

MLIS Syllabus

Course code	Course Title				C/E/F	Credits				Marks	
	L	T	P	C		Exam	IA				
1st Year 1st Semester											
ML-01	Fundamentals / Perspectives of Information Science				C	2	0	1	3	50	25
ML-02	Advanced / Advances in Knowledge organization				C	2	0	1	3	50	25
ML-03	Resource Description				C	2	0	1	3	50	25
ML-04	Information Retrieval-I				C	2	0	1	3	50	25
ML-05	Quantitative Techniques				C	2	0	1	3	50	25
ML-06	Information & Communication Technology				C	4	0	2	6	50	50
ML-07	One paper to be selected from a pool of courses				E	2	0	1	3	50	25
ML-F1	Mathematics for Information Studies-I				F	4	0	0	NC	00	100
	Sub Total					16	0	8	24	350	200
	1st Year 1st Semester Total					Credit=24				Marks=550	
1st Year 2nd Semester											
ML-08	Knowledge Discovery and Data Mining				C	2	0	1	3	50	25
ML-09	Metadata Creation & Management				C	2	0	1	3	50	25
ML-10	Information Retrieval-II				C	2	0	1	3	50	25
ML-11	Informetrics				C	2	0	1	3	50	25
ML-12	Research Methodology & Technical Writing				C	2	0	1	3	50	25
ML-13	Library Automation & Digital Library Systems				C	4	0	2	6	50	50
ML-14	One paper to be selected from a pool of courses				E	2	0	1	3	50	25
ML-15	Dissertation				C	0	3	0	3	50	25
ML-16	Field Work				C	0	0	1	1	00	25
ML-F2	Mathematics for Information Studies-II				F	4	0	0	NC	00	100
	Sub Total					16	3	9	28	400	250
	1st Year 2nd Semester Total					Credit=28				Marks=650	
Course Total	Credit=52					Marks=1200					

List of Elective Courses under ML-07

Course code	Course Title	C/E/F	Credits				Marks	
Semester I			L	T	P	C	Exam	IA
ML-07A	Ranganathan Study (CC+CCC)	E	2	0	1	3	50	25
ML-07B	Book History & Bibliography	E	2	0	1	3	50	25
ML-07C	Library Collection Development & Book Selection	E	2	0	1	3	50	25
ML-07D	Community Information Services	E	2	0	1	3	50	25
ML-07E	Information Literacy	E	2	0	1	3	50	25
ML-07F	Information Consolidation & Technical Writing	E	2	0	1	3	50	25
ML-07G	Content Management	E	2	0	1	3	50	25
ML-07H	Knowledge Management	E	2	0	1	3	50	25
ML-07I	Comparative Librarianship	E	2	0	1	3	50	25
ML-07J	Book Publishing	E	2	0	1	3	50	25
ML-07K	Digital Humanities	E	2	0	1	3	50	25

List of Elective Courses under ML-14

ML-14A	Public Library Systems	E	2	0	1	3	50	25
ML-14B	Academic Librarianship International	E	2	0	1	3	50	25
ML-14C	Science Communication & Technology Transfer	E	2	0	1	3	50	25
ML-14D	Social Science Information Systems	E	2	0	1	3	50	25
ML-14E	Agricultural Information Systems	E	2	0	1	3	50	25
ML-14F	Business Information Systems	E	2	0	1	3	50	25
ML-14G	Legal Information Systems	E	2	0	1	3	50	25
ML-14H	Biomedical Ontology	E	2	0	1	3	50	25
ML-14I	User Interface Design	E	2	0	1	3	50	25
ML-14J	Natural Language Processing							
ML-14K	Application Software in Information Studies	E	0	0	4	2	00	75

1st Year 1st Semester

Paper Code: ML-01

Paper Name: FUNDAMENTALS / PERSPECTIVES OF INFORMATION SCIENCE

- Information and Knowledge. Definition of information and related phenomena. Various attributes of information. Fact, belief, knowledge: nature and characteristics. Sources of knowledge. Growth of knowledge and its impact on library and information services.
- Information Science and related concepts. Scope and coverage of information science. Relation of Information Science with Library Science, Documentation, Information Storage and Retrieval, Informatics, Information Management, Cybernetics and Information Technology.

- Communication of information. Verbal and nonverbal communication. Models of communication. Channel capacity. Barriers of communication.
- Sociology of Information. Trans-border data flow. Censorship. Data Security. Social, political, cultural factors for production preservation, access, dissemination of information. Politics of information: what – why – and how, global information order vs. indigenous knowledge system, Information explosion vs. Information dearth, Information divide and digital divide; freedom, confidentiality and privacy of information. Typology of information sectors. Globalization and Information Communication Technology. National Information Policy.
- Economics of information. Information as resources and commodity. Models of production and distribution of knowledge or information

Suggested Readings:

Bawden, D. & Robinson, L.(2012). *Foundations of information science*. London: Facet Publishing.

Dearnley, J. & Feather, J. (2001). *The wired world: an introduction to the theory and practice of the information society*. London: Library Association.

Dordick, H.S. & Wang, G. (1993). *The information society: a retrospective view*. Newbury Park, CA: Sage.

Feather, J. (2008). *The information society: a study of continuity and change* (5th ed.). London: Facet Publishing.

Gilchrist, A., Ed. (2009). *Information science in transition*. London: Facet Publishing.

Kumar, P.S.G. (1999). *Fundamental of information science*. New Delhi: S. Chand.

Rubin, R. (2010). *Foundations of library and information science*. New York: Neal-Schuman Publishers.

Machlup, F. (1984). *The economics of information and human capital*. Princeton: Princeton University Press.

Martin, W. J. (1995). *The global information society*. Brookfield, VT: Gower.

McGarry, K. J. (1993). *The changing concept of information: an introductory analysis* (2nd. ed.). London: Facet Publishing.

Masuda, Y. (1980). *The information society as post-industrial society*. Washington, D.C.: World Future Society.

Toffer, A. (1991). *Power shift: knowledge wealth and violence at the edge of the 21st century*. New York: Bantam Books, 1991.

Vickery, B.C. & Vickery, A. (1987). *Information science in theory and practice*. London: Butterworth, 1987.

Webster, F. (2002). *Theories of the information society* (2nd ed.). London: Routledge.

Paper Code: ML-02

Paper Name: ADVANCED / ADVANCES IN KNOWLEDGE ORGANIZATION

- Organization of Knowledge. Universe of subjects-structure, nature / characteristics. Multi-dimensional nature of subjects. Transformation of multidimensional universe into one dimension.
- Theoretical foundation of classification. Descriptive or static theory of classification. Dynamic theory of library classification. Fundamental categories. Categorization of isolate ideas before and after Ranganathan. Work at semantic level. Theory of Integrative Levels. Absolute Syntax and related concepts Contributions of CRG, FID and DRTC.
- Species of Classification Schemes. Principles, objectives and components of major classification schemes. History, special features and evaluation of DDC, UDC and CC. Comparison of DDC UDC and CC. Broad System of Ordering (BSO). Web Dewey. Design of depth classification schedules
- Recent Trends in knowledge organization. Mono and multi-lingual thesauri. Automatic classification. Classification of web resources. Web ontology. Taxonomy. Folksonomies.

Suggested Readings:

Bavakutty, M. (1981). *Conons of library classification*. Trivandrum: Kerala Library Associations.

Broughton, V. (2004). *Essential classification*. London: Facet Publishing.

Buchanan, B. (1979). *Theory of library classification*. London: Clive Bingley.

Dhyani, P. (1998). *Library classification: Theory and principles*. New Delhi: Vishwa Prakashan.

Foskett, A. C. (1996). *The subject approach to information* (5th ed.). London: Clive Bingley.

- Husain, Sabahat. (2004). *Library classification: Facets and analysis*. Delhi: B. R. Publishing.
- Krishan Kumar. (1988). *Theory of classification* (4th rev. ed.). New Delhi: Vikas Publishing House
- Maltby, A. (1975). *Sayers manual of classification for libraries* (5th ed.). London: Andre Deutsch.
- Needham, C. D. (1971). *Organizing knowledge in libraries* (2nd ed.). London: Andre Deutsch.
- Ohdedar, A. K. (1994). *Book classification*. Calcutta: Bengal Library Association.
- Ranganathan, S. R. (1967). *Prolegomena to library classification* (3rd ed.). Bangalore: Sarada Ranganathan Endowment for Library Science.
- Ranganathan, S. R. (1990). *A descriptive account of colon classification*. Bangalore: Sarada Ranganathan Endowment for Library Science.
- Ranganathan, S. R. (2006). *Philosophy of library classification*. Bangalore: Ess Ess Publications.
- Ranganathan, S. R. & Neelameghan, A. (1988). *Classified Catalogue Code, with additional rules for dictionary catalogue code* (5th ed.). Bangalore: Sarada Ranganathan Endowment for Library Science.
- Taylor, A. G. (2007). *Introduction to cataloguing and classification* (10th ed.). New Delhi: Atlantic.
- Singh, S. (1998). *Universe of knowledge: Structure & development*. Jaipur: Raj Publishing.
- Sood, S. P. (1998). *Universe of knowledge and universe of subjects*. Jaipur: G. Star Printers.
- Svenonius, E. (2000). *The intellectual foundations of information organization*. Cambridge, Mass: MIT Press.
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Paper Code: ML-03

Paper Name: RESOURCE DESCRIPTION

- Cataloguing Codes -history, principles, meaning, characteristics, rules of Cataloguing Codes. Construction of cataloguing codes- essential components and levels. Cataloguing codes for vernacular languages Comparative study between AACR2 and CCC.
- Bibliographic Description and Data Standards. Bibliographic data elements and models of bibliographic description. ISBDs, FRBR, RDA.
- Content designator based cataloguing. Bibliographic format . MARC, UNIMARC, MARC 21, CCF. Distributed cataloguing standards. Z39.50. Exchange standards- ISO 2709, Z39.2 . Retro-conversion.
- Generic and Domain Specific Metadata Schemas. DCEMES, GILS, TEI, EAD. Metadata encoding and harvesting. Interoperability and crosswalks.

Suggested Readings:

Bowman, J. H. (2003). *Essential cataloguing*. London: Facet Publishing.

Chan, L. M. (1994). *Cataloging and classification: an introduction*. New York: McGraw-Hill.

Girija Kumar & Krishan Kumar. (2004). *Theory of cataloguing*. New Delhi: Vikas Publishing House.

Horner, J. (1975). *Cataloguing*. London: AAL.

Hunter, E. J., & Blackwell, K.G.B. (1983). *Cataloguing*. London: Clive Bingley.

IFLA. (1998). *IFLA: Functional requirements for bibliographic records: final report*. Munchen: K.G. Saur.

IFLA Study Group (1998/2009). *Functional Requirements for Bibliographic Records: Final Report*. available at: www.ifla.org/files/cataloguing/frbr/frbr_2008.pdf (accessed May 27, 2011).

Olding, R.K. (1967). *Readings in library cataloguing*. New Delhi: Lakshmi Bookstore.

Oliver, C. (2010). *Introducing RDA: a guide to the basics*. Chicago: American Library Association.

Patton, G. E. (2009). *Functional requirements for authority data: a conceptual model*. München: K.G. Saur.

Ranganathan, S. R. (1955). *Headings and canons: comparative study of five catalogue*

codes. Madras: S. Viswanathan.

Ranganathan, S. R., & Neelameghan, A. (1988). *Classified Catalogue Code, with additional rules for dictionary catalogue code* (5th ed.). Bangalore: Sarada Ranganathan Endowment for Library Science.

Sengupta, B. (1975). *Cataloguing: Its theory and practice* (3rd ed.). Calcutta: World Press.

Svenonius, E. (2000). *The intellectual foundations of information organization*. Cambridge, Mass: MIT Press.

Taylor, A. G. (2007). *Introduction to cataloguing and classification* (10th ed.). Westport, CT: Libraries Unlimited.

Viswanathan, C. G. (2008). *Cataloguing theory and practice*. New Delhi: Ess Ess Publications.

Paper Code: ML-04

Paper Name: INFORMATION RETRIEVAL-I

- Fundamentals of Information Retrieval System. Role of information centres in information transfer cycle. Meaning, objectives and functions of IR system. Text retrieval system.
- Models of information retrieval – traditional, user Centered and cognitive model. Traditional Retrieval Models - Boolean, Probabilistic, Vector Processing, Clustering, Best Match.
- Users of IR systems. Information need. Information seeking behavior. Information needs in different areas of activities. Models of information seeking behavior. Search strategy . Searching process.
- Evaluation of IR Systems. Purpose & Criteria. Recall and Precision. Evaluation experiments – Cranfield Tests, MEDLARS, SMART, TREC Experiments

Suggested Readings:

Baeza-Yates, R. & Ribeiro-Neto, B. (1999). *Modern information retrieval*. New York: ACM Press.

Belkin, N. J. (1980). Anomalous states of knowledge as basis for information retrieval. *The Canadian Journal of Information Science*, 5, 133–143.

- Belkin, N. J. (1984). Cognitive models and information transfer. *Social Science Information Studies*, 4, 111–129.
- Belkin, N. J., Oddy, R. & Brooks, H. (1982). ASK for information retrieval. *Journal of Documentation*, 38(2), 61–71.
- Blair, D.C. (1990). *Language and representation in information retrieval*. Amsterdam : Elsevier.
- Chu, H. (2003). *Information representation and retrieval in the digital age*. Medford, N.J: Information Today.
- Chowdhury, G. G. (2010). *Introduction to modern information retrieval*.(3rd ed.). London: Facet Publishing.
- Ingwersen, P. (1992). *Information retrieval interaction*. London: Taylor Graham.
- Ingwersen, P. & Järvelin, K.(2005). The turn: Integration of information seeking and retrieval in context. Dordrecht: Springer.
- Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science*, 42(5), 361–371.
- Kuhlthau, C. C. (1993). A principle of uncertainty for information seeking. *Journal of Documentation*, 49(4), 339–355.
- Lancaster, F. W. (1979). *Information retrieval systems: characteristics, testing, and evaluation*. (2nd ed.). New York: John Wiley.
- Manning, C. D., Raghavan, P. & Schütze, H. (2008). *Introduction to information retrieval*. New York: Cambridge University Press.
- Meadow, C.T., Boyce, B.R., Kraft, D.H. & Barry, C. (2007). *Text information retrieval systems*. (3rd ed.). London: Academic Press.
- Nie, J.-Y. (2010). *Cross-language information retrieval*. San Rafael, Calif: Morgan & Claypool.
- Ruthven, I., Lalmas, M. & Rijsbergen, K. V. (2003). Incorporating user search behavior into relevance feedback. *Journal of the American Society for Information Science and Technology*, 54(6), 529–549.
- Salton, G. and McGill, M. J. (1983). *Introduction to information retrieval*. New York: McGraw-Hill.
- Salton, G. (1989): *Automatic text processing: The transformation, analysis, and retrieval of information by computer*. Reading, Mass.: Addison-Wesley.

Saracevic, T. (1975). Relevance: A review of and a framework for the thinking on the notion in information science. *Journal of the American Society of Information Science*, 26(6), 321– 343.

Saracevic, T. (1996). Interactive models in information retrieval (IR): A review and proposal. In *Proceedings of the 80th Annual Meeting of the American Society of Information Science*, 33, 3–9.

Sparck Jones, Karen, (Ed.) (1981). *Information retrieval experiment*. London: Butterworth.

Sparck Jones, K. & Willett, P. (Ed.) (1997). *Readings in information retrieval*. San Francisco, Calif: Morgan Kaufman.

Svenonius, E. (2000). *The intellectual foundation of information organization*. Cambridge, Mass.: MIT Press.

Taylor, A. G. (2004). *The organization of information* (2nd ed.). Westport, CT: Libraries Unlimited.

van Rijsbergen, C. J. (1979). *Information retrieval* (2nd ed.). London: Butterworths.

Voorhees, E. M. (2000). Variations in relevance judgments and the measurement of retrieval effectiveness. *Information Processing & Management*, 36(5), 697–716.

Wilson, T. D. (1999). Models in Information Behaviour Research. *Journal of Documentation*, 55, 249–270.

Wilson, T. D. (2000). Human Information Behaviour. *Informing Science*, 3(2), 49–56.

Paper Code: ML-05

Paper Name: QUANTITATIVE TECHNIQUES

- Statistical methods - Introduction. Measures of Variability and skewness. Sampling & sample designs. Correlation studies and regression analysis. Hypothesis testing, Null and Alternative Hypothesis, Sampling error, Chi-Square test. Analysis of Variance and Covariance. Multivariate Analysis Techniques . Time series – Components, measurement of trend and statistical fluctuations.
- Operations Research (OR) - Meaning, nature, methodology and utilities. OR techniques. .Work study. Queuing theory. Game theory. Network analysis. CPM and PERT.
- Project using statistical packages e.g., R.

Suggested Readings:

- Albert, J. & Rizzo, M. (2012). *R by example*. New York: Springer.
- Braun, W.J. & Murdoch, D.J. (2007). *A first course in statistical programming with R*. Cambridge, N.Y.: Cambridge University Press.
- Gun, A.M., Gupta, M.K. & Dasgupta, B. (2008). *Fundamentals of Statistics*. (8th rev. ed.). 2 vols. Kolkata: World Press, 2008.
- Hafner, A.W. (1988). *Descriptive statistical techniques for librarians*. Chicago: American Library Association.
- Mustafi, C.K. (2012). *Operations research: Methods and practice*. New Delhi: New Age International Publisher.
- Pal, M.N., Chatterjee, A.K. & Mukherjee, S. K. (1991). *Introduction to work study* (3rd rev ed.). New Delhi: Oxford and IBH Publishing.
- Ravichandra Rao, I.K. (1983). *Quantitative methods for library and information science*. , New Delhi: Wiley Eastern.
- Sehgal, R.L. (1998). *Statistical techniques for librarians*. New Delhi: Ess Ess Publications.
- Simpson, I. S. (1988). *Basic statistics for librarians* (3rd ed.). London: Library Association.
- Taha, H.A. (2014). *Operations research: An introduction* (9th ed.). New Delhi: Pearson Education India.

Paper Code: ML-06

Paper Name: INFORMATION & COMMUNICATION TECHNOLOGY

- Operating systems –single user and multi-user operating systems –Distributed operating systems - Open source operating systems (e.g. Linux). Linux user level tasks. Linux system administration. Linux networking.
- High level programming languages (e.g., C / C++ / Java) and their use in problem solving.
- Database Management Systems - Basic concepts. Database system architecture. Database design – E-R model. Relational databases. Introduction to SQL – ANSI/SQL , SQL Implementation e.g., MySQL, MariaDB, PostgreSQL. Database security, backup and recovery. Distributed databases, Object-oriented databases, Web databases, Bibliographical databases.
- Web Technology. HTML- Elements, Attributes, Tags, Forms, Frames, Tables. CSS. DHTML. XML Technologies: XML, Namespace, DTD, W3C XML Schema, XPath, XQuery, Parsing XML, XML DOM, XSLT, XSL-FO. Scripting Languages (e.g., Perl, PHP, Javascript). Applets.

Suggested Readings:

Balagurusamy, E. (2013). *Object oriented programming with C+*. (6th ed.). New Delhi: Tata McGraw-Hill.

Balagurusamy, E. (2013). *Programming in ANSI C* (6th ed.). New Delhi: Tata McGraw-Hill.

Bayross, I. (2005). *Web enabled commercial applications development using ... HTML, DHTML, JavaScript, Perl CGI*. (3rd rev. ed.). New Delhi: BPB.

Bayross, I. & Shah, S. (2005). *MySQL 5 for professionals*. Mumbai: Shroff Publishers.

Das, S. (2006). *Your UNIX: The ultimate guide*. (2nd ed.). New Boston: McGraw-Hill.

Date, C. J., Kannan, A. & Swamynathan, S. (2006). *An Introduction to database systems* (8th ed.). New Delhi: Pearson Education.

Deitel, H.M. (2006). *Internet and world wide web* (3rd ed.). New Delhi: Pearson Education.

Elmasri, R. & Navathe, S.B. (2017). *Fundamentals of database systems* (7th ed.). Boston: Pearson Education.

Kanetkar, Y.P. (2013). *Let us C* (13th ed.). New Delhi: BPB Publications.

Negus,C. (2013). *Ubuntu Linux toolbox: 1000+ commands for power users* (2nd ed.). Hoboken, New Jersey: John Wiley.

Negus,C. (2015). *Linux Bible (2015)* (9th ed.). Indianapolis: John Wiley.

Schildt, H. (2017). *Java: a beginner's guide*. (7th ed.). New York: McGraw- Education.

Sobell, M.G. (2015). *A practical guide to Ubuntu Linux* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Stephens, R. K., Jones, A. & Plew, R. R. (2016). *Sams teach yourself SQL in 24 hours* (6th ed.). Indianapolis: Sams.

Tyler, S. (2006). *Fedora Linux*. Mumbai: Shroff Publishers.

McPeak, J. & Wilton, P. (2015). *Beginning Javascript*. (5th ed.).New York: John Wiley.

Paper Code: ML-07

Paper Name: ELECTIVE

[Syllabus will be provided by the concerned teacher]

Paper Code: ML-F1

Paper Name: MATHEMATICS FOR INFORMATION STUDIES-I

Algebra. Elementary Functions. Exponential Function. Logarithmic Function. Permutation. Combination. Matrices. Unit (Identity) Matrix. Addition. Null Matrix. Multiplication. Multiplication by a Scalar. Determinant. Rank. Inverse Matrix. Simultaneous System of Linear Equations. Eigen values. Eigen vectors.

Mathematical Logic (Classical First Order Logic). Propositional Calculus. Proposition. Negation.

Conjunction. Disjunction. Implication (subjunction, conditional). Equivalence (bi-conditional)

Contradiction. Tautology. Rules of Inference. Normal form. Predicate Calculus. Predicate. Quantifiers. Properties. Non-conventional Logics. Modal Logic. Temporal Logic. Three-valued Logics.

Set Theory. The Concept of a Set. Subset. Equality of Sets. Union. Intersection. Difference. Symmetrical Difference. Cartesian Product. Complement. Power Set. Cardinality. Sets of Numbers

Relations. Binary Relation. Equivalence Relation. Ordering Relation. Partially Ordered Set (Poset). Partition.

Probability. Probability and Relative Frequency. Independent Events. Conditional Probability. Bayes' Theorem. Random Variable. Probability Distribution. Density Function.

Vectors. Sum of Vectors. Scalar Product. Vector (Linear) Space.

Suggested Readings:

Das, N.G. (2009). *Statistical methods*. New Delhi: Tata McGraw-Hill.

Dominich, S. (2001). *Mathematical foundations of information retrieval*. Dordrecht: Springer Science+Business Media.

Feller, W. (2008). *An introduction to probability theory and its applications*. (3rd ed.). New York: Wiley.

Liu, C. L. (2006). *Elements of discrete mathematics*. (2nd ed.). New York: Tata McGraw-Hill.

Mapa, S. K. (2011). *Higher algebra: Abstract and linear*. (12th ed.). Kolkata: Sarat Book House.

Rosen, K. H. & Krithivasan, K. (2013). *Discrete mathematics and its applications*. (7th ed.). New York: McGraw-Hill.

Thomas, C. (2009). *Schaum's outlines mathematics for liberal arts majors*. New York: McGraw-Hill.

1st Year 2nd Semester

Paper Code: ML-08

Paper Name: KNOWLEDGE DISCOVERY & DATA MINING

- Knowledge Discovery. Knowledge discovery process. Knowledge Discovery and Information Retrieval. Data Warehousing. Data warehousing and OLAP. Physical data warehouse design. Data cleaning.
- Foundations of Data Mining. Stages of data mining process; Overview of main methods of data mining. Data mining models and algorithms.
- Decision-Tree based classifiers. Decision tree learning; Classification. Classification and prediction - basic concepts. Bayesian classification. Rule-based classification. Classification by means of neural networks, SVM classifier, etc
- Association-Rule mining. Association-Rule mining methods; Multi-level association rules, association mining and correlation analysis, constraint-based association rules. Association rules and sequential patterns.
- Information Extraction using neural networks. Clustering - K-means- Hierarchical Clustering- Self Organizing Feature Maps- Principle Components. Cluster analysis - basic concepts, types of data in cluster analysis, partitioning and hierarchical methods. Statistical Methods.
- Web Mining. Web content mining. Web structure mining. Web usage mining. Practical web mining applications overview.
- Mining Social Networks. Ubiquitous Data Mining. Collaborative Data Mining. Multimedia Data Mining. Data Mining in Medicine. Organizational Data Mining. Spatial Data Mining. Temporal Data Mining.

- Knowledge Discovery and Data Mining Software.

Suggested Readings:

Chakrabarti, S. (2002). *Mining the Web: Analysis of hypertext and semi structured data*. New York: Morgan Kaufmann.

Dunham, M. H. (2003). *Data mining: Introductory and advanced*. New York: Prentice Hall

Han, J. & Kamber, M. (2012). *Data mining: Concepts and techniques*. (3rd ed.). San Francisco: Morgan Kaufmann.

Hand, D., Mannila, H. & Smyth, P. (2012). *Principles of data mining*. New Delhi: PHI Learning.

Roiger, R. J. (2017). *Data mining : A tutorial-based primer*.(2nd ed.). Boca Raton: CRC Press.

Tan, P., Steinbach, M. & Kumar, V. (2014). *Introduction to data mining*. Essex: Pearson.

Paper Code: ML-09

Paper Name: METADATA CREATION & MANAGEMENT

Cataloguing of Non –Book Materials (according to AACR2 Revision 1988 and MARC 21)

- Books, Pamphlets, and Printed Sheets
- Cartographic Materials
- Manuscripts (Including Manuscript Collections)
- Music
- Sound Recordings
- Motion Pictures and Videorecordings
- Graphic Materials
- Electronic Resources
- Three-Dimensional Artefacts and Realia
- Microforms
- Continuing Resources

Suggested Readings:

American Library Association et al. (1978). *Anglo-American cataloguing rules* (2nd ed., 1988 rev.). Chicago: ALA.

Aswal, R. S. (2004). *MARC 21 cataloging format for 21st Century*. New Delhi: ESS ESS Publications.

- Fritz, D., & Fritz, R. (2003). *MARC 21 for everyone: A practical guide*. Chicago : American Library Association.
- Haynes, D. (2004). *Metadata for information management and retrieval*. London: Facet Publishing.
- Hunter, E.J. (1989). *Examples illustrating AACR2:1988 revision*. London: Library Association, 1989.
- Lazarinis, F. (2015). *Cataloguing and classification: An introduction to AACR2, RDA, DDC, LCC, LCSH and MARC 21 Standards*. Oxford: Chandos Publishing.
- Maxwell, R. L. & Maxwell, M. F. (2004). *Maxwell's handbook for AACR2R*. Chicago: American Library Association.
- Mukhopadhyaya, A. (2007). *Guide to MARC 21 for cataloging books and serials*. Oxford: Chandos Publishing.
- Sears, M. E. (2010). *Sears List of Subject Headings* (20th ed.). New York: H. W. Wilson
- Welsh, A., & Batley, S. (2012). *Practical cataloguing: AACR, RDA and MARC 21*. London: Facet Publishing.

Paper Code: ML-10

Paper Name: INFORMATION RETRIEVAL – II

- Automatic Indexing and Intelligent IR. Automatic Indexing: Processes, clustering, inverted file. Artificial Intelligence & Expert Systems. Fundamentals of NLP.
- Multimedia Information Retrieval. Attribute-based image retrieval, Text-based image retrieval. Query by Image Content. (Using content descriptors; color and texture, Identifying shapes - image objects). Streamed Image Retrieval - basic concepts. Improving result quality. Digital audio-video retrieval.
- Cognitive Information Retrieval - Concepts. Human computer interaction processes. polyrepresentation and the cognitive overlap .cognitive IR research: Information need vs., Knowledge need and Information behavior vs. knowledge behavior. CIR Processes –Multitasking view of CIR-social constructivism metaphor. CIR Techniques - Implicit relevance feedback -visual representation Techniques-Knowledge Domain Visualizations.
- Quantum Information Retrieval. Basic concepts of quantum mechanics –Observables-Superposition. - Probability-Interference-Entanglement-Detection. Quantum Formalism in IR. Concept Combination. Word Ambiguity. Semantic Spaces.

Contextual Search. Ranking Principle. User Interaction. Relevance Detection. Evaluation Studies

- Recent trends in IR. Collaborative Information Retrieval. Quantum Information Retrieval. Blog Information Retrieval. Information Retrieval for E-Discovery. Bibliometric-Enhanced IR. Cross-/ multilingual IR. Collaborative IR. Data Mining for Information Retrieval. Semantic Models in Information Retrieval. Question Answering.

Suggested Readings:

Baeza-Yates, R. & Ribeiro-Neto, B. (1999). *Modern information retrieval*. New York: ACM Press.

Belkin, N. J. (1980). Anomalous states of knowledge as basis for information retrieval. *The Canadian Journal of Information Science*, 5, 133–143.

Belkin, N. J. (1984). Cognitive models and information transfer. *Social Science Information Studies*, 4, 111–129.

Belkin, N. J., Oddy, R. & Brooks, H. (1982). ASK for information retrieval. *Journal of Documentation*, 38(2), 61–71.

Blair, D.C. (1990). *Language and representation in information retrieval*. Amsterdam : Elsevier.

Busemeyer, J. & Bruza, P. D. (2012). *Quantum models of cognition and decision*. Cambridge, N.Y.: Cambridge University Press.

Ceri, S., Bozzon, A., Brambilla, M., Della Valle, E., Fraternali, P. & Quarteroni, S. (2013). *Web information retrieval*. Heidelberg: Springer.

Chakrabarti, S. (2002). *Mining the Web: Analysis of hypertext and semi structured data*. New York: Morgan Kaufmann.

Chen, C. (2004). *Information visualization: Beyond the horizon. (2nd ed.)*. New York: Springer.

Chowdhury, G. G. (2010). *Introduction to modern information retrieval. (3rd ed.)*. London: Facet Publishing.

Chu, H. (2003). *Information representation and retrieval in the digital age*. Medford, N.J: Information Today.

Ingwersen, P. (1992). *Information retrieval interaction*. London: Taylor Graham.

- Ingwersen, P. (1999). Cognitive information retrieval. *Annual Review of Information Science and Technology*, 34, 3-52.
- Ingwersen, P. & Järvelin, K.(2005). *The turn: Integration of information seeking and retrieval in context*. Dordrecht: Springer.
- Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science*, 42(5), 361–371.
- Kuhlthau, C. C. (1993). A principle of uncertainty for information seeking. *Journal of Documentation*, 49(4), 339–355.
- Lancaster, F. W. (1979). *Information retrieval systems: characteristics, testing, and evaluation*. (2nd ed.). New York: John Wiley.
- Manning, C. D., Raghavan, P. & Schütze, H. (2008). *Introduction to information retrieval*. New York: Cambridge University Press.
- Meadow, C.T., Boyce, B.R., Kraft, D.H. & Barry, C. (2007). *Text information retrieval systems*. (3rd ed.). London: Academic Press.
- Melucci, M. (2015). *Introduction to information retrieval and quantum mechanics*. New York: Springer.
- Nie, J.-Y. (2010). *Cross-language information retrieval*. San Rafael, Calif: Morgan & Claypool.
- Peters, C., Braschler, M., & Clough, P. (2012). *Multilingual information retrieval: From research to practice*. Heidelberg: Springer.
- Rüger, S. M. (2010). *Multimedia information retrieval*. [San Rafael, Calif.]: Morgan & Claypool.
- Ruthven, I., Lalmas, M. & Rijsbergen, K. V. (2003). Incorporating user search behavior into relevance feedback. *Journal of the American Society for Information Science and Technology*, 54(6), 529–549.
- Salton, G. and McGill, M. J. (1983). *Introduction to information retrieval*. New York: McGraw-Hill.
- Salton, G. (1989): *Automatic text processing: The transformation, analysis, and retrieval of information by computer*. Reading, Mass.: Addison-Wesley.
- Saracevic, T. (1975). Relevance: A review of and a framework for the thinking on the notion in information science. *Journal of the American Society of Information Science*, 26(6), 321–343.

Saracevic, T. (1996). Interactive models in information retrieval (IR): A review and proposal. In *Proceedings of the 80th Annual Meeting of the American Society of Information Science*, 33, 3–9.

Sparck Jones, Karen, (Ed.) (1981). *Information retrieval experiment*. London, Butterworth.

Sparck Jones, K. & Willett, P. (Ed.) (1997). *Readings in information retrieval*. San Francisco, Calif: Morgan Kaufman.

Spink, A. & Cole, C. (Eds.). (2005). *New directions in cognitive information retrieval*. New York: Springer

Spink, A., & Jansen, B. J. (2004). *Web search: Public searching of the web*. Dordrecht: Kluwer Academic Publishers.

Svenonius, E. (2000). *The intellectual foundation of information organization*. Cambridge: MIT Press.

Taylor, A. G., Joudrey, D. N. & Wisser, K.M. (2017). *The organization of information* (4th ed.). Westport, CT: Libraries Unlimited.

Thelwall, M. (2009). *Introduction to webometrics: Quantitative web research for the social sciences*. [S.l.]: Morgan & Claypool.

van Rijsbergen, C. J. (1979). *Information retrieval* (2nd ed.). London: Butterworths.

Voorhees, E. M. (2000). Variations in relevance judgments and the measurement of retrieval effectiveness. *Information Processing & Management*, 36(5), 697–716.

Wilson, T. D. (1999). Models in Information behaviour research. *Journal of Documentation*, 55, 249–270.

Wilson, T. D. (2000). Human information behaviour. *Informing Science*, 3(2), 49–56.

Paper Code: ML-11

Paper Name: INFORMETRICS

- Bibliometrics, Scientometrics, Informetrics and Webometrics – Terminological issues and historical developments . Philosophical foundations of bibliometrics: - Bernal, Merton, Price, Garfield, and Small. Network of science –Derek John de Solla Price.
- Bibliometrics Laws. Lotka's Law, Zipf's Law and Mandelbrot's reinterpretation, Bradford's Law of Scattering , Garfield's Law of Concentration, 80/20 rule, Ortega Hypothesis. Information Production Processes. Success-Breeds-Success. Growth of scientific literature. Obsolescence of scientific literature.

- Indicators of publication productivity. Factors influencing publication productivity. Publication Productivity of Institutions and National research activity. Publication productivity by discipline. Publication productivity dynamics of institutions, regions or countries, journals and Individuals Scientific Collaboration. Co-authorship as a measure of scientific collaboration. Collaboration rate. International Collaboration.
- Impact Factor and the Evaluation of Scientists: Bibliographic Citations at the Service of Science Policy and Management. Journal Citation Reports. Indicators of citation Impact. Journal impact factor. Scientometric indicators. From Citation Counting to the Hirsch Index. *g*-index, Gini Index. Evaluations of Countries, Institutions, and Research Groups. Citations of patents. Structure of science-Co-Citation analysis. CO-Word analysis, Co-word Extraction. Co-word Classification. Clustering and Visual Displaying.
- Webometrics. Bibliometric laws in the Cyberworld. Citations in e-journals and open archives. Web Scientometric Indicators. Web Impact Assessment.
- Emerging Trends in Bibliometrics, Scientometrics, Informatics and Webometrics.

Suggested Readings:

- Bar-Ilan, J. (2008). Which h-index? A comparison of WoS, Scopus and Google Scholar. *Scientometrics*, 74(2), 257-271.
- Borgman, C. L., & Furner, J. (2002). Scholarly communication and bibliometrics. *Annual Review of Information Science and Technology*, 36, pp. 3–72. doi:10.1002/aris.1440360102
- De Bellis, N. (2009). *Bibliometrics and citation analysis: from the Science Citation Index to cybermetrics*. Lanham, Maryland: Scarecrow Press.
- De Solla Price, D. (1963). *Little Science, big Science*. New York: Columbia University Press.
- Egghe, L. (2005). *Power Laws in the information production process: Lotkaian informetrics*. Amsterdam: Elsevier.
- Garfield, E. (1979). *Citation indexing: It's theory and application in science, technology and humanity*. New York: John Wiley .
- Geisler, E. (2000). *The metrics of science and technology*. Westport, Conn.: Quorum Books.
- Hirsch, J. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 102(46), 16569-16572.

Ingwersen, P. (1998). The calculation of web impact factors. *Journal of Documentation*, 54(2), pp. 236–243. doi:10.1108/EUM0000000007167.

Leydesdorff, L. (2001). *The challenge of scientometrics: The development, measurement, and self-organization of scientific communications*. (2nd ed.). [Parkland, Ill.] : Universal Publishers.

Lotka, A.J. (1926). The frequency distribution of scientific productivity. *Journal of the Washington Academy of Sciences*, 16(12), 317-324.

Merton, R.K. (1973). *Sociology of science: Theoretical and empirical investigations*. Chicago: University of Chicago Press.

Narin, F. (1976). *Evaluative bibliometrics: The use of publication and citation analysis in the evaluation of scientific activities*. New Jersey: Computer Horizons.

Sengupta, I.N. (1988). *Bibliometrics research: Growth of bibliometrics literature*. Calcutta: SBA.

Spink, A., & Jansen, B. J. (2004). *Web search: Public searching of the web*. Dordrecht: Kluwer Academic Publishers.

Thelwall, M. (2009). *Introduction to webometrics: Quantitative web research for the social sciences*. [S.I.]: Morgan & Claypool.

Vinkler, P. (2010). *The evaluation of research by scientometrics indicators*. Oxford: Chandos.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, NY: Cambridge University Press.

Zipf, G.K. (1949). *Human behavior and the principle of least Effort*. Cambridge, USA: Addison-Wesley.

Paper Code: ML-12

Paper Name: RESEARCH METHODOLOGY & TECHNICAL WRITING

- Concept, meaning, objectives and processes of research. Problems of research. Research question. Types of research. Basic and Applied research, Descriptive, Experimental and Analytical research, Quantitative and Qualitative research, Conceptual research. Ethical aspects of research.
- Research Design and Methods. Meaning, need and features of good research design. Identification and formulation of problem; Hypothesis: Types of research design. Stages of research and designing research proposal. Literature search- Print, Non-

Print and digital resources. Descriptive, Historical, Scientific methods. Experimental and Delphi method. Survey method. Case study method.

- Data collection, Data Analysis, Reporting. Data collection, survey method, sampling techniques. Data collection tools: Questionnaire, Schedule, Interview, Observations, Scales. Data analysis and interpretation. Data presentation-tabulation, graphical presentation, use of statistical packages. - Research reporting: structure, style, contents, guidelines, quality parameters and citation.
- Trends in Researches. Research scenario in Science and Technology. Collaborative researches, Relay research. Library and Information Science research. Impact of new technologies, e-citation, on-line survey, Webliography, Organizations, Institutions, Experts.
- Technical Writing and Editing. Definition and attributes of technical writing. Documentation and referencing. Jobs of editor. Proof correction.

Suggested Readings:

American Psychological Association.(2010).*The publication manual of the American Psychological Association* (6th ed.). Washington, DC: APA.

Best, J.W. & Kahn, J.V. (2006). *Research in education*. 10th ed. Boston: Pearson.

Busha, C. & Harter, S. (1980). *Research methods in librarianship: techniques and interpretations*. New York: Academic Press.

Bushaway, R. W. (2003). *Managing Research*. Maidenhead, England: Open University Press.

Connaway, L.S. & Powell, R. R. (2010). *Basic research methods for librarians*. (5th ed.). Santa Barbara, CA: Libraries Unlimited.

Gerson, S. J. & Gerson, S. M. (1992). *Technical writing: Process and product*. Englewood Cliff's: Prentice Hall.

Gorman, G.E. & Clayton, P. (2004). *Qualitative Research for the Information Professional: A practical handbook* (2nd ed.). London: Facet Publishing.

Huckin, T. N. & Olsen, L. A. (1991). *Technical writing and professional communication for non-native speakers of English*. (2nd ed.). New York: McGraw-Hill.

Khan, M. A. (2002). *Research methods in library and information science*. New Delhi: Cosmo Publications.

Kothari, C.R. (2004). *Research methodology: methods and techniques* (2nd rev. ed.). New Delhi : Wiley Eastern Publishers.

Krishan Kumar (1992). *Research methods in library and information science*. New Delhi: Vikas Publishing House.

Kuhn, T.S. (1996). *The structure of scientific revolutions*. (3rd ed.). Chicago: University of Chicago Press.

Lawal, I. O. (2009). *Library and information science research in the 21st century: a guide for practicing librarians and students*. Oxford, UK: Chandos Publishing.

Modern Language Association of America. (2008). *MLA style manual and guide to scholarly publishing*. (3rd ed.). New York: MLA.

Moore, N. (2006). *How to do research* (3rd ed.). London: Facet Publishing.

Neelameghan, A. (1975). *Presentation of ideas in technical writing*. New Delhi: Vikas Publishing House.

Ohdedar, A.K. (1993). *Research methodology*. Calcutta: Bengal Library Association.

Rubens, P. (2001). *Science and technical writing: A manual of style* (2nd ed.). New York: Routledge.

Simpson, I. S. (1990). *How to interpret statistical data: A guide for librarians and information scientists*. London: Library Association.

Slater, Margaret, (Ed.). (1990). *Research methods in library and information studies*. London: Library Association.

University of Chicago. (2010). *The Chicago manual of style*. (16th ed.). Chicago: University of Chicago Press.

Paper Code: ML-13

Paper Name: LIBRARY AUTOMATION & DIGITAL LIBRARY SYSTEMS

- Impact of ICT on Library and information Systems. Cataloguing. Online databases. OPAC. WebOPAC. Digital reference tools. Electronic journals. Electronic theses and dissertations etc. Library security technology –RFID etc. Automated Library Systems. Planning for library automation. System selection and implementation. Integrated Library Management Software (ILMS). Subsystems of an ILMS – File organization & data structures. Study of different ILMS e.g., Koha, NewGenlib,

Evergreen etc. Evaluation of ILMS. Evaluation of ILMS. Multilingual issues in ILMS.

- Institutional repositories / Digital library systems - Meaning, scope and objectives. Digital library initiatives and projects in abroad and India. Digital library architecture. Digital preservation – issues, strategies. Digital Rights Management (DRM) and copyright issues. Digitization, tools and process. Document scanning technology & Equipment- scanners- digital camera. Hardware and software for digital library creation, OCR, image editing software. Organization of digital objects – metadata encoding. Resource identifiers (Naming services) – URN,URI, CNRI,s. Handle system, PURL, DOI. Metadata schemas – Crosswalks of metadata schemas. Metadata harvesting – OAI / PMH. Open source digital library software. Multilingual issues in digital library systems. Users and usage of digital libraries - Quantitative and qualitative evaluation.
- Project on Integrated Library Management Software (e.g., Koha, NewGenlib etc.).
- Hands on practice of Scanner, Digital Camera & OCR.
- Project on Institutional Repository / Digital Library Software (e.g., GSDL, DSpace, E- Print Archive etc.)

Suggested Readings:

Arms,W. Y. (2000). *Digital libraries*. Cambridge, MA.: MIT Press.

Andrews, J. (2010). *Digital Libraries*. London: Ashgate.

Choudhury, G. G. (2004). *Introduction to digital libraries*. London: Facet Publishing.

Cooper, M. D. (1996). *Design of library automation systems*. New York: John Wiley.

Dahl, M., Banerjee, K. & Spalti, M. (2006). *Digital Libraries: Integrating content and systems*. Oxford: Chandos Publishing.

Haravu, L. J.(2004). *Library automation: Design, principles and practice*. New Delhi: Allied Publishers.

Kochtanek, J. R. & Mathews, J. R. (2004). *Library information systems: From library automation to distributed information access solutions*. Westport: Libraries Unlimited.

Lesk, M. (1996). *Understanding Digital Libraries* (2nd ed.). San Francisco: Morgan Kaufman.

William, A. (2005). *Digital Libraries*. New Delhi: Anne.

Paper Code: ML-14

Paper Name: ELECTIVE

[Syllabus will be provided by the concerned teacher]

Paper Code: ML-15

Paper Name: DISSERTATION

Each student will have to prepare a dissertation on a topic approved by the Board of Studies under the guidance of a teacher and submit the same at the end of second semester.

Paper Code: ML-16

Paper Name: FIELD WORK

Field (library, users, use behavior, community information, local history etc.) surveys will be conducted by the students and supervised by the teachers of the department. After completion of the survey each student will submit a survey report and present the same in the colloquium conducted and evaluated by the departmental teachers.

Paper Code: ML-F2

Paper Name: MATHEMATICS FOR INFORMATION STUDIES-II

Fuzzy sets. Fuzzy Union. Fuzzy Intersection. Fuzzy Complement. Fuzzy Relation. Fuzzy Projections.

Metric spaces. Neighbourhood (Vicinity). Open Set. Convergence. Completeness. Fixed Point.

Topology. Topological Space. Vicinity. Hausdorff Space. Compactness.

Grph theory - Basic concepts. Walk. Connected Graph. Blocks. Block Graph. Tree. Block-Cut Point Tree.

Calculus. Sequence. Limit. Cauchy Sequence. Limit of Functions. Continuous Function. Derivative. Maximum and Minimum. The Indefinite Integral. The Definite Integral

Differential Equatins. Linear Equation of the First Degree (type 1 linear equation). Cauchy Problem.

Recursion and complexity theory. Primitive Recursion. Primitive (partial) Recursive Function. Recursive Function. Turing Machine. Turing computability. Recursion and Computability.

Artificial neural network. Artificial Neuron. The Fundamental State Equation. Operation. Energy Function. Equilibrium and Stability. The Winner Takes All Strategy. Learning

Suggested Readings:

Das, N.G. (2009). *Statistical methods*. New Delhi : Tata McGraw-Hill.

Dominich, S. (2001). *Mathematical foundations of information retrieval*. Dordrecht: Springer Science+Business Media.

Feller, W. (2008). *An introduction to probability theory and its applications*. (3rd ed.). New York: Wiley.

Liu, C. L. (2006). *Elements of discrete mathematics*. (2nd ed.). New York: Tata McGraw-Hill.

Mapa, S. K. (2011). *Higher algebra: Abstract and linear* (12th ed.). Kolkata: Sarat Book House.

Rosen, K. H. & Krithivasan, K. (2013). *Discrete mathematics and its applications* (7th ed.). New York: McGraw-Hill.

Thomas, C. (2009). *Schaum's outlines mathematics for liberal arts majors*. New York: McGraw-Hill.