INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTION FORM

Course Title	Web Intelligent and Algorithms			
Course Code	BCS201			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	-	-	3
Course Coordinator	Ms. K.Radhika, Associate Professor, CSE			
Team of Instructors	-			

I. COURSE OVERVIEW

This course introduces the fundamental concepts as well as practical applications of contemporary artificial intelligence (e.g. incorporating knowledge discovery and data mining, intelligent agents, and social network intelligence) and advanced information technology (e.g. involving wireless networks, ubiquitous devices, social networks, and data/knowledge grids) in the context of Web empowered systems, environments, and activities. In addition, it discusses the techniques and issues central to the development of Web Intelligence (WI) computing systems.

II. PREREQUISITE(S)

Level	Credits	Periods/ Week	Prerequisites
PG	3	3	Fundamentals of Statistics, Data Mining, Programming concepts

III. MARKSDISTRIBUTION

Subject	SEE Examination	CIA Examination	Total Marks
Web Intelligent and Algorithms	70 Marks	30 Marks	100 Marks

Semester End Examination 70 Marks All the Units (1, 2, 3, 4 and 5)	70 Marks (3 Hours)	5 questions to be answered. Each question carries 14 Marks

		Continuous Internal Assessment (CIA) - 1		
Average of two CIA Examinations	30 Marks (2 Hours)	Units I, II and III(half)	Continuous Internal Examination (CIE) (2 hours) [4 questions to be answered out of 5 questions from **Part- A & B]**	**Part - A** 5 questions to be answered out of 5 questions, each carries 1 mark.
				Part - B 4 questions each carry 5marks.
			Technical Seminar and Term Paper	5 marks
		Continuous Internal Assessment (CIA) - 2		
	30 Marks (2 Hours)	Units III (half) IV and V	Continuous Internal Examination (CIE) (2 hours) [4 questions to be answered out of 5 questions from **Part- A & B]**	**Part – A** 5 questions to be answered out of 5 questions, each
				Part - B 4 questions each carry 5marks.
			Technical Seminar and Term Paper	5 marks

IV. EVALUATIONSCHEME

S. No	Component	Duration	Marks
1	CIE - I Examination	2 hour	25
2	Technical Seminar and Term Paper	10 minutes seminar and 1000 words document	05
	TOTAL		30
3	CIE - II Examination	2 hour	25
4	Technical Seminar and Term Paper	10 minutes seminar and 1000 words document	05
	TOTAL		30
CIA Examination marks to be considered as average of above two CIA's			
5	EXTERNAL Examination	3 hours	70
	GRAND TOTAL		100

V. COURSEOBJECTIVES

The course should enable the students to
I. Illustrate the fundamental knowledge on web intelligent applications.
II. Summarize the searching and indexing techniques in search engines.
III. Outline the suggestions and recommendations for extracting intelligence from web applications.
IV. Understand the constraint based tag recommender system learning from user interactions.
V. Apply data mining algorithms to recommendation systems.

I.   COURSE OUTCOMES

At the end of the course the students are able to:

1. **Identify** the major components of an Information Retrieval engine.
2. **Identify** the Semantic Web.
3. **Explain** major algorithms for data mining.
4. **Apply** web content mining strategies and algorithms on data collections.
5. **Build** a search engine which indexes and ranks web documents.
6. **Process** and Analyze web logs.
7. **Apply** Web Structure Mining strategies and algorithms on data collections.

II. HOW PROGRAM OUTCOMES AREASSESSED

	Program Outcomes	Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Seminar
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	H	Seminar
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	S	Projects
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	S	Projects
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	S	Projects
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	N	--
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	N	--
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	N	--
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	--
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	N	--

	Program Outcomes	Level	Proficiency assessed by
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	N	--
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	S	Projects

III. HOW PROGRAM SPECIFIC OUTCOMES AREASSESSED

	Program Specific Outcomes	Level	Proficiency assessed by
PSO1	**Professional Skills:** The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Seminars
PSO2	**Problem-solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.	S	Projects
PSO3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	S	Guest Lectures

N- None   **S-Supportive**   **H - Highly related**

IV. SYLLABUS

UNIT – I
INTRODUCTION AND WEB SEARCHING
Introduction and web searching: Historical perspective, evolution of web 2.0.; Intelligent web applications: Examples, web searching, indexing; Improving search results based on link analysis, introduction to page rank, avoiding dead ends and spider traps, using page rank in a search engine, efficient computation of page rank, topic sensitive page rank, intelligent web crawling, improving search results based on user clicks, ranking documents, precision and recall.

UNIT – II
CREATING SUGGESTIONS AND RECOMMENDATIONS
Creating suggestions and recommendations: Concepts of distance and similarity, collaborative filtering, recommendations based on similar users, recommendations based on similar items, recommendations based on content; Extracting intelligence from content: Blogs, wikis, message boards.

UNIT – III
LEARNING FROM USER INTERACTIONS
Learning from user interactions: Extracting intelligence from tags, tag related metadata, tag generation; Leveraging tags: Dynamic navigation, using tag clouds, targeted search, recommendations based on tags constraint based recommender systems, hybrid recommender systems.

UNIT – IV
RECOMMENDER SYSTEM TYPES
Recommender system types: Constraint based recommender systems, neighborhood based recommendation systems and hybrid recommender systems.

UNIT – V
DATA MINING METHODS IN RECOMMENDATION SYSTEMS
Data mining methods in recommendation systems: Classifiers, clustering, association rule mining techniques, explanations in recommender systems, evaluating recommender systems, advertising on the web, on line and off line algorithms, the matching problem, adwords problem, Web 3.0 and the semantic web, the next generation web.

TEXT BOOKS
1. HaralambosMarmanis, Dmitry Babenko, "Algorithms of the Intelligent Web",
    Dreamtech Press, 2nd Edition, 2016.
2. Segaran, "Programming Collective Intelligence", O"reilly, 1st Edition, 2007
3. Christopher D. Manning, PrabhakarRaghavan, HinrichSchütze, "Introduction to Information

REFERENCE BOOKS

1. Berners Lee, Godel, Turing, "Thinking on the Web", Wiley Inter Science, 1st Edition, 2009.
2. Gautam Shroff, "Intelligent Web - Search, Smart Algorithms, and Big Data", Oxford
    University Press, 1st Edition, 2013
3. HaralambosMarmanis, Dmitry Babenko, "Algorithms of the Intelligent
    Web", Manning Publications, 1st Edition, 2009.

V.   COURSE PLAN

At the end of the course, the students are able to achieve the following course learning outcomes.

Lecture No.	Course learning outcomes	Topics to be covered	Reference
1 – 3	Identify the major components of an Information Retrieval engine.	Introduction and web searching: Historical perspective, evolution of web 2.0.; Intelligent webapplications: Examples, web searching, indexing; Improving search results based on link analysis	T2:1.1-1.2
4 – 6	**Identify** the Semantic Web	Introduction to page rank, avoiding dead ends and spider traps, using page rank in a search engine,efficient computation of page rank	T1:2
7 – 9	**Identify** the Semantic Web	topic sensitive page rank, intelligent web crawling, improving searchresults based on user clicks	T2:2.1-2.2
10 – 13	**Identifying** the Recommendation rules	ranking documents, precision and recall., recommendations based on similar users	T1:4
14 – 16	**Identifying** the Recommendation rules	Creating suggestions and recommendations: Concepts of distance and similarity, collaborative filtering	T1:4

17 – 20	Identify the recommended based systems	Recommendations based on similar items, recommendationsbased on content; Extracting intelligence from content: Blogs, wikis, message boards.	T1: 6
21 – 22	Explain major algorithms for data mining.	Learning from user interactions: Extracting intelligence from tags, tag related metadata, tag generation	T1: 5
23 – 25	Apply web content mining strategies and algorithms on data collections.	Leveraging tags: Dynamic navigation, using tag clouds	T1:7
25 – 28		targeted search, recommendations based on tagsconstraint based recommender systems, hybrid recommender systems	T1:10
29 – 31	Apply various Recommendation systems	Recommender system types: Constraint based recommender systems	T1:8
32 – 35		Neighborhoodbased recommendation systems and hybrid recommender systems.	T1:8 T1:13
35 – 38	Apply various Recommendation systems	Neighborhood based recommendation systems and hybrid recommender systems.	T1:9 T1:14 T1: 17
39 -- 42	Apply various Recommendation systems	evaluating recommender systems, advertising on theweb, on line and off line algorithms	T1: 17
43 – 45		the matching problem, adwords problem, Web 3.0 and the semantic web, the next generation web.	T1:16

XI   MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OFPROGRAM OUTCOMES AND PROGRAM SPECIFICOUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	H	H										S	H	H	
II		H	S		S								S	H	
III	S	H	S										H		S
IV	H	S											H	S	
V	H	S											H	S	S

S-Supportive   **H – Highly related**

XII   MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H			S									H	S	
2	S	H	S									S	H		S
3	S	H			S								S		
4	H			S								S	S	S	
5	S	H	S		S							S	H		S
6	H	S		S									S		
7	H				S							S	H	S	
8	H			S									H	S	
9	S	H	S									S	H		S

     S-Supportive   **H – Highly related**

Prepared by: Ms. K.Radhika, Associate Professor, CSE   HOD, CSE