

CS207	Compiler Design	L	T	P
		3	1	0

**Introduction:** Translators, Various phases of compiler, tool based approach to compiler construction.

**Lexical analysis:** token, lexeme and patterns, difficulties in lexical analysis, error reporting, implementation, regular definition, transition diagrams, LEX.

**Syntax Analysis:** top down parsing (recursive descent parsing, predictive parsing), operator precedence parsing, bottom-up parsing (SLR, LALR, Canonical LR), YACC.

**Syntax directed definitions:** inherited and synthesized attributes, dependency graph, evaluation order, bottom-up and top-down evaluation of attributes, L-attributed and S-attributed Definitions.

**Type checking:** type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

**Run time system:** storage organization, activation tree, activation record, parameter passing, dynamic storage allocation, symbol table: hashing, linked list, tree structures.

**Intermediate code generation:** intermediate representation, translation of declarations, assignments, control flow, Boolean expressions and procedure calls, implementation issues.

**Code generation and Optimization:** issues, basic blocks and flow graphs, register allocation, code generation, dag representation of programs, code generation from DAGs, peephole optimization.

***Suggested Readings:***

1. A. V. Aho, J. D. Ullman, Principles of Compiler Design, Narosa Publishing House.
2. J. P. Trembley, P. G. Sorensen, The Theory and Practice of Compiler Writing, McGraw Hill.
3. A. Holub, Compiler Design in C, PHI

CS209	Machine Learning	L	T	P
		3	0	2

**Machine Learning Concepts:** Designing a Learning System, Styles of Learning; Supervised learning; Unsupervised Learning; Semi-Supervised Learning; Basics of Decision Theory, Information Theory and Probability Distributions; Linear and Logistic Regression.

**Bayesian Learning:** Notion of Prior, Likelihood and Posterior; Naïve Bayes and Conditional Independence; Estimation using Maximum Likelihood; Hidden variables and Missing Data; Bayesian Models.

**Classification & Clustering:** Naive Bayes, Nearest Neighbour and Linear Classification Models; K-means and Expectation Maximization for Clustering; Mixture Models, Flat and Hierarchical Clustering, Applications of Classification and Clustering.

***Suggested Readings:***

1. T. M. Mitchell, Machine Learning, McGraw Hill.
2. C. M. Bishop, Pattern Recognition and Machine Learning, Springer.
3. K. P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press.

- 
4. D. Barber, B. Reasoning, Machine Learning, CUP.
  5. P. Harrington, Machine Learning in Action, Manning Publications.

CS353	Internet of Things	L	T	P
		2	1	1

**Introduction to IoT:** Genesis of IoT, IoT and Digitization, IoT Challenges, Comparing IoT architectures, a simplified IoT architecture, The core IoT functional Stack, IoT data management and compute stack.

**Engineering for IoT Networks:** Sensors, Actuators, Smart Objects, Sensor Networks, IoT Access Technologies, IP as the IoT Network Layer, Applications protocols for IoT.

**Data and Analytics for IoT:** An introduction to data analytics for IoT, Machine Learning, Big data analytics tools and technology, edge streaming analytics, network analytics

**IoT in Industry:** Manufacturing, Oil and Gas, Utilities, Smart and Connected Cities, Transportation, Mining, Public Safety.

***Suggested Readings:***

1. D. Hanes, G. Salgueiro, P. Grossetete, R. Barton, J. Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, CISCO.
2. Rajkamal, Internet of Things, McGraw Hill Education.

CS312	Information Retrieval	L	T	P
		2	1	1

**Introduction:** Information, Information Need and Relevance; The IR System; Early developments in IR, User Interfaces.

**Retrieval Evaluation:** Notion of Precision and Recall; Precision-Recall Curve, Standard Performance Measures such as MAP, Reciprocal ranks, F-measure, NDCG, Rank Correlation, Standard Data sets.

**Retrieval and IR Models:** Boolean Retrieval; Term Vocabulary and Postings list; Ranked retrieval; Inverted Index, Index Construction; Index compression.

**Document Processing:** Representation; Vector Space Model; Feature Selection; Stop Words; Stemming; Notion of Document Similarity.

**Link Analysis:** Page Rank, HITs, Web Crawling.

Applications.

***Suggested Readings:***

1. R. Baeza-Yaets, B. Ribeiro-Neto, Modern Information Retrieval: The Concept and Technology behind Search, 2nd Edition, Addison-Wesley.
2. C. D. Manning, P. Raghvan, H. Schutze, Introduction to Information Retrieval, Cambridge University Press.
3. D. A. Grossman, O. Frieder, Information Retrieval: Algorithms and Heuristics, 2nd Ed., Springer.
4. S. Buettcher, Charles L.A. Clarke, G. V. Carmack, Information Retrieval: Implementing and Evaluating Search Engines, MIT Press.
5. B. Croft, D. Metzler, T. Strohman, Search Engines: Information Retrieval in Practice, Addison Wesley