials

Required Text: Text books

1. Computer graphics, Hearn and Baker, PHI
2. Computer Graphics, Foley, PE-LPE,

Optional Materials: Reference Books

1. Procedural Elements of Computer graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill.
3. Computer Graphics, Schoum Series.

Cryptography and Network Security

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-1-0, (4)	Program Elective	IT106201IT

[Pre-requisites: Computer Networks]

Course Objectives

1. Training students to master the basic principles, knowledge, and skills about network security.
2. They will learn how to apply cryptography as a tool for maintaining confidentiality, along with hash functions and digital signatures helping in message integrity and authentication.
3. Learn to Analyze encryption algorithms.
4. Design and Develop intrusion detection system

Course Content

Unit 1: Introduction

Introduction to Security attacks, services And mechanisms, Introduction to cryptology, Classical Encryption techniques Cipher Principles, Data Encryption Standard,TripleDES,Block Cipher Design Principles and Modes of Operation,evaluation criteria for AES, AES Cipher.

Unit 2: Key Management

Introduction to Number Theory,Public Key Cryptography and RSA,ElGamalCryptosystem,Diffie-Hellman key Exchange, Elliptic Curve Architecture and Cryptography.

Unit 3: Authentication requirements and applications

Authentication functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, MD5 message Digest algorithm, Secure Hash Algorithm, Digital Signature Standard.Kerberos, X.509 Authentication Service, Electronic Mail Security – PGP – S/MIME

Unit 4 Web security:

Security Socket Layer (SSL)&Transport Layer Security (TLS), Secure Electronic Transaction (SET). System security: intruders, viruses and related threads, firewall design principles.

Course Materials

Required Text: Text books

1. William Stallings, “Cryptography And Network Security – Principles and Practices”, Prentice Hall of India, Third Edition 2003.
2. BehrouzForouzan, ”Cryptography and Network Security” Tata McGraw-Hill ,1e (special Indian Edition), 2007.

Optional Materials: Reference Books

1. AtulKahate, “Cryptography and Network Security”, Tata McGraw-Hill, 2003.
2. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Third Edition, Pearson Education, 2003.
4. Menezes, A.J.; Van Oorschot, P.C.; Vanstone, S.A. Handbook of applied cryptography. CRC Press, 1997.

Advanced Database Management System

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-1-0, (4)	Program Elective	IT106202IT

[Pre-requisites: Database System Concepts]

Course Objectives

1. To understand the basic concepts and terminology related to distributed DBMS and its design.
2. To design and develop query processing strategies.
3. To understand transaction processing and concurrency control in distributed databases.
4. To understand reliability and replication concepts in distributed databases.

Course Content

Unit-1: Overview of Distributed Database and Distributed Database Design

Distributed Database Management Systems - Promises of distributed database, design issues of distributed databases, distributed database architecture, Distributed Database Access Primitives, Integrity Constraints in Distributed Databases, Data fragmentation, horizontal fragmentation, vertical fragmentation,Allocation of Fragments, allocation problem, allocation model, Translation of Global Queries to Fragment Queries, The Equivalence Transformation for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping - Aggregate Function Evaluation, Parametric Queries, Database Integration, Schema Matching, Schema Integration, Schema Mapping.

Unit 2: Query Decomposition and Data Localization

Overview of Query Processing-objectives, Characterization of Query Processors, Layers of Query Processing, Query Decomposition and Data Localization- Localization of Distributed Data, Optimization of Distributed Queries, Centralized Query Optimization, Join Ordering in Distributed Queries, Distributed Query Optimization.

Unit 3: Distributed Transaction Management and Concurrency Control

Introduction to Transaction Management, Properties of Transactions, Types of Transactions, Distributed Concurrency Control, Taxonomy of Concurrency Control Mechanisms, Locking Based Concurrency Control Algorithms, Timestamp Based Concurrency Control Algorithms, Optimistic Concurrency Control Algorithms, Deadlock Management - The System R* ,The Architecture of System R*, Compilation - Execution and Recompilation of Queries, Protocols for Data Definition and Authorization in R*, Transaction and Terminal Management.

Unit 4: Reliability, Replication and Current Trends

Distributed DBMS Reliability, Reliability Concepts and Measures, Failures in Distributed DBMS, Local Reliability Protocols, Distributed Reliability Protocols, Data Replication, Consistency of Replicated Databases, Update Management Strategies, Replication Protocols, Current trends in No SQL, New SQL data management issues on the cloud, Stream data management.

Course Materials

Required Text: Text books

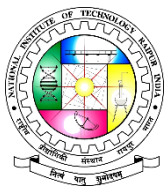
1. Stefano Ceri, GuiseppePelagatti, "*Distributed Databases - Principles and Systems*", Tata McGraw Hill, 2008.
2. Ozsu M.T., Sridhar S., "*Principles of Distributed database systems*", Pearson education, 2011.
3. Korth& Sudarshan*, "Database system concept",* Tata McGraw Hill, 2008.

Optional Materials: Reference Books

1. Raghu RamaKrishnan, JohnaasGehrke, "*Database Management Systems*", TataMcGrawHill, 2000.
2. Elmasri, Navathe, "*Fundamentals of Database Systems*", Addison-Wesley, Fifth Edition 2008.
3. Peter Rob, Carlos Coronnel, "*Database Systems- Design, Implementation and Management*", Course Technology, 2000.

Cyber Law

[6thSemester, Third Year]



Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-0-0, (3)	Program Elective	IT106203IT

[Pre-requisites: Cryptography and Network Security]

Course Objectives

1. To understand key terms and concepts in Cryptography, Governance and Compliance.
2. To analyzing the nature of attacks through cyber/computer forensics software/tools.
3. To develop cyber security strategies and policies.
4. To demonstrate a critical understanding of the Cyber law with respect to Indian IT/Act 2008.

Course Content

Unit 1: Introduction to Cyberspace and Cybercrimes

Cyber Space: Understanding Cyber Space, Defining Cyber Laws Jurisdiction in Cyber Space: Concept of Jurisdiction, Internet Jurisdiction, Indian Context of Jurisdiction. UnderstandingCyber Crimes: Defining Crime, Crime in context of Internet – Actus Reus/ Mens Rea, Types of crime in Internet, Computing damage in Internet crime. Cyber Crimes: Fraud, Hacking, Mischief, Trespass, Defamation, Stalking, Spam. Web hosting and web Development agreement, Legal and Technological Significance of domain name.

Unit 2: IT ACT 2000

Overview of IT Act 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm: Public Cryptography, Private Cryptography; Electronic Governance: Legal Recognition of Electronic Records, Legal Recognition of Digital Signature; Certifying Authorities, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication; Alternative Dispute Resolution, Online Dispute Resolution (ODR).

Unit 3: Trademarks and Patents

Legal Issues in Internet and Software Copyright: Jurisdiction Issues and Copyright, Infringement, Remedies of Infringement, Multimedia and Copyright issues, Software Piracy, Patents: Understanding Patents, International context of Patents,Indian Position on Computer related Patents. Trademarks: Understanding Trademarks, Trademark Law in India, Infringement and Passing Off, Trademarks in Internet, Domain name registration, Domain Name Disputes & WIPO.

Unit 4: Cyber Law and Related Legislation and E-Commerce and Legal Issues

IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections: Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act; Law Relating To Employees And Internet, Hierarchy of courts. Electronic Money, Regulating e-transactions, Role of RBI and Legal issues, Transnational Transactions of E-Cash, Credit Card and Internet, Laws relating to Internet credit cards, Secure Electronic Transactions, Electronic Data Base and its Protection.

Course Materials

Required Text: Text books

1. Cyber law simplified: Vivek Sood , Tata McGraw Hill Education Pvt Ltd , 2001, fifth reprint 2009.
2. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher.
3. Information Security policy &implementation Issues, NIIT, PHI.

Optional Materials: Reference Books

1. Cyber CRIME notorious Aspects of the Humans & net Criminals activity in Cyber World Barna Y Dayal D P Dominant Publisher.
2. Cyber Crime Impact in the new millennium, Marine R.C. Auther press.
3. Spam Attack, Cyber Stalking & abuse, Barna Y, Dayaal D P Dominant publisher.
4. Frauds & Financial crisis in Cyber space, Barna Y, Dayal D P, Dominant publisher.

Machine Learning

[6thSemester, Third Year]

Course Description			
Offered by Department	Credits	Status	Code
Information Technology	3-0-0, (3)	Open Elective	IT106301IT

[Pre-requisites: Data Mining, DBMS, Data Structure]

Course Objectives

1. To understand Data Science concepts, techniques, and applications.
2. To understand the underlying principle of Data Science, Statistics and Analytics techniques.
3. To understand different tools to solve real life problems.

Course Content

Unit-1 Introduction:

Introduction to Data Science, Data Science and Machine Learning, Application of Data Science, Mathematical Foundations of Data Scienceand Machine Learning, Random Variables and Probabilities, Probability Theory , ProbabilityDistributions.

Unit-2 Data Analytics Approaches:

Introduction to data analytics, Concept of supervised and unsupervised learning, Statistical concepts used in data science, Difference between population and sample, Types of variables, Measures of central tendency, Measures of variability, Coefficient of variance, Skewness and Kurtosis, Inferential statistics: Normal distribution, Test hypotheses Central limit theorem, Confidence interval, T-test, Type I and II errors, Student's T distribution. Introduction to SPSS Tool for statistics.

Unit-3 Ensemble Learning Approaches:

Concept of ensemble learning, Bagging, Random forests, Boosting, Gradient Boosting, Stacking, Parameter tuning: Hyper parameter tuning, regularization and generalization. Effects of Underfitting and over-fitting, Hidden Markov models.

Unit-4 Machine Learning Tools:

Introduction to Python: Environment set-up, Jupyter overview, Python Numpy, Python Pandas, Python Matplotlib, Introduction to R: An introduction to R, Data structures in R, Data visualization with R, Data analysis with R.

Course Materials

Required Text: Text books

1. Introduction to Statistics by Gareth M James, Daniela Witten, Trevor Hastie, Robert Tibshirani
2. Data Science handbook by Carl Shan, William Chen, Hanry Wang, Max Song
3. Doing Data Sciences by Rachel Schutt and Cathy O Neil, O'Reilly 2013
3. M. Mitchell, Machine Learning (1 ed.), McGraw Hill, 2017.
4. E. Alpay din,Introduction to Machine Learning (3 ed.), PHI, 2015.

Optional Materials: Reference Books

1. Machine Learning: An Algorithmic Perspective by Stephen Marsland, published by CRC Press.
2. Understanding Machine Learning: From Theory to Algorithms by Shai Shalev -Shwartz and Shai BenDavid, Cambridge University Press.
3. Hands-On-Machine-Learning-with -Scikit-Learn-and-TensorFlow (O'reiley)
4. Probabilistic Graphical Models: Principles and Techniques (Adaptive Computation and MachineLearning series) 1st Edition by Daphne Koller, Nir Friedman

Graph Theory

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-0-0, (3)	Program Elective	IT106302IT

[Pre-requisites: Discrete Mathematics]

Course Objectives

1. To introduce the basic knowledge about graphs, their properties and applications as models of networks.
2. To formulate problems in terms of graphs, solve problems, and apply algorithms
3. To be familiar with a wide variety of graph theoretic ideas, notation, algorithms, and useful proof techniques.
4. To distinguish a game situation from a pure individual's decision problem.

Course Content

Unit-1: Graphs and relations:

Graphs and relations Sub graphs, Isomorphism, Degrees, Directed graphs, Graph Models, Graphic sequence, Special classes of graphs, Trees.

Unit-2: Graph connectivity and searching:

Multiple connectivity, Trees, the MST problem, Distance in graphs, graph metrics, Concepts of route planning in graphs.

Unit-3: Network flows:

The "max-flow min-cut" theorem via Ford-Fulkerson's algorithm, Applications to connectivity and representatives, matching in graphs, Packing problems, Enumeration.

Unit-4: Graph colouring

Graph colouring: Edge and list colourings, Drawings and planar graphs, Duality, Euler's formula and its applications, computationally hard graph problems, Intersection graph representations, chordal graphs, Structural width measures, Graph minors, Graph embeddings on surfaces, Crossing number, Ramsey theory

Course Materials

Required Text: Text books

1. Diestel, Reinhard, "Graph theory," 3rd ed. Berlin: Springer, 2006.
2. J. A. Bondy and U. S. R. Murty, "Graph Theory," volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.

Optional Materials: Reference Books

1. Douglas. B. West, "Introduction to Graph Theory", Second edition. PrenticeHall,2005
2. J. A. Bondy and U. S. R. Murty, "Graph Theory with Applications," http://www.math.jussieu.fr/~jabondy/books/gtwa/gtwa.html, 2008

Computational Geometry

[6thSemester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Technology	3-0-0, (3)	Open Elective	IT106303IT

[Pre-requisites: Mathematics-I]

Course Objectives

1. Introduce rigorous algorithmic analysis for problems in Computational Geometry.
2. Discuss applications of Computational Geometry to graphical rendering.
3. Introduce the notions of Delaunay Triangulations.
4. Develop expected case analyses for linear programming problems in small dimensions.

Course Content

Unit1:

Geometric primitives , Line intersection using Sweep Line, No Class "Meshing Roundtable" Using Permutations for Topological Information, Triangulating a Polygon using Line Sweep.

Unit 2:

2D/3D-Linear Programming Smallest Enclosing Disc, Trapizodial Decomposition, Trapizodial Maps and tails Est., Seidel's Triangulating a Polygon , 2D convex hull: Output-sensitive and Random Incremental.

Unit 3:

Geometric Transforms , Delaunay Triangulation Min-Max angle Thm , 3D Convex Hull , 2D Incremental Delaunay, Mesh Generation Quadtree.

Unit 4:

Delaunay Refinement, Thanksgiving Holiday, Bezier Curves and de Casteljau Algorithm, B-splines, Subdivsion Surfaces.Convexifying Polygonal Cycles, Surface Reconstruction.

Course Materials

Required Text: Text books

1. Computational Geometry Algorithms and Applications, 2nd ed., by de Berg, van Kreveld, Overmars, and Schwarzkopf (Springer-Verlag, 2000).

Optional Materials: Reference Books

1. M. Bern and D. Eppstein. Mesh generation and optimal triangulation. Computing in Euclidean Geometry (2nd ed.), D.-Z. Du and F. Hwang (eds.), World Scientific, 1995, 47-123.
2. H. Edelsbrunner. Triangulations and meshes in computational geometry. ActaNumerica (2000), 133-213.

Artificial IntelligenceLab

[6thSemester, Third Year]

Course Description			
Offered by Department	Credits	Status	Code
Information Technology	0-0-2, (1)	Lab	IT106401IT

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.

Computer Graphics Lab

[6thSemester, Third Year]

Course Description			
Offered by Department	Credits	Status	Code
Information Technology	0-0-2, (1)	Lab	IT106402IT

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.