

CS202	Theory of Computation	L	T	P
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Formal Language and Grammar: Production systems, Chomsky Hierarchy, Right linear grammar and Finite state automata, Context free grammars, Normal forms, Derivation trees and ambiguity.

Finite state Automata: Non deterministic and deterministic FSA, NFSA with ϵ - moves, Regular Expressions, Equivalence of regular expression and FSA, Pumping lemma, closure properties and decidability, Myhill - Nerode theorem and minimization, Finite automata with output.

Pushdown automata: Acceptance by empty store and final state, Equivalence between pushdown automata and context-free grammars, Closure properties of CFL, Deterministic pushdown automata.

Turing Machines: Techniques for Turing machine construction, Generalized and restricted versions equivalent to the basic model, Godel numbering, Universal Turing Machine, Recursively enumerable sets and recursive sets, Computable functions, time space complexity measures, context sensitive languages and linear bound automata.

Decidability: Post's correspondence problem, Rice's theorem, decidability of membership, emptiness and equivalence problems of languages.

Suggested Readings:

1. J. E. Hopcraft, R. Motwani, J. D. Ullman, Introduction to Automata Theory, Languages and Computation, Pearson.
2. H. R. Lewis, C. H. Papadimitrou, Elements of the Theory of Computation, PHI.
3. P. Linz, An Introduction to Formal Language and Automata, Narosa Publisher.
4. K. L. P. Mishra, N. Chandrasekaran, Theory of Computer Science: Automata, Languages and Computation, PHI.

CS204	Object Oriented Programming	L	T	P
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Object Oriented Concepts: Objects and Classes, Bottom-up approach, O-O design principles, O-O Design and Modeling.

Basic O-O language Constructs: Primitive Data Types and Operations, Selection Statements, Loops, Arrays, Strings, Objects and Classes, Inheritance and method overriding, Polymorphism.

Java Language Fundamentals: Object Design: constructors, instance variables, methods. Memory models, scope, streams and I/O programming, Inner classes, Interfaces and packages, Exception Handling, Multithreading.

Advanced Concepts: Creating GUIs and Displaying Data, Event Driven Programming.

Frameworks: The framework concept, Frameworks in the Java API: Collections Framework, Graphics Framework

Suggested Readings:

1. C. T. Wu, An introduction to Object Oriented Programming with JAVA, McGraw Hill.
2. E. Balagurusamy, Programming with Java, TMH.
3. B. Eckel, Thinking in Java, Pearson.
4. H. Schildt, Java: The Complete Reference, McGraw Hill Education
5. H. Deitel, P. Deitel, Java 9 for Programmers, Pearson

CS206	Computer Networks	L	T	P
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Introduction to Internetworking and TCP/IP.

Addressing and Routing: Logical Addressing- IPv4 Addresses, IPv6 Addresses. Internet protocol- Internetworking, IPv4, IPv6, transition from IPv4 to IPv6. Address Mapping- ARP, RARP, BOOTP, DHCP, Error Reporting- ICMP. Multicasting-IGMP. Routing- Delivery, Forwarding, Intra and Inter-domain routing, Unicast Routing Protocols-Distance Vector Routing, Link State Routing, Path Vector Routing. Multicast Routing protocols.

TCP and UDP: Process to process delivery- Client/Server Paradigm, Multiplexing and De- multiplexing, Connectionless Versus Connection-Oriented Service, Reliable Versus Unreliable. UDP- Well-Known Ports for UDP, User Datagram, UDP Operation, Use of UDP.TCP- TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control. Congestion Control- Network performance, Open loop congestion control, Closed loop congestion control, Congestion control in TCP, Quality of Service.

Network Applications: DNS- Name space, Distribution of name space, DNS in the Internet, resolution, DDNS. Remote logging- TELNET, Electronic Mail- SMTP, POP, IMAP, File Transfer- FTP, WWW, HTTP, Network Management: SNMP .

Network Security: Security services- message confidentiality, message integrity, Message authentication, Digital signature, Entity authentication, Key management- Symmetric, Asymmetric. Security in the Internet: IPsec, TLS, PGP, VPN and Firewalls.

Suggested Readings:

1. B. A. Forouzan, Data Communications and Networking, Fifth edition, TMH .
2. A. S. Tanenbaum, Computer Networks, Fourth edition, PHI.
3. A. Forouzan, TCP/IP Protocol Suite, 4th Edition, McGraw Hill, 2010
4. D E. Comer, Internetworking with TCP/IP Principles, Protocols and Architecture, Pearson Education.

CS201	Probability and Statistics for Computer Science	L	T	P
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Introduction: Data Collection and Descriptive Statistics, Inferential Statistics and probability Models, Population and Samples.

Descriptive Statistics: Describing Datasets, Single Point Summarization, Paired Datasets.

Probability: Sample Space and Events, Axioms of Probability, Conditional Probability.

Random Variables and Expectations: Random variables, Jointly Distributed Random variables, Expectation, Variance, Co-variance, Probability Distributions. Parameter Estimation-Maximum Likelihood Estimates; Regression Analysis; Applications, Markov Process, Poisson Process.

Suggested Readings:

1. S. M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Elsevier.
2. W. Feller, An Introduction to probability Theory and its Applications- Vol. 1, Wiley.
3. K. S. Trivedi, Probability and Statistics with Reliability, Queuing and Computer Science Applications, Wiley.