

INDUCTION BOOKLET

Academic Year 2014-2015



Department of Computer Science

School of Mathematics, Statistics and Computational Sciences

Central University of Rajasthan

NH-8 Jaipur- Ajmer Highway, Bandarsindri

Kishangarh -305802

District-Ajmer, Rajasthan

Website: www.curaj.ac.in

From the Vice Chancellor's Desk

Dear Students,

A very warm welcome to you all at the Central University of Rajasthan. Many of you may wonder as to what this new university will be like in future? Let me quote the draft vision of the University.

"Central University of Rajasthan aspires to be India's most energetic and responsive University, offering unparalleled educational opportunities for learner community especially to the lower socio-economic strata of the society seeking the highest quality undergraduate and graduate education, continuing personal or professional enrichment in higher education and selected profession that will lead to the formation of scholarly community serving the nation by advancing, sharing and applying the knowledge and facilitating the development of thoughtful, creative, adaptable, contributing and humane citizens."

As stated in the working document on academic issues and their implementation in 15 new Central Universities, prepared by the UGC sub-committee, we have introduced school system under which different departments have been established. These departments will have adequate faculty and administrative set up, which will facilitate the implementation of the Choice Based Credit System (CBCS) in letter and spirit.

The Central University of Rajasthan had started two unique post graduate programmes, namely M.Sc./M.A. Statistics and M.Sc. Tech. Mathematics in the academic year 2009-10, six programmes viz. M.A. English, M.Sc. Computer Science, M.Sc. Chemistry, M.A. Economics, MBA and M.Tech. in Computer Science in the academic year 2010-2011 and subsequently six new programmes, namely M.Sc. Physics, M.Sc. Biotechnology, M.Sc. Environmental Science, M.A. in Culture and Media Studies, M.Arch and M.A. Hindi *w.e.f.* the academic year 2011-12. In the academic year 2012-2013, six additional new programmes namely, M.Pharm., M.A. in Public Policy, Law and Governance, M.A. in Social Work/ M.S.W., M.Com, M.Sc. in Biochemistry and Microbiology along with the Ph.D. Programmes in all these 20 Departments. In the academic year 2013-2014, the University started Integrated M.Sc. programmes in Mathematics, Physics, Chemistry, Economics, Biotechnology, Microbiology, Biochemistry, Computer Science, Environmental Science and Statistics.

All of these programmes at Central University of Rajasthan are unique in nature with high job potential and have been streamlined to meet the emerging needs of both the public and the private sectors. If you consider education as adventure and wish to contribute to nation building then the Central University of Rajasthan is the place for you. Let me assure you that the University will try to give its best to you all. At the same time, I also expect the best from you. Once again welcome to the Central University of Rajasthan and thanks for choosing this institution for your bright future.

I wish you all the very best in your pursuit of excellence.

Prof. (Dr.) A.P. Singh
Vice Chancellor (i/c)

About the University

The Central University of Rajasthan has been established by an Act of Parliament (Act No. 25 of 2009, The Gazette of India, No. 27, published on 20th March, 2009) as a new Central University and is fully funded by the Government of India.

The Visitor

The President of India, His Excellency Shri Pranab Mukherjee, is the visitor of the Central University of Rajasthan.

The Vice Chancellor

The President of India, in his capacity as the visitor of the university in 2009, appointed Prof. M. M. Salunkhe as the founder Vice-Chancellor of the university. The present Vice Chancellor is Prof. (Dr.) A. P. Singh (i/c).

Vision

The Central University of Rajasthan aspires to be one of India's most dynamic and vibrant universities, responsive to the changing global trends, providing unparalleled educational opportunities for the learner community, especially for those coming from the lower socio- economic strata of society, seeking quality education. It proposes to offer innovative undergraduate and graduate academic programmes as well as continuing personal and professional enrichment in selected areas that will lead to the formation of a scholarly community by advancing, sharing and applying knowledge, and by facilitating the development of thoughtful, creative, sensitive and responsible citizens.

Mission

The mission of the Central University of Rajasthan is to contribute and work with a sense of commitment towards the education, culture, economy, environment, health and social advancement of the region and the nation at large by providing excellent undergraduate liberal education and quality programs leading to bachelor's, master's, professional and doctoral degrees.

Goal

- To facilitate accessible and affordable quality education that equips the students with scholarly and professional skills, moral values and global perspectives.
- To strengthen the research potential of both students and faculty focusing, in particular, on regional problems.
- To integrate national and international perspectives into our fundamental fourfold mission of teaching, research, extension and consultancy.
- To explore knowledge and wisdom in order to build a wealth of interdisciplinary academic resources, indispensable for sustainable development and accomplish the status of a leading research intensive university, and to engage in the transfer of knowledge and technology to the community in order to strengthen and elevate the community potential to increase the competitiveness of India at the global level.
- To employ the strategy of proactive management to the university administration and to operate the system within a sensible framework of high-quality governance based on efficiency, transparency and accountability.
- To develop the university as one of the best places in the world to attain intellectual skills and acquire an affirmative mindset to thrive in an increasingly competitive global job market, simultaneously acting as responsible citizens of the global community by the inculcation of value-oriented education.

Medium of Instruction and Examinations

The medium of instruction in respect of all courses conducted in the schools, centres and departments admitted to the privileges of the University shall be English, except in cases of studies/research in Languages.

Attendance

All students must have a minimum 75% of attendance in all individual courses, in order to be eligible to appear at the End of Semester examination for the programme. The attendance in at least two of the three sessional tests (in-semester examination) is compulsory for a student to be eligible to take the End of Semester Examination (EoSE).

Avoid Plagiarism

Plagiarism means presenting another person's ideas, work, copying or reproducing the work without due permission/acknowledgment of the source. Work submitted for assessment may also be regarded as plagiarized where significant portions of an assignment have been reproduced from the work of another student. Hence the students are advised not to resort to plagiarism in their work. The Central University of Rajasthan is opposed to and will not tolerate plagiarism. The University is currently under process to provide plagiarism tool as detailed below:

Name: Turnitin; Website: www.turnitin.com; No. of users: 100

Academic Honesty

The role of the Central University of Rajasthan is to create, preserve, transmit and apply knowledge through teaching, research and creative works. The university is committed to academic excellence and high standards of ethical behaviour as the corner stones of scholastic achievement and quality assurance. The university requires all students to act honestly, ethically and with integrity in their dealings with the university employees, the other students and public.

Sexual Harassment

Central University of Rajasthan strives to provide a place of work and study free of sexual harassment, intimidation or exploitation. Where sexual harassment is found to have occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action (as per the

university ordinance 21 sensitization, prevention and Redressal of sexual harassment, Act Section 28(n) against those responsible. Reports of sexual harassment are taken seriously and will be dealt promptly. The students with such issues are advised to approach the anti-sexual harassment cell <http://www.curaj.ac.in/Default.aspx?PageId=68> and links therein. All the issues pertaining to the students shall be kept in absolute confidentiality.

Anti-Ragging

Any disorderly conduct whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness any other student, indulging in rowdy or undisciplined activities which causes or is likely to cause annoyance, hardship or psychological harm or to raise fear of apprehension thereof in fresher's or junior students or asking the students to do any act or perform something which such students will not do in the ordinary course and which has the effect of causing or generating a sense of shame or embarrassment so as to adversely affect the physique or psyche of a fresher or a junior student.

The Central University of Rajasthan is opposed to and will not tolerate ragging. All cases of ragging will be strictly dealt with as per provision under **ORDINANCE 22** Curbing the Menace of Ragging in Higher Educational Institutions (Act Section 28 (n). You may use 24x7 Anti Ragging Helpline, Toll free No. 1800-180-5522 or E-mail- helpline@antiragging.net .

For details visit <http://www.curaj.ac.in/Default.aspx?PageId=121>.

Financial Aid/Assistance

- Single Girl Child Scholarship of Rs. 2,000/- per month by UGC (Government of India)
- ST/SC Scholarships (Government of Rajasthan).
- Scholarship of Rs. 1,000/- per month to first three students in merit (CUCET-2013) admitted to any programme by Central University of Rajasthan for the first semester. The subsequent semester results will determine the students' eligibility for these scholarships in the following semesters.
- Students admitted to M. Tech./M.Arch. with valid GATE Score get MHRD Scholarship
- Post-Graduate Merit Scholarship for University Rank Holders at Undergraduate
- Amount of Rs. 2000/- per month by UGC (Government of India)
- Post-Graduate Scholarship for selected SC/ST candidates of Rs. 5000/- per month (M.Tech.) and Rs. 3000/- per month for other professional courses.

Communication with University Authorities

Any communication, routine or otherwise, with the University Authorities should be routed through the respective Head of the Department only. **No student should, under any circumstances send a letter or e-mail to the university authorities directly.** For any problem, the students are advised to contact the concerned co-ordinator of the programme.

Hostel Accommodation & Other Facilities

The Central University of Rajasthan has planned to provide hostel facility for all the students admitted to different programmes. However, the University reserves the right of allotment of hostel rooms and other facilities and it is not a matter of right for a student to claim accommodation in the University hostels. Each student who has taken hostel admission needs to abide by the hostel rules, failing which his/her admission to the Hostel will be withdrawn. Students residing in the hostel are required to take active part in running the Hostel Mess and in the payment of Mess Bill before the due date every month. Apart from the Hostel Mess, the students can have their food from the University Canteen in the campus.

Both the boys' and the girls' hostels have well-equipped Gym, which will be open for the residents of the hostel during specific timings. The students are required to sign a register kept at the entrance of the Gym before using the facility. It is the responsibility of the students to take care of the exercise machines and report to the concerned authority, in case of any misuse/damage to the equipment in the gym.

The hostel residents will have access to 24 hour hi-speed internet access through Wi-Fi facility. The students are required to fill up a form and submit it at the Server Room in the academic building to get a username and password, which would enable the student to make use of this facility. Students are advised not to open any unsuitable sites as their activity will be under continuous scrutiny and henceforth such internet sites will be blocked.

The University provides transport facility to the students from the Campus till Bandar Sindri Chowk and back on all weekdays. On Sundays, the University Bus provides transportation from the Campus till Kishangarh and back. The students are advised to get permission from the concerned authority in case they need the vehicle during any emergency. The University has appointed a Medical Officer who is available throughout the day in the campus for any health related problems of the students. In severe cases, the University takes care of the students by sending them either to Kishangarh hospital or Marble City Hospital. In all respects, the University ensures a pleasant stay in the Campus.

About Library

The University Library is a central facility to support the teaching and research activities of the University. The library has been, over the years successfully catering to the information needs of all the academic community viz., teachers, research scholars and students of Sciences, Social Sciences, Humanities, Performing Arts, Fine Arts, Communication and Management Studies.

The library has a collection of more than 15,000 books. Library subscribes following periodicals, popular magazines & newspapers in English and Indian languages.

The library also has 10 mbps UGC-INFONET connectivity. The library is open from 9:00 a.m. to 6:00 p.m. on all working days.

Current Science

1. University News
2. Economic and Political Weekly
3. Applied Mathematics Letters
4. Proceedings: Mathematical Sciences
5. Resonance
6. Journal of Actuarial
7. Journal of Actuarial Society of India
8. Sankhya
9. Journal of the Indian Statistical Institute
10. IEEE Systems Journal
11. Journal of Computers and Systems Sciences
12. Foundations and Trends in Databases
13. Journal of Network and Computer Communication
14. Scandinavian Actuarial Journal
15. Journal of Applied probability
16. Journal of Economics
17. Insurance Mathematics & Economics
18. International Journal of Post-Colonial Studies
19. Journal of Commonwealth Literature
20. Modern Drama
21. Modern Fiction Studies
22. Journal of Literary Theory
23. Harvard Business Review South Asia

- 24. Indian Journal of Training & Development**
- 25. Vikalpa (Academic)**
- 26. Global Business Review**
- 27. Journal of Human Values**
- 28. Journal of Entrepreneurship**
- 29. Indian Journal of Public Administration**
- 30. Indian journal of Finance**
- 31. Indian Journal of Marketing**
- 32. Express Computer**
- 33. Digit**
- 34. Date Quest**
- 35. PC Quest**
- 36. Computer Today**
- 37. The Economist**
- 38. Frontline**
- 39. India Today (English)**
- 40. India Today (Hindi)**
- 41. Business and Economy**
- 42. Yojana**
- 43. Outlook**
- 44. Times of India**
- 45. Economics Times**
- 46. The Financial Times**
- 47. Hindustan Times**
- 48. DNA**
- 49. Rajasthan Patrika**
- 50. Dainik Bhaskar**

The list of e-resources available in/through the library are given below.

List of E-Resources

UGC- Infonet Consortium (IP based access)

- [American Chemical Society](http://www.pubs.acs.org/)
- [American Institute of Physics](http://journals.aip.org/)
- [American Physical Society](http://publish.aps.org/browse.php)
- [Annual Reviews](http://arjournals.annualreviews.org/)
- [Economic & Political Weekly](http://www.epw.in)
- Elsevier Science
- [ISID](http://www.sciencedirect.com/)
- [ISID](http://isid.org.in/)
- [JCCC](http://jccc-ugcinfonet.in) or www.jccc-ugcinfonet.in
- Oxford University Press
- [JSTOR](http://www.oxfordjournals.org)
- [Project Euclid](http://www.jstor.org/)
- [Royal Society of Chemistry](http://projecteuclid.org/)
- [SIAM](http://www.rsc.org/Publishing/Journals/)
- [MathSciNet](http://epubs.siam.org/)
- [Springer Link](http://www.ams.org/mathscinet/)
- [Taylor & Francis](http://www.springerlink.com/)
- [Taylor & Francis](http://www.informaworld.com/)

Subscribed Resources (IP based access)

- IEEE Online <http://www.ieee.org/ieeexplore>
- ACM Digital Library <http://www.dl.acm.org>
- EBSCO (Art & Architecture Complete) <http://search.ebscohost.com>
- Business Source Elite E-Journal Collection (EBSCO) <http://search.ebscohost.com>
- Bentham Science (Pharmacology, Toxicology and Pharmaceutical science) <http://www.benthamscience.com>
- Science Direct (Pharmacy) <http://www.sciencedirect.com>
- SciFinder <https://scifinder.cas.org>

Open Access Resources

- IMF e-library <http://elibrary-data.imf.org/> (Data interface)
<http://www.elibrary.imf.org/> (Text interface)

Central University of Rajasthan
Academic Calendar 2014 – 2015

Sl. No.	Activities	Dates
1.	Admissions, Counseling and Registration	30 June – 11 July 2014
2.	Commencement of Classes (Old Batches)	07 July 2014 (Monday)
3.	Commencement of Classes (New Batches)	14 July 2014 (Monday)
4.	Last date to submit course registration form and deposit fee without late fee	15 July 2014 (Tuesday)
5.	Last date to submit course registration form and deposit fee with late fee	21 July 2014 (Monday)
6.	Students' Election (Tentative)	14 Aug 2014 (Thursday)
7.	First Internal Assessment (IA)	19 – 22 Aug 2014 (Tue – Fri)
8.	Second Internal Assessment (IA)	26 Sept – 1 Oct 2014 (Fri – Wed)
9.	Sports & Cultural Events (Tentative)	7 - 10 Oct 2014 (Tue – Fri)
10.	Completion of teaching/Practical	11 Nov 2014 (Tuesday)
11.	Last date to submit attendance to CoE	12 Nov 2014 (Wednesday)
12.	Revision of Course work	12-14 Nov 2014 (Wed-Fri)
13.	End of Semester Examination (EoSE)	17 – 28 Nov 2014 (Mon – Fri)
14.	Showing of EoSE-Dec., 2014 Answer Books	On or before 3 rd Dec, 2014 (Wednesday)
15.	Announcement of Draft Results Notice Boards by the Departments	4 Dec, 2014 (Thursday)
16.	Submission of Results by Departments to Controller of Examinations (CoE)	5 Dec, 2014 (Friday)
17.	Uploading of Results by CoE on University Website	17 Dec, 2014 (Wednesday)
18.	Winter Courses	8 – 19 Dec 2014
19.	<i>Winter Vacation</i>	22 Dec 2014 – 2 Jan 2015

Note:

1. IA schedule (including 3rd IA) is to be announced by the concerned departments.
2. Please refer to the University Holiday Calendar for list of Holidays.
3. Winter courses will be announced by the Departments in the month of November.
4. Attending two internal assessment test is the prerequisite to be eligible for attending EoSE

Central University of Rajasthan
Academic Calendar 2014 – 2015

Sl. No.	Activities	Dates
1.	Commencement of Classes	05 Jan 2015 (Monday)
2.	Last date to submit course re-registration form and deposit fee without late fee	09 Jan 2015 (Friday)
3.	Last date to submit course registration form and deposit fee with late fee	16 Jan 2015 (Friday)
4.	First Internal Assessment (IA)	9 - 13 Feb 2015 (Mon – Fri)
5.	Second Internal Assessment (IA)	23 - 27 March 2015 (Mon – Fri)
6.	Completion of teaching/Practical	05 May 2015 (Tuesday)
7.	Last date to submit attendance to CoE	06 May 2015 (Wednesday)
8.	Revision of Course work	06-08 May 2015 (Wed-Fri)
9.	End of Semester Examination (EoSE)	11 to 22 May 2015 (Mon – Fri)
10.	Showing of EoSE-Dec., 2014 Answer Books	On or before 27 May 2015 (Wednesday)
11.	Announcement of Draft Results Notice Boards by the Departments	28 May 2015 (Thursday)
12.	Submission of Results by Departments to Controller of Examinations (CoE)	29 May 2015 (Friday)
13.	Uploading of Results by CoE on University Website	10 June 2015 (Wednesday)
14.	Summer Vacation	1-26 June 2015 (Mon – Fri)
15.	Counseling, Orientation Program & Registration	29 June – 10 July 2015
16.	Commencement of Classes	13 July 2015 (Monday)
17.	Last date to submit course re-registration form and deposit fee without late fee	15 July 2015 (Wednesday)
18.	Last date to submit course registration form and deposit fee with late fee	22 July 2015 (Tuesday)

Note:

1. IA schedule (including 3rd IA) is to be announced by the concerned departments.
2. Please refer to the University Holiday Calendar for list of Holidays.
3. Winter courses will be announced by the Departments in the month of November.
4. Attending two internal assessment test is the prerequisite to be eligible for attending EoSE

Important:

- Cumulative Attendance of the students to be maintained Online.
- Each Internal Assessment shall be of one hour duration and be conducted during the respective class hour. The schedule to be declared at least one week prior to the commencement of IA.
- Marks scored in each Internal Assessment to be notified and submitted to the Academics Office within one week from the III Internal Assessment.
- Within one week from the conduct of III Internal Assessment, the total marks given to the students for Attendance and Class Room Participation/Viva-Voce/Group Discussion/Tutorial/Case Studies/etc. together with the two highest Internal Assessment marks be notified and submitted to the Academics Office.
- Academic Activities be planned during 23rd November-1st December, 2013 by the departments.
- Regular seminar activities by the students and by the invited experts may be planned as per mutual convenience.

**OSD (Academics)
Central University of Rajasthan**

List of Holidays during the year 2014

1. Milad-Un-Nabi or Id-E-Milad* (Birthday of Prophet Mohammad) *14 January, Tuesday
2. Republic Day 26 January, Sunday
3. Maha Shivratri 27 February, Thursday
4. Holi 17 March, Monday
5. Mahavir Jayanti 13 April, Sunday
6. Good Friday 18 April, Friday
7. Buddha Purnima 14May, Wednesday
8. Idu'l Fitr**29 July, Tuesday
9. Independence Day 15 August, Friday
10. Janmashtami 18 August, Monday
11. Mahatma Gandhi's Birthday 02 October, Thursday
12. Dussehra (Vijaya Dashami)03October, Friday
13. Idu'l Zuha* (Bakrid)*06October, Monday
14. Diwali (Deepawali) 23 October, Thursday
15. Muharram**04November, Tuesday
16. Guru Nanak's Birthday 06 November, Thursday
17. Christmas Day 25December, Thursday

*Date (s) is/are liable to change subject to visibility of the Moon.

Future Prospects of the Programme

Artificial Intelligence (AI) is a fascinating field of study in modern science and engineering faculties. Its aims are two fold: developing a theory of understanding intelligence and building programs that exhibit human-like behaviors. Since its inception 1956, this field has been studied as a core element of computer science and engineering programs around the world. It is envisioned that the AI will remain a challenging field for the 21st century too. The M.Sc.Computer Science (Artificial Intelligence) is designed to provide a specialized program to train future generations of students in both theoretical and practical aspects of AI. The aim is to produce graduates who will leaders in the field and full fill the need of both in AI industry, research and academic organizations.

Departmental Faculty

S.No.	Name of the Faculty	Area of Interest
1.	Dr. Mamta Rani, Head and Associate Professor	Fractal Graphics & Chaos
2.	Dr. A.Nagaraju Assistant Professor	Mobile Computing, Grid and Cloud computing
3.	Dr. Nishtha Kesswani Assistant Professor	Wireless Networks
4.	Mr. Gaurav Meena Assistant Professor	DBMS, Information security and adhoc networks
5.	Mr. Raviraj Choudhary Assistant Professor	Algorithms, Image Processing
6.	Mr. Sanjay Kumar Anand Assistant Professor	AI, Natural Language Processing, Soft Computing
7.	Mr. Vinod Kumar Assistant Professor	Information Security, Computer Networks

Scheme and Detailed Syllabus

Syllabus of M.Sc. Computer Science (Artificial Intelligence)

For New Batch 2014 Onwards

Scheme of M.Sc. Computer Science (Artificial Intelligence)

The details of the courses with code, title and the credits assign are as given below.

Course Category

CCC: Compulsory Core Course

ECC: Elective Core Course

OEC: Other Elective Course

First Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours			EoS Exam. Duration (Hrs.)	Relative Weights %		
					L	T	P	Theory	IA	STs	EoSE
1	MAI 111	Introduction to Artificial Intelligence	CCC	3	3	0	0	3	10	40	50
2	MAI 112	Logic in Computer Science	CCC	4	3	1	0	3	10	40	50
3	MAI 113	Design and Analysis of Algorithms	CCC	3	3	0	0	3	10	40	50
4	MAI 114	Theory of Computation	CCC	4	3	1	0	3	10	40	50
5	MAI 115	Programming Language 1	CCC	2	2	0	0	3	10	40	50
6	MAI 116	Professional Communication	CCC	3	2	1	0	3	10	40	50
7	MAI 117	Artificial Intelligence Lab	CCC	1	0	0	2	0	100	0	0
8	MAI 118	Design and Analysis of Algorithms Lab	CCC	1	0	0	2	0	100	0	0
9	MAI 119	Programming Language 1 Lab	CCC	2	0	0	4	0	100	0	0
10	MAI 120	Professional Communication Lab	CCC	1	0	0	2	0	100	0	0
			Total Credits	24							

Second Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours			EoS Exam. Duration (Hrs.)	Relative Weights %		
					L	T	P		Theory	IA	STs
1	MAI 211	Programming Language 2	CCC	3	3	0	0	3	10	40	50
2	MAI 212	Compiler Design	CCC	3	3	0	0	3	10	40	50
3	MAI 213	Machine Learning	CCC	3	3	0	0	3	10	40	50
4	MAI 214	Elective 1	ECC	4	3	1	0	3	10	40	50
5	MAI 215	Elective 2	ECC	4	3	0	2	3	10	40	50
6	MAI 216	Advanced English/ Indian Language/ Foreign Language	OEC	2	2	0	0	3	10	40	50
7	MAI 217	Research Seminar	CCC	2	1	1	0	0	100	0	0
8	MAI 218	Programming Language 2	CCC	1	0	0	2	0	100	0	0
9	MAI 219	Compiler Design Lab	CCC	1	0	0	2	0	100	0	0
10	MAI 220	Machine Learning Lab	CCC	1	0	0	2	0	100	0	0
			Total Credits	24							

Third Semester

S. No	Subject Code	Course Title	Course Category	Credit	Contact Hours			EoS Exam. Duration (Hrs.)	Relative Weights %		
					L	T	P		IA	STs	EoSE
1	MAI 311	Data Mining & Knowledge Discovery	CCC	3	3	0	0	3	10	40	50
2	MAI 312	Neural Networks	CCC	3	3	0	0	3	10	40	50
3	MAI 313	Elective-3	ECC	4	3	0	2	3	10	40	50
4	MAI 314	Elective-4	ECC	4	3	0	2	3	10	40	50
5	MAI 315	Open	OEC	4	3	1	0	3	10	40	50

		Elective									
6	MAI 316	Mini Project	PW	4	0	0	8	0	100		
7	MAI 317	Data Mining Lab	CCC	1	0	0	2	0	100		
8	MAI 318	Neural Networks Lab	CCC	1	0	0	2	0	100		
			Total Credits	24							

Fourth Semester

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours			EoS Exam. Duration (Hrs.)	Relative Weights %		
					L	T	P		IA	STs	EoSE
1.	MAI 411	Project Work in Industry or Institution (16 week)	PW	24					500	for project report and evaluation and 100 for viva-voice.	
			Total Credits	24							

➤ Elective 1

1. Game Theory
2. Fuzzy Logic
3. Operation Research
4. Simulation & Modelling

➤ Elective 2/3/4

1. Soft Computing
2. Evolutionary Computing
3. Advanced Algorithms
4. Human Computer Interaction
5. Design of Expert Systems
6. Intelligent Physical Agents
7. Robot Motion Planning
8. Web Technologies
9. Evolutionary Computing & Genetic Algorithm
10. Computational Intelligence
11. Artificial Cognitive Systems
12. Intelligent hybrid systems
13. Software Agents and Swarm Intelligence
14. Computational Linguistic
15. Knowledge Modelling and Management
16. Parallel Programming
17. Open Source Operating system
18. Fractal Theory

- 19. Cloud Computing
- 20. Social Network and Semantic Web
- 21. Advanced Java

➤ First Semester

MAI 111: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

UNIT 1- An Overview of AI: Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI.

UNIT 2 -AI Production Systems, Search and Control Strategies:

AI Production systems and control strategies; Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A* Search, AO* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepening, Heuristic Pruning..

UNIT 3-Knowledge Representations:

First order predicate calculus, Clause form representation of WFFs, resolution principle & unification, inference mechanism, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT 4-Natural Language Processing:

Overview of linguistics, grammars and languages, Parsing techniques: Chart Parsers, transition nets, augmented transition nets, WASP Parser.

UNIT 5-Expert systems:

Introduction and applications of expert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells, dealing with uncertainty: Bayesian reasoning and fuzzy reasoning. Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

Books:

1. Introduction to AI and Expert Systems: D.W. Patterson PHI.
2. Artificial Intelligence: P.H. Winston, Addison Wesley.
3. Principles of AI: N.J. Nilsson, Springer-Verlag
4. Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education

MAI 112: LOGIC IN COMPUTER SCIENCE

Logic: Introduction to Logic, Propositional Logic and Predicate Logic

Propositional Logic: Elements of Propositional Logic - Negation, Conjunction, Disjunction; Truth Table, Tautology, Connectives, Construction of Proposition, Semantics, normal forms, Reasoning with Propositions, Implications, Proof of Identities, Proof of Implications.

Predicate Logic: Well Formed Formula of Predicate Logic, Predicate, Validity, Quantification, Constructing Formulas, Reasoning with Predicate Logic, Quantifiers and Connectives.

Verification: Model checking, Linear-time temporal logic, program verification.

Induction and Recursion, Recurrence Relations, Proof by Induction.

Set and Functions: Sets, relations, functions, operations, and equivalence Relations, relation of partial order, partitions, binary relations, Equivalence relations, growth of functions, Complexity of Algorithms.

Combinatorics: Permutation, combinations, Binomial theorem, Counting, Pigeonhole principle. Generalized Inclusion-Exclusion Principle (GIEP), discrete probability.

Trees and Graphs: Trees, traversals, spanning trees; graphs – path, connectivity, reachability, cycles and circuits, planar graphs, Euler and Hamiltonian graphs, graph traversals, topological sorting, graph coloring.

Text/References:

1. Thomas Koshy: Discrete Mathematics with Applications. Elsevier.
2. Michael Huth and Mark Ryan: Logic in Computer Science: Modelling and Reasoning about Systems. Cambridge.
3. Winfried Karl Grassmann, Jean-Paul Tremblay: Logic and Discrete Mathematics: A Computer Science Perspective, Prentice Hall.
4. Elliott Mendelson: Introduction to Mathematical Logic, CRC Press.
5. David J. Hunter. Essentials of Discrete Mathematics
6. Liu: Introduction to Discrete Mathematics, McGraw-Hill.
7. Rosen: Discrete Mathematics and its Applications. Elsevier.
8. Kolman B., Busby R: Discrete Mathematical Structures for Computer Science, PHI.

MAI 113: DESIGN AND ANALYSIS OF ALGORITHMS

Algorithm Analysis: Time, space, lower, upper bounds, asymptotic complexity, summation, recurrence.

Design Strategies: Divide-and-conquer, Dynamic Programming, Greedy methods, Backtracking, Branch-and-Bound Technique.

Graph Algorithms: Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow.

String Matching, Computational Geometry.

Problem Classification: P and NP class, NP-completeness and reducibility, NP-complete problems.

Text Book/ Reference Books:

1. T. Cormen, C. Leiserson, R. Rivest. Introduction to Algorithms, Indian Reprint, PHI

2. V. Aho, J. Hopcraft, J. Ulmann. The Design and analysis of computer Algorithms. Addison Wesley
3. S. Basse, A. V. Gelder, Computer Algorithms: Introduction to design and Analysis, 3rd., Pearson Education Asia Pvt. Ltd.

MAI 114: THEORY OF COMPUTATIONS

Models of computation: Classification, Properties and Equivalences.

Regular languages model: finite state machine (deterministic and non deterministic), regular grammars, regular expressions, equivalence of deterministic and non-deterministic machine and of the three models; Properties: closure, decidability, minimality of automata.

Context-free languages models: Context Free Grammar, Derivation trees, Simplification of Context Free Grammar, Chomsky Normal Form, Greibach Normal Form, pushdown automata and their equivalence, Properties of Context Free Languages.

Recursive and recursively enumerable sets model: Turing machines, grammars, recursive functions and their equivalence; Church's thesis; Properties: closure, decidability, undecidability, non computability, notion of reduction, computational complexity, NP-completeness.

Text Book/ Reference Books:

1. Hofcroft J.E., Ullman J.D., Introduction to Automata Theory, Languages and Computation, Narosa Publishing House.
2. Lewis H. R. and Papadimitriou C. H., Elements of the theory of computation, Pearson Education Asia
3. Martin J. C., Introduction to Languages and the Theory of Computation, 2e, Tata McGraw-Hill

MAI 115: PROGRAMMING LANGUAGE 1

Department will offer commonly used programming language in industry to promote practical exposure.

MAI 116: DYNAMICS OF COMMUNICATION SKILLS

1. Grammar and Vocabulary: Conditionals/Tenses, relative clauses, subject-verb agreement, Grammatical errors.

2. Oral Communication:

Listening Skill – Active listening, Barriers to active listening, Asking questions to improve listening.

2.2 Speaking Skill- Stress patterns in English, Speaking with confidence, Barriers in Speaking.

2.3 Reading Skill- Skimming, Scanning, Intensive reading, Linking devices in a text, prediction, Different versions of a story/incident.

3. Written communication:

3.1 Writing process, paragraph organization, writing styles, Note making

3.2 Types of writing- technical vs. creative; Types of technical writing, Writing a technical paper.

4. **Scientific writing:** Writing a Scientific Report on a project undertaken or an experiment conducted (theory + practice)

5. Soft Skills

5.1 **Body Language Gestures/ postures** – Body language, gesture, posture.

5.2 **Group discussion** – Giving up of PREP, REP Technique, how body language during group discussion.

5.3 **Presentation skills:** (i) How to make power point presentation (ii) Body language during presentation (iii) **Resume writing:** Cover letter, career objective, Resume writing (tailor made)

5.4 **Mock Interview:** Each student to face an interview and to demonstrate the above taught skills.

Language Lab Sessions

Pronunciation

Writing Practice

Listening Practice

Reading and Comprehension Practice

Presentation Skills

Interviews

Group Discussions

Conversations

Reference Books:

1. Advanced English Usage: Quirk & Greenbaum; Pearson Education.

2. Developing Communication Skills: Banerjee Meera & Mohan Krishna; Macmillan Publications, 1990.

3. Business Communication: Chaturvedi, P.D.; Pearson Publications.

4. Business Communication; Mathew, M.J.; RBSA Publications, 2005.

5. Communication of Business; Taylor, Shirley; Pearson Publications.

6. Soft Skills : ICFAI Publication

7. Collins English Dictionary and Thesaurus, Harper Collins Publishers and Times Books

8. Longman Language Activator, Longman Group Pvt Ltd

9. Longman Dictionary of contemporary English, Longman

10. The new Penguin Dictionary – a set of dictionaries of abbreviations, spelling, punctuation, plain English, grammar, idioms, thesaurus, 2000.

11. New Oxford Dictionary.

➤ Second Semester

MAI 211: PROGRAMMING LANGUAGE 2

Department will offer commonly used programming language in industry to promote practical exposure

MAI 212: COMPILER DESIGN

Definition of Compiler, Translator, Interpreter, Phase of compiler , introduction to one pass & Multipass compilers, Bootstrapping, Relationship between Finite automata and lexical analyzer, Input, buffering, Recognition of tokens,

Role of parser, Relation between CFG and parsing. Bottom up parsing and Top down parsing techniques. Shift reduce parsing, Operator precedence parsing, Recursive descent parsing, predictive parsers. LL grammars.

Syntax directed definitions, Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using three address code,

Storage organization: Storage allocation Strategies, Activation records, Parameters passing, Symbol table organization. Definition of basic block, DAG. Code generation from DAG.

Recommended Books:

1. Aho, Ullman and Sethi: Compilers, Addison Wesley.
2. Holub, Compiler Design in C, PHI.
3. Tremblay, Sorenson: The Theory and Practice of Compiler Writing, BSP

MAI 213: MACHINE LEARNING

Introduction: What is Machine Learning?, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation, Learning Input-Output Functions, Types of Learning, Input Vectors, Outputs, Training Regimes, Noise, Performance Evaluation.

Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.

Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute, entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Over-fitting, noisy data, and pruning.

Unsupervised Learning: What is Unsupervised Learning?, Clustering Methods, A Method Based on Euclidean Distance, A Method Based on Probabilities, Hierarchical Clustering Methods, A Method Based on Euclidean Distance, A Method Based on Probabilities.

Explanation-Based Learning and Reinforcement Learning: Deductive Learning, Domain Theories, Evaluable Predicates, Passive Reinforcement Learning, Direct utility estimation, Adaptive dynamic programming, Temporal-difference learning, Active Reinforcement Learning, Exploration, Learning an action-utility function, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.

1. Introduction To Machine Learning, Nils J. Nilsson
2. Artificial Intelligence: A Modern Approach: Stuart J. Russell, Peter Norvig, PHI.
3. Artificial Intelligence – Structures and Strategies for Complex Problem Solving, George F. Luger, 4th Edition, Pearson Education.

MAI 214: ELECTIVE 1 (FUZZY LOGIC)

Introduction: Fuzzy Logic, Classical and Fuzzy Sets, Mathematics of fuzzy set theory, Fuzziness of Fuzzy Sets, Operations on Fuzzy Sets, Compliment, Intersections, Unions, Combinations of Operations,

Aggregation Operations, comparison of fuzzy and crisp set theory, one to one mapping, max-min principle, extension principle.

Fuzzy Arithmetic and Fuzzy Relations: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Fuzzy Relations, Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Fuzzy Logic and Possibility Theory: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges, Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

Fuzzy knowledge based systems: Fuzzy knowledge base, rule base, Data base for fuzzy, Inference rules, Fuzzification, defuzzification, methods of defuzzification.

Hybrid systems and Fuzzy Logic Applications: Applications of Fuzzy Logic, e.g. application to Decision Making Systems, Pattern Recognition; Neuro- fuzzy and fuzzy genetic systems,.

Text/References:

1. G.J.Klir & T.A. Folyger, Fuzzy Sets, Uncertainty & Information, PHI.
2. G.J.Klir & B.Yuan, Fuzzy sets & Fuzzy logic by PHI.
3. Kevin M. Passino and Stephen Yurkovich, Fuzzy Control, Addison Wesley.

MAI 215: ELECTIVE 2 (SOFT COMPUTING)

What is soft computing? Main paradigms: fuzzy sets, neural networks, evolutionary computing, rough sets, hybridization.

Fuzzy sets.

Brief overview of crisp sets, the notion of fuzziness, what, why and when to apply fuzzy set, operations on fuzzy sets, fuzzy numbers. Crisp relations, fuzzy relations, approximate reasoning, different methods of rule aggregation and defuzzification. Fuzzy measures, possibility, necessity, entropy, fuzzy logic control.

Rough sets.

Introduction to Rough sets, Lower and Upper approximations. Indiscernability, reducts, dependency rules and dimensionality reduction.

Hybridizations.

Different types of integration, merits. Neuro-fuzzy computing; Neuro-genetic, Neuro-rough, Rough-fuzzy, Neuro-rough-genetic etc.

Applications of soft computing to pattern recognition, image processing, data mining.

References:

1. G. J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 1995.

2. S. K. Pal and D. Dutta Mazumdar, Fuzzy Mathematical Approach to Pattern Recognition, John Wiley, New York, 1986.
3. H. –J. Zimmermann, Fuzzy Set Theory and Its Application, 2nd ed., Kluwer, Boston, 1990.
4. S. Haykin, Neural Networks: A Comprehensive Foundation, 2nd ed., Prentice Hall, New Jersey, 1999.
5. J. M. Zurada, Introduction to Artificial Neural Systems, West Publishing Co., St. Paul, Minnesota, 1992.
6. D. E. Goldberg, “Genetic algorithms in search, optimization and machine learning”, Addison Wesley, 1989.
7. Z. Pawlak, “Rough Sets-Theoretical Aspects of Reasoning about Data”, Kluwer Academic Publishers, 1991.
8. S. K. Pal and S. Mitra, “Neuro-fuzzy pattern recognition: Methods in soft computing”, John Wiley, 1999.
9. C. T. Lin & C. S. G. Lee, “Neural Fuzzy systems – A neurofuzzy synergism to intelligent systems”, Prentice Hall, 1996.

MAI 216: ADVANCED ENGLISH/ INDIAN LANGUAGE/ FOREIGN LANGUAGE

UNIT 1

Sentence Analysis: Simple, Compound and Complex sentences
Subject and Verb Agreement

UNIT 2

Phrases: Adjective , Adverb and Noun Phrase
Clauses : Adjective, Adverb and Noun Phrase

UNIT 3

Voice
Narration

UNIT 4

Gerund
Participle

Suggested Readings:

1. Wren & Martin: High School English Grammar and Composition
2. Raymond Murphy : English Grammar in Use (4th edition)
3. Martin Hewings : Advanced Grammar in Use
4. Betty Schramper: Understanding and Using English Grammar

MAI 217: RESEARCH SEMINAR

Overview of Research techniques, Writing a good research paper and presentation skills, Seminar based on recent research, indexing and citation.

➤ Third Semester

MAI 311: DATA MINING AND KNOWLEDGE DISCOVERY

Introduction to data mining & knowledge discovery in databases, Data mining v/s Databases, Complexities of Data mining, Application & future scope of data mining, the knowledge discovery process: normalization, converting, smoothing data, method for attribute elimination and creation.

Data mining versus KDD, Data mining versus OLTP, introduction to data warehouse, OLAP, Application areas of data mining, Functionality of Data mining.

Data mining techniques: Simple data mining techniques & strategies, Association rule mining in large database: mining single dimensional Boolean association rules from transactional database. Apriori Algorithm, Mining multilevel association rules, constraint based association mining.

Classification & Prediction: Introduction, issues regarding clustering and prediction, classification by K-nearest neighbours, decision tree: ID3, Introduction to Cluster Analysis: k- means clustering, nearest neighbouring clustering.

Neural Networks, Introduction to web mining, Case study: Biomedical, Financial, Retail industry, web based.

Text book/Reference Book:

1. Data Mining–concepts & techniques by Jia wei han & Micheline kamber, Morgan Kaufman, published an imprint of Elsevier.
2. Data mining A tutorial based primer. By Richard J. Roiger, Michael W. Geatz, Pearson Education.
3. Data Mining Introductory and Advanced topics. By Margaret H. Dunham. Pearson Education.
4. Data mining and data warehousing by [Teck June Ho](#), Pearson/Prentice Hall, 2005
5. Data Mining By Gopalan & Sivaselvan, PHI Learning Pvt. Ltd.
6. Data mining: Theory, Methodology, Techniques and Applications By Graham J. Williams, Simeon J. Simoff. Springer Science & Business, 2006
7. Data Mining Techniques by Arun k Punjari ,University Press,2007

MAI 312: NEURAL NETWORKS

Neural Architecture: Neuron model, transfer function, hamming and Hopfield network, perception, learning rule, recurrent networks.

Back propagation: generalized delta rule, limitations, modifications – momentum, variable learning rate, conjugate gradient.

Learning: Supervised, associative, competitive, unsupervised learning.

Unsupervised learning: Self-organizing maps, Adaptive Resonance Theory.

Neural network applications: Pattern classification, function approximation.

Text/References:

1. Simon Haykin: Neural Networks: A Comprehensive Foundation (2nd Edition)
2. Christopher M. Bishop: Neural Networks for Pattern Recognition
3. James A. Freeman, David M. Skapura: Neural Networks, Pearson Education.
4. Martin T. Hagan: Neural Network Design, Thomson Learning.

➤ **ELECTIVE 1**

1. GAME THEORY

What do Game Theorists do ? Two sided Matching, Describing non-cooperative games: Games in extensive form, Games in Strategic form.

Solution concepts: Domination; Repeated elimination of dominated strategies. Stability; Nash Equilibrium. Security; Maxmin. Two-person zero-Sum games; Value and Equilibrium.

Randomized strategies: Mixed strategies -Nash Theorem, Behavioral strategies; Perfect recall., Refinement of the Nash Equilibrium. Sub-game perfectness; Backward induction (looking forward), Forward induction (looking backward).

Correlated equilibrium. Repeated games and the Folk Theorem. Modelling incomplete information in games. Some expository examples: The value of information. Hierarchies of beliefs. The model of Harsanyi and Bayesian equilibrium. The Mertens-Zamir Universal Belief Space.

Cooperative Games: The Nash Bargaining problem. Games in coalition function form.

Text /Reference Book:

1. The Core. The Shapley value Shmuel Zamir - HKUST - Spring 2009 - Game Theory
2. M. J. Osborne and A. Rubinstein, A course in Game Theory, MIT Press, 1994.
3. Roger Myerson, Game Theory, Harvard University Press, 1991.
4. D. Fudenberg and J. Tirole, Game Theory, MIT Press, 1991.
5. J. von Neumann and O. Morgenstern, Theory of Games and Economic Behavior, New York: John Wiley and Sons., 1944.
6. R.D. Luce and H. Raiffa, Games and Decisions, New York: John Wiley and Sons., 1957.
7. G. Owen, Game Theory, (Second Edition), New York: Academic Press, 1982.

2. FUZZY LOGIC

Introduction: Fuzzy Logic, Classical and Fuzzy Sets, Mathematics of fuzzy set theory, Fuzziness of Fuzzy Sets, Operations on Fuzzy Sets, Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, comparison of fuzzy and crisp set theory, one to one mapping, max-min principle, extension principle.

Fuzzy Arithmetic and Fuzzy Relations: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Fuzzy Relations, Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Fuzzy Logic and Possibility Theory: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges, Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

Fuzzy knowledge based systems: Fuzzy knowledge base, rule base, Data base for fuzzy, Inference rules, Fuzzification, defuzzification, methods of defuzzification.

Hybrid systems and Fuzzy Logic Applications: Applications of Fuzzy Logic, e.g. application to Decision Making Systems, Pattern Recognition; Neuro- fuzzy and fuzzy genetic systems,.

Text/References:

1. G.J.Klir & T.A. Folyger, Fuzzy Sets, Uncertainty & Information, PHI.
2. G.J.Klir & B.Yuan, Fuzzy sets & Fuzzy logic by PHI.
3. Kevin M. Passino and Stephen Yurkovich, Fuzzy Control, Addison Wesley.

3. OPERATION RESEARCH

Unit I

Introduction: nature and meaning of O.R. Modelling in operations research, features of operation research, scope of operations research. Linear Programming Problem: formulation of L.P.P. solution of L.P.P. graphical method, simplex methods, duality.

Unit II

Assignment problems: Mathematical formulation, Reduction theorem, methods of solving the assignments problems, Unbalanced assignment problem, Transportation problem: formulation, basic feasible solution: North-West-Corner method, least cost method, Vogel's approximation method, Optimum solution: Modi method.

Unit III

Project management: introduction, network diagram representation, time estimates and critical path in network analysis, project evaluation and review techniques. Introduction of Inventory, types, inventory decisions, how to develop n variables model, costs involved in inventory problems, variables in inventory problem, classification of characteristics of inventory systems, EOQ model without shortage.

Unit IV

Queuing Theory: introduction, queuing system Transient and steady traffic inlets, Distribution of arrival distribution of departure, M/M/I: ∞ / FCFS model. Replacement problems: replacement policy for items whose maintenance cost increases with time and money value is constant.

Reference Books:

1. Introduction to Operations Research (Sixth Edition) by F.S. Hillier and G. J. Lieberman, Mc Graw Hill International Edition, Industrial Engineering Series, 1995.
2. Linear Programming by G. Hadley, Narosa Publishing House, 1995.
3. Operations Research by Taha.
4. Operations Research by S D Sharma.

4. MODELLING & SIMULATION

Unit-1

Introduction to Simulation and Modeling, Simulation process, Advantages and disadvantages of simulation techniques, Limitations of simulation techniques, Comparison of simulation and analytical methods, fixed time-step vs. even to even model, Analog vs. digital Simulation.

Unit- II

Simulation of continuous systems, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, Queuing Models, Characteristics of Queuing Models, Behavior of arrivals, Pattern of arrival at the system, The arrival time distribution, Queuing process, Queuing discipline, Service process, Distribution of service time, Performance measures of a queuing system, Classification of queuing models, Single server queuing models and its simulation.

Unit-III

Inventory model, Deterministic inventory models with and without shortage cost model, Simulation of Inventory models, CPM and PERT networks, Characteristics, Critical path computation,

Unit-IV

Monte- Carlo simulation, Real time simulation, Hybrid simulation, Distributed Lag models, Cobweb model, Generation of random numbers, Test for randomness, confidence interval, Statistical methods.

Recommended Reading:

1. D. N. P. Murthy, N. W. Page and E. Y. Rodin, Mathematical Modeling, Pergamon Press.
2. Dr.Pratiksha Saxena, Modeling and Simulation,Narosa Publication
3. J. N. Kapoor, Mathematical Modeling, Wiley Estern Ltd.
4. P. Fishwick: Simulation Model Design and Execution, PHI, 1995, ISBN 0-13-098609-7
5. A. M. Law, W. D. Kelton: Simulation Modeling and Analysis, McGraw-Hill, 1991, ISBN 0-07-100803-9
6. J. A. Payne, Introduction to Simulation, Programming Techniques and Methods of Analysis, Tata McGraw Hill Publishing Co. Ltd.
7. F. Charlton, Ordinary Differential and Differential equation, Van Nostarnd.

➤ Elective 2/3/4

1. SOFT COMPUTING

What is soft computing? Main paradigms: fuzzy sets, neural networks, evolutionary computing, rough sets, hybridization.

Fuzzy sets.

Brief overview of crisp sets, the notion of fuzziness, what, why and when to apply fuzzy set, operations on fuzzy sets, fuzzy numbers. Crisp relations, fuzzy relations, approximate reasoning, different methods of rule aggregation and defuzzification. Fuzzy measures, possibility, necessity, entropy, fuzzy logic control.

Rough sets.

Introduction to Rough sets, Lower and Upper approximations. Indiscernability, reducts, dependency rules and dimensionality reduction.

Hybridizations.

Different types of integration, merits. Neuro-fuzzy computing; Neuro-genetic, Neuro-rough, Rough-fuzzy, Neuro-rough-genetic etc.

Applications of soft computing to pattern recognition, image processing, data mining.

References:

1. G. J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 1995.
2. S. K. Pal and D. Dutta Mazumdar, Fuzzy Mathematical Approach to Pattern Recognition, John Wiley, New York, 1986.
3. H. –J. Zimmermann, Fuzzy Set Theory and Its Application, 2nd ed., Kluwer, Boston, 1990.
4. S. Haykin, Neural Networks: A Comprehensive Foundation, 2nd ed., Prentice Hall, New Jersey, 1999.
5. J. M. Zurada, Introduction to Artificial Neural Systems, West Publishing Co., St. Paul, Minnesota, 1992.
6. D. E. Goldberg, “Genetic algorithms in search, optimization and machine learning”, Addison Wesley, 1989.
7. Z. Pawlak, “Rough Sets-Theoretical Aspects of Reasoning about Data”, Kluwer Academic Publishers, 1991.
8. S. K. Pal and S. Mitra, “Neuro-fuzzy pattern recognition: Methods in soft computing”, John Wiley, 1999.
9. C. T. Lin & C. S. G. Lee, “Neural Fuzzy systems – A neurofuzzy synergism to intelligent systems”, Prentice Hall, 1996.

2. EVOLUTIONARY COMPUTING & GA

- Evolution in Nature,
- Genetic Algorithms,
- The basics of Genetic Programming (GP),
- Fitness functions in GP,

- Advanced Representations,
- GP implementation,
- Code growth and methods to control it,
- Applications of GP, including: classification, image analysis, electronic circuits, etc.,
- Koza's criteria for human-competitive machine intelligence and review of GP's human-competitive results,
- Advanced techniques and tricks of the trade.

Text book/ Reference book:

A Field Guide to Generic Programming by POLI, R., LANGDON, W.B., and MCPHEE, N.F. 2008, Springer-Verlag.

3. ADVANCED ALGORITHMS

Introduction to Algorithm: RAM model Notations, Recurrence analysis - Master's theorem and its proof - Amortized analysis. Recurrence equations, Time and space complexity, NP, NPC and NP-Hard problems, undecidability.

Advanced Data Structures: B-Trees, Binomial Heaps, Fibonacci Heaps, AVL trees, Red-black trees, disjoint set – union and path compression.

Graph algorithms: MST, Shortest path, Matching and Flows.

Dynamic programming: Longest common subsequence, Chain of matrix multiplication, Optimal polygon triangulation.

Approximate Algorithms: Vertex-cover, set-covering problems, Travelling Salesman problem.

Parallel algorithms: Basic techniques for sorting, searching, merging..

Randomized algorithms: Primality testing, Integer factorization, Randomized algorithms, Probabilistic algorithms. Use of probabilistic inequalities in analysis, applications using examples.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley
4. Brassard : Fundamental of Algorithmics, PHI.
5. Sara Baase: Computer Algorithms: Introduction to Design and Analysis, Pearson Education.
6. Papadimitriou, Steiglitz: Combinatorial Optimization: Algorithms and Complexity, PHI.
7. Motwani and Raghavan: Randomized Algorithms, Cambridge University Press
8. Joseph Ja'Ja': Introduction to Parallel Algorithms, Addison-Wesley
9. Vaizirani: Approximation Algorithms, Springer Verlag

4. HUMAN COMPUTER INTERACTION

The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems.

The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices.

The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.

Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering

Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.

Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method.

Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.

Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working.

Textbook/Reference book:

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson.

5. DESIGN OF EXPERT SYSTEMS

1. **Fundamentals of Knowledge representations:** Introduction, Meaning of knowledge, knowledge representation and reasoning, procedural knowledge, declarative knowledge, expressing knowledge in terms of Vocabulary, basic facts, complex facts, terminological facts, Knowledge engineering
2. **Knowledge representation techniques:** Representation, mappings, approach and issues, reductions, semantic net, PROLOG and semantic net, Difficulties with semantic net, Schemata, frame, difficulties with frames,
3. **Logic and sets & first order logic :** predicate logic, propositional logic, first order predicate logic, Universal quantifiers, Existential quantifiers, quantifiers and sets, limitation of predicate logic
4. **Introduction to expert system:** what is an expert system, advantage of expert system, general concept of expert system, characteristic of an expert system, the development of expert system techniques, expert system techniques, applications & domain language, shells & tools, elements of an expert system, production system, procedural and non-procedural paradigm, connectionist expert system and inductive learning
5. **Design of expert system:** selection of appropriate problem, expert system components, stage of the development of an expert system, development process, errors in development stage, S/w and expert system, expert system life cycle, expert system design examples, certainty factor, decision tree, backward chaining, monitoring problem.

Reference Books:

1. Artificial Intelligence, Modern Approach Second edition, by Russel, Norving, Pub. By Prentice Hall.
2. Expert systems principle and programming, third edition, by Joseph Giarratano & Gary Riley, PWS publishing.
3. Introduction to AI and expert system, By Dan W Patterson , PHI pub.

6. INTELLIGENT PHYSICAL AGENTS

Agents in the World, Introduction: What Are Agents and How Can They Be Built? :

Introduction of Artificial Intelligence and Agents, Agents Situated in Environments, Brief introduction to s/w agent technology, brief introduction about Individual Agents and Multiagent Systems, Agent Modelling

Agent Architectures and Hierarchical Control : Agents , Agent Systems , Hierarchical Control, Embedded and Simulated Agents, Acting with Reasoning, Agent and Acquaintance Models

Agent Programming Platforms and Languages: The BDI Agent Architecture and Execution Model, Jason, 3APL, JACK, JADE.

Agent based framework: conceptual framework, Model-Driven Architecture, view point framework,

Applications of agents in the real world: Industry related like Business-to-Business E-Commerce, Intelligent Lifestyle Applications like intelligent homes and Smart Music Player

Text Book/Reference Books

1. Intelligent software agents: foundations and applications by Walter Brenner, Rüdiger Zarnekow, Hartmut Wittig Springer, 1998.
2. Agent-based hybrid intelligent systems: an agent-based framework for complex problem Solving By Zili Zhang (Ph.D.), Chengqi Zhang, Springer 2005.

7. ROBOT MOTION PLANNING

Introduction to the field of robotics: fundamental ideas about robotics, types of robot, Applications, limitations, mathematical position and orientation in 3-space.

Modelling and representation: 3D transformations and geometry, forward and inverse kinematics, investigation of kinematics to velocities and static forces.

Control methods: Introduction to control theory, subsumption based architecture, linear control method, non-linear control methods, methods of programming.

Optimal and model predictive control: markov decision processes, sensing, hidden markov model, interpreting motion, kalman filtering and particle filtering.

Text Book/Reference book:

1. Robot motion planning By Jean-Claude Latombe, Kluwer Academic Publishers
2. Introduction to Robotics: Mechanics and Control (3rd Edition), John J. Craig (Author)
3. Introduction to Autonomous Mobile Robots, Roland Siegwart and Illah R. Nourbakhsh (TheMITpress)
4. "Control of Robot Manipulators" , Lewis, Abdallah, and Dawson

8. WEB TECHNOLOGY

Course Description: This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies. The topics include (although in some cases briefly): History of the Web, Hypertext Markup Language (HTML), Extensible HTML (XHTML), Cascading Style Sheets (CSS), JavaScript, and Extensible Markup Language (XML). We will follow the guidance of the World Wide Web Consortium (W3C) to create interoperable and functional websites.

Overall Course Objectives:

Upon completion of this course the student will be able to:

1. Describe and explain the relationship among HTML, XHTML, CSS, JavaScript, XML and other web technologies;
2. get familiar with W3C standards and recommendations;
3. create and publish a basic web page using HTML and its many tags;
4. describe limitations of creating interactivity including browser support and differences;
5. describe the difference between Java and JavaScript;
6. understand and use JavaScript variables, control structures, functions, arrays, and objects;
7. learn and modify CSS properties using JavaScript;
8. find out what are XML syntax, elements, attributes, validation etc. ;
9. utilize HTML, XHTML, CSS, XML, and JavaScript to develop an interactive web site.

9. EVOLUTIONARY COMPUTING

Objective: The course aims at introducing the main concepts, techniques and applications in the field of evolutionary computation and providing inputs on when evolutionary computation techniques are useful.

Introduction to Evolutionary Computation (EC): Biological and artificial evolution, A historical perspective, Introduction to different branches of EC: Evolutionary Programming, Evolutionary Strategies, Genetic Algorithms and Genetic Programming, Basic structure of a simple evolutionary algorithm, a Common Framework for Simple Evolutionary Algorithm. Population Size- Parent Population Size, Offspring Population Size, Selection- Choosing Selection Mechanisms, Reproductive Mechanisms- Mutation, Recombination, Crossover or Mutation?, Representation Issues, Choosing Effective Reproduction Mechanisms.

Search Operators and Representations: The importance and types of representation, search operators, Adaptive representations, Recombination/Crossover for strings (e.g., binary strings), e.g., one-point, multi-point, and uniform crossover operators, Mutation for strings, e.g., bit-flipping, Recombination/Crossover and mutation rates, Recombination for real-valued representations, e.g., discrete and intermediate recombination, Mutation for real-valued representations, e.g., Gaussian and Cauchy mutations, self-adaptive mutations, etc., Why and how a recombination or mutation operator works.

Selection Schemes: Fitness proportional selection and fitness scaling, Ranking, including linear, power, exponential and other ranking methods, Tournament selection, Selection pressure and its impact on evolutionary search

Evolutionary Combinatorial Optimization and Comparison of branches of EC: Genetic Algorithms, Evolutionary Programming, Evolutionary Strategies and Genetic Programming, When to use which EC technique? Theoretical Analysis of Evolutionary Algorithms (EA): Schema theorems, Convergence of EAs, Computational time complexity of EAs, No free lunch theorem.

Genetic Algorithms: Types of Genetic Algorithms, a simple genetic algorithm, population initialization, crossover, mutation, fitness evaluation, search operators, selection, Applications of Genetic Algorithms, GA for TSP.

Text Books:

1. K. A. De Jong, Evolutionary Computation: A Unified Approach, MIT Press (Prentice Hall of India), Cambridge MA, 2006.
2. T. Back, D. B. Fogel, and Z. Michalewicz, Handbook on Evolutionary Computation, IOP Publishing Ltd., 2000.
3. Z Michalewicz, Genetic Algorithms + Data Structures = Evolution Programs, Springer-Verlag, Berlin, 1999.

10. COMPUTATIONAL INTELLIGENCE

- Computational Intelligence and Knowledge,
- A Representation and Reasoning System
- Definite Knowledge
- Searching
- Knowledge Engineering
- Beyond Definite Knowledge
- Actions and Planning

Text book/ Reference book:

Computational Intelligence - A logical Approach by David Pool, Alan Mackworth & Randy Goebel, Oxford University press New York

11. ARTIFICIAL COGNITIVE SYSTEMS

- An embodied logical model for cognition in artificial cognition system
- Modelling field theory of higher cognitive function
- Reconstructing Human Intelligence within computational science
- Stratified constraint satisfaction network in synergetic multi-agent simulation of language evolution
- Making Meaning in computers; Synthetic ethology revisited
- Mimetic minds; Meaning Formation through epistemic mediators and external representation.

Text book/ Reference book:

Artificial Cognition System by Angelo Loula, Ricardo Gudwin & Joao Queiroz, 2007, Idea Group Inc.

12. INTELLIGENT HYBRID SYSTEMS

- Introduction to Fuzzy system, Neural Network, and Genetic Algorithms
- A fuzzy Neural Network for Approximate fuzzy reasoning
- Novel Neural algorithms for solving fuzzy relation equations
- Methods for simplification of fuzzy models
- A new approach of neurofuzzy learning algorithm
- Neural networks in intelligent data analysis
- Data Driven identification of key variables
- Applications of intelligent techniques in process analysis
- Adaptive genetic programming for system identification

Text book/ Reference book:

Intelligent hybrid systems: fuzzy logic, neural networks, and genetic algorithms, By Da Ruan, Kluwer academic Publishers 1997

13. SOFTWARE AGENTS AND SWARM INTELLIGENCE

- Brief Introduction to S/W agent Technology
- Agent & AI
- Practical design of intelligent agent System
- Intelligent Agent application Area
- Biological Foundations of Swarm Intelligence
- Swarm Intelligence in Optimization
- Routing protocols for next-generation network Inspired by collective Behaviours of insects societies: An overview

- An Agent based approach to self organised production
- Organic Computing and Swarm Intelligence

Text book/ Reference books:

1. Intelligent software agents: foundations and applications by Walter Brenner, Rudiger Zarnekow, Hartmut Witting Springer, 1998.
2. Swarm intelligence: introduction and applications By Christian Blum, Daniel Merkle., Springer 2008.

14. COMPUTATIONAL LINGUISTIC

- Introduction
- The role of natural language processing
- Linguistics and its structure
- A Historical outline
- Product of computational linguistics: present and prospective
- Language as a meaning and text transformer
- Possible points of view on natural language
- Language as a bi directional transformer
- Linguistic models

Text book/ Reference book:

Computational Linguistics: Models Resources, Applications by Igor A. Bolshakov and Alexander Gelbukh, IPN-UNAM-FCE, 2004.

15. KNOWLEDGE MODELLING AND MANAGEMENT

- Knowledge modelling technology
- Industrial evolutions w r t knowledge management
- State of the art of enterprise modelling
- Enterprise knowledge architecture
- Knowledge modelling for industrial application
- Introduction and application domain
- Complexity: an emergent organizational paradigm in the knowledge based economy
- The epistemology of knowledge
- The complexity paradigm for a networked system
- Knowledge management and management learning: what computers can still do
- The influence of knowledge structures on the usability of knowledge systems

Text book/ Reference book:

1. Active Knowledge Modeling of Enterprises By Frank M. Lillehagen, Frank Lillehagen, John Krogstie, Springer 2008
2. Knowledge management and management learning: extending the horizon of knowledge based management By Walter R.J. Baets, Springer 2005

16. PARALLEL PROGRAMMING

Pipeline and Vector Processing: Non linear and linear pipelining, Multiprocessor, Multicomputer, Super computer. Array Processors. Scope and Application of Parallel approach.

Paradigms of parallel computing: SIMD, Systolic; Asynchronous - MIMD, reduction paradigm. Hardware taxonomy: Flynn's classifications, Handler's classifications.

PRAM model and its variants: EREW, ERCW, CRCW, PRAM algorithms, Sorting network, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism.

Parallel Processors: Taxonomy and topology - shared memory mutliprocessors, distributed memory networks. Processor organization - Static and dynamic interconnections. Embeddings and simulations.

Performance Metrics: Laws governing performance measurements. Metrics - speedup, efficiency, utilization, cost, communication overheads, single/multiple program performances, bench marks.

Scheduling and Parallelization: Scheduling parallel programs. Loop scheduling. Parallelization of sequential programs. Parallel programming support environments.

Text/Reference Books:

1. M. J. Quinn.Parallel Computing: Theory and Practice, McGraw Hill, New York, 1994.
2. T. G. Lewis and H. El-Rewini. Introduction to Parallel Computing, Prentice Hall, New Jersey, 1992.
3. T. G. Lewis.Parallel Programming: A Machine-Independent Approach, IEEE Computer Society Press, Los Alamitos.
4. Sima and Fountain, Advanced Computer Architectures, Pearson Education.
5. Mehdi R. Zargham, Computer Architectures single and parallel systems, PHI.
6. Ghosh, Moona and Gupta, Foundations of parallel processing, Narosa publishing.
7. Ed. Afonso Ferreira and Jose' D. P. Rolin, Parallel Algorithms for irregular problems - State of the art, Kluwer Academic Publishers.
8. Selim G. Akl, The Design and Analysis of Parallel Algorithms, PH International.

17. OPEN SOURCE OPERATING SYSTEM

Introduction: open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean any cost. History : BSD, The Free Software Foundation and the GNU Project. Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache, BSD, GPL, LGPL).

Open source operating system: Overview of Open Source operating systems, Introduction to Linux and Unix, Flavours of *NIX Operating systems.

Introduction to Linux: File system, Shell and Kernel,vi editor, shell variables, command line programming.

Filters and commands: Pr, head,tail,cut,paste,sort,uniq,tr,join,etc,grep,egrep,fgrepetc., sed,awk etc.,granting and revoking rights.Any other relevant topic.

References:

1. Brian W. Kernighan, The Practice of Programming, Pearson Education.
2. Bach Maurice J, Design of the Unix Operating system, PHI.
3. Daniel P. Bovet, Understanding the Linux Kernel, Oreilly.

18. FRACTAL THEORY

Unit I. **The** basic concepts of geometric iteration, principle of feedback processes Fundamentals of Fractals, Types of fractal (mathematical and nature), self-similarity, fractal dimension, multiple reduction copy machines, the chaos game, fractals in nature, and decoding fractals. Chaos wipes out every computer. Chaos in (nature and Math).

Unit II. Standard mathematical fractals(seirpinski carpet ,gasket, cantor dust , koch kurve etc),limits and self simalarity,Fractal dimension,Types of fractal dimension, implementation of standard fractal and calculating their dimensions.

Affine transformation, Transformations, composing simple transformations, classical fractals by IFS, drawing the classical fractals using IFS .

Unit III. Deterministic Chaos, analysis of chaos, periodic points,sensitivity, fixed points, logistic map, sensitivity dependence of initial condition, implementation and detailed analysis of logistic map (mathematically and in real life)

L- systems, turtle graphics (graphical interpretation of L-Systems), Networked MRCMs, L-Systems tree and bushes, Growing classical fractals with L-Systems and their implementation.

Unit IV. Julia set (Fractal basin boundaries), complex numbers, escape nad prisoners set, filled Julia set, Quaternion Julia set, exploring Julia sets by varying complex numbers. Mandelbort set, geometric features and properties , study structure of Mandelbort set. Implementation of Julia set and Mandelbort set.

Project: Students will complete a final creative project that involves researching an application to fractals and chaos. Students will create something to go along with the project, like artwork, a short story, or a computer generated image.

19. CLOUD COMPUTING

UNIT-I:

Overview of Computing Paradigm, Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing.

Introduction to Cloud Computing. Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics & Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing

UNIT-II

Role of Open Standards ,Cloud Computing Architecture,Cloud computing stack ,Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services

UNIT-III

Service Models (XaaS),Infrastructure as a Service(IaaS),Platform as a Service(PaaS), Software as a Service(SaaS),Deployment Models ,Public cloud,Private cloud,Hybrid cloud Community cloud,Infrastructure as a Service(IaaS),Introduction to IaaS IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization,Server,Storage,Network, Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service)

UNIT-IV

Examples,Amazon EC2,Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus,Platform as a Service(PaaS),Introduction to PaaS,What is PaaS, Service Oriented Architecture (SOA),Cloud Platform and Management,Computation ,Storage

Examples: Google App Engine,Microsoft Azure,SalesForce.com's Force.com platform

Software as a Service(PaaS):Introduction to SaaS,Web services,Web 2.0,Web OS,Case Study on SaaS

Cloud Security:Infrastructure Security,Network level security, Host level security, Application level security,Data security and Storage,Data privacy and security Issues, Jurisdictional issues raised by Data location.Identity & Access Management,Access Control,Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

Case Study on Open Source & Commercial Clouds

- Eucalyptus
- Microsoft Azure
- Amazon EC2

Reference Books

Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

20. SOCIAL NETWORKS AND SEMANTIC WEB

OBJECTIVES OF THE COURSE:

- to learn web intelligence
- to learn knowledge representation for the semantic web
- to learn ontology engineering
- to learn semantic web applications, services and technology
- to learn social network analysis and semantic web

UNIT I

Web Intelligence

Introduction to Intelligent Web and its Applications, Information Age and World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee World Wide Web, Semantic Web and Logic on the semantic Web.

Knowledge Representation for the Semantic Web

Introduction to KR, Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema

UNIT II

Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping

Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology.

UNIT III

Social Network Analysis

What is networks analysis? Development of Social Networks Analysis, Key concepts and measures in network analysis – The global structure of networks, Macro-structure of social networks, Personal networks

Electronic Sources for Network Analysis

Electronic Discussion networks, Blogs and Online Communities, Web-based networks. Modeling and aggregating social network data

UNIT IV

Developing social-semantic applications

Building Semantic Web Applications with social network features, Flink: the social networks of the Semantic Web community, Evaluation of web-based social network extraction.

TEXT BOOKS:

- Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCES:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, Rudi Studer, Paul Warren, John Wiley & Sons.

2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
3. Information sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C.Evans, J.Taylor, O'Reilly, SPD.

21. ADVANCED JAVA

Unit I: Introduction: Basic introduction of core java,

Classes, Objects: Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods.

Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.

String handling: The string constructor, string length, special string operator character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.

Unit II: Exception Handling and Multithreaded Programming: Exception Handling- Fundamental, types, uncaught exception, using try and catch, multiple catch, nested try, throw, throws, finally, Java thread model, creating threads, extending thread class, stopping & blocking a thread, Life cycle of thread, thread exception, thread priority, synchronization- implementing and runnable interface, inter thread communication, multithreading.

Applets: Fundamentals, architecture, life cycle, simple applet programs, AWT working with Graphics: line, rectangle, ellipse, circle, arcs, polygons working with colours: Working with fonts, streams and files.

Unit III: Java Database Connectivity (JDBC): JDBC architecture, JDBC Basics, establishing a connection, JDBC Statements. Designing a User Interface with swing - Benefits of swing, application framework , adding components to a swing , frame working with swing.

HTML: Introduction, editing HTML, basic HTML tables and formatting,

Remote Method Invocation: RMI overview, RMI architecture, Example demonstrating RMI.

Unit IV: Servlet: Fundamentals, architecture, life cycle, initialization, threads, retrieving data in servlet, servicing GET and POST request, servlet sessions-sessions tracking, cookies.

Basic introduction of JAVA Beans: Enterprise Bean overview, types of enterprise Beans, advantages of enterprise Beans, the life cycle of enterprise Beans.

Java server Page: Basic JSP architecture, life cycle of JSP (Translation and compilation), JSP with database, JSP capabilities (Exception handling, session management).

Recommended Book:

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
2. Deitel: How to Program JAVA, PHI
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems-An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.
5. Advance programming in JAVA by V.K. Jain and Hemlata
6. David flangan, Jim Farley, W Crawford an Kris Magnusson, Java ebterprise in a Nutshell, Shroff Publishers, Kolkata.
7. The complete reference of JAVA 2 by Patrick Naughton and Herbert Schieldt.