Detailed Syllabus
Lecture-wise breakup

Course Code	16B1NCI648	**Semester - Odd** **(specify Odd/Even)**	**Semester** VII **Session** 2023 -2024 **Month from:** July 24- Dec 24
Course Name	Information Retrieval and Semantic Web		
Credits	3	**Contact Hours**	3 – 0 -- 0

Faculty (Names)	**Coordinator(s)**	Prof. Neetu Sardana (Sector-62), Dr. Mukta Goyal (Sector-128)
	Teacher(s) (Alphabetically)	Dr. Mukta Goyal, Prof. Neetu Sardana

COURSE OUTCOMES		**COGNITIVE LEVELS**
C430.11.1	Understand standard Information retrieval models, indexing mechanism, Web technologies used for designing an intelligent web.	Level-2 (Understanding)
C430-11.2	Apply query processing techniques for content extraction in varied Information retrieval systems.	Level-3 (Applying)
C430-11.3	Analyze the searching algorithms for Information Retrieval.	Level-4 (Analysis)
C430-11.4	Evaluate the IR system results using different metrics for knowledge base modeling and parameter estimation.	Level-5 (Evaluating)
C430-11.5	Design intelligent application for solving real world information retrieval problems	Level-6 (Creating)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Information Retrieval	Theory of information retrieval, Information retrieval on Data and information retrieval on the Web Information retrieval tools and their architecture.	3
2.	Boolean Retrieval & Index Construction	An example information retrieval problem, Processing Boolean queries, the extended Boolean model versus ranked retrieval, Blocked-Sort based Indexing, Single-pass-in-Memory Indexing, Distributed and Dynamic Indexing.	6
3.	Dictionary and tolerant retrieval	Wild card queries, Spelling correction, Phonetic correction	4
4.	Scoring Term weighting and the vector space model	Term frequency and weighting, Vector space model, Variant TF-IDF Scoring, Probabilistic IR, Language Modeling, Distributed word representations (Word Co-occurrence, Word Embedding (GLOVE, Word2Vec)), Evaluation of IR System.	6
5.	Link analysis	Web as graph and Page ranking algorithms	4
6.	Information retrieval tools	Web directory, Search engine, Meta search engines, Web searching and search engine architecture, Searching Algorithms (Fish, Shark etc...).	4
7.	Web Crawling	Web Crawler architecture and Web crawling (parallel, distributed and focused web crawling).	5
8.	Taxonomy and Ontology	Creating domain specific ontology, Ontology life cycle Semantic Web: Resource description Framework (RDF),	10

		Turtle format, Storing RDF in Databases/files, Language Tags and labels in RDF files, RDF schema and web ontology language (OWL), SPARQL Query Language.	
			Total number of Lectures **42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 5, Assignment/ Quiz= 10, Mini Project= 10)
Total	**100**

The students in the group of 3-4 will read research papers in which information retrieval methods such as Index construction, Query Processing, tolerant retrieval, vector space modeling, probabilistic information retrieval, Link Analysis etc are utilized to solve research related problems. The students will implement the research papers using a standard dataset taken from the platforms like Kaggle, Github, UCI, KDD etc. Applying the methods on standard dataset will enable the students in enhancing their understanding and skills towards Information retrieval.

Recommended Reading material:

Text Books

1.	Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, "An Introduction to Information Retrieval", Cambridge University Press (CUP), 2008.
2.	A Semantic Web Primer, by Grigoris Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra, Publisher: MIT Press; 3rd edition, 2012.

Reference Books

1.	Salton, G. and McGill, M.J., "Introduction to Modern Information Retrieval", Computer Series. McGraw-Hill, New York, NY, 1983.
2.	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, ―Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011
3.	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, ―Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
4.	Rijsbergen C. J. 2012," Information Retrieval", 2nd edition**.**
5.	Learning SPARQL: Querying and Updating with SPARQL 1.1, by Bob DuCharme Publisher: O'Reilly Media; 2 edition, July 18, 2013.