



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTION FORM

Course Title	Research Methodology			
Course Code	BCS703			
Course Structure	Lectures	Tutorials	Practicals	Credits
	3	-	-	3
Course Coordinator	Ms. K Lakshmi Revathi, Associate Professor			
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	Basic concepts of Research Techniques

III. MARKSDISTRIBUTION

Subject	SEE Examination	CIA Examination	Total Marks
Research Methodology	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
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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. Identify an appropriate research problem in their interesting domain.
- II. Organize and conduct research project.
- III. Prepare a research project thesis report.
- IV. Understand the law of patent and copyrights.
- V. Adequate knowledge on process for filing Patent.

I. COURSE OUTCOMES

After completing this course the student must demonstrate the knowledge and ability to:

1. Define the terms research and methodology.
2. Arrange a range of quantitative and / or qualitative research techniques to business and management problems / issues
3. Describe research approaches, techniques and strategies in the appropriate manner for decision making.
4. Explain the design features for specific and identifying the research process.
5. Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process
6. Use the research process for report writing
7. Collect data for designs and methodologies to apply to a specific research project.
8. Discuss about patent laws and ownership rights.
9. Describe how to register copy rights.

II. HOW PROGRAM OUTCOMES ARE ASSESSED

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 ARE ASSESSED

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

Definition, types of research, research approaches, research process, validity and reliability in research, features of good design, types of research design, and basic principles of experimental design.

UNIT – II MEASUREMENT AND SCALING TECHNIQUES

Errors in measurement, tests of sound measurement, scaling and scale construction techniques, forecasting techniques, time series analysis, interpolation and extrapolation.

UNIT – III METHODS OF DATA COLLECTION

Primary data, questionnaire and interviews, collection of secondary data, cases and schedules. Professional attitude and goals, concept of excellence, ethics in science and engineering, some famous frauds in science, case studies.

UNIT – IV INTERPRETATION OF DATA AND REPORT WRITING

Layout of a research paper, techniques of interpretation, making scientific presentation at conferences and

popular lectures to semi technical audience, participating in public debates on scientific issues.

UNIT – V

INTRODUCTION TO INTELLECTUAL PROPERTY

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights; Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law; Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

TEXT BOOKS

1. C. R. Kothari, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2nd Edition, 2004.
2. P. Gupta, “Statistical Methods”, Sultan Chand and Sons, New Delhi, 1st Edition, 2005.
3. Richard W. Stim, “Intellectual Property: Patents, Trademarks, and Copyrights”, Cengage learning, 2nd Edition, 2001.

REFERENCE BOOKS

1. P. Narayana Reddy, G. V. R. K. Acharyulu, “Research Methodology and Statistical Tools”, Excel Books, New Delhi, 1st Edition, 2008.
2. Prabuddha Ganguli, “Intellectual Property Right, Unleashing the Knowledge Economy”, Tata Mc Graw Hill Publishing Company Ltd, 1st Edition, 2001.

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	Define the terms research and methodology	Introduction and definition of research methodology	T1
2	Arrange a range of quantitative and / or qualitative research techniques to business and management problems / issues	Types of Research	T1
3	Describe research approaches, techniques and strategies in the appropriate manner for decision making process	Research approaches	T1
4	Describe research approaches, techniques and strategies in the appropriate manner for decision making process	Research process	T1
5	Describe research approaches, techniques and strategies in the appropriate manner for decision making process	Validity in research	T1
6	Describe research approaches, techniques and strategies in the appropriate manner for decision making process	Reliability in research	T1
7	Explain the design features for specific and identifying the research process.	Features of good design	T1
8	Explain the design features for specific and identifying the research process.	Types of research design	T1

9	Explain the design features for specific and identifying the research process.	basic principles of experimental design.	T1
10	Arrange a range of quantitative and / or qualitative research techniques to business and management problems /	Errors in measurement	T1
11	Arrange a range of quantitative and / or qualitative research techniques to business	tests of sound measurement,	T1
12	Describe research approaches, techniques and strategies in the appropriate manner for decision making.	scaling construction techniques	T1
13	Explain the design features for specific and identifying the research process.	scale construction techniques	T1
14	Describe research approaches, techniques and strategies in the appropriate manner for decision making the research process	forecasting techniques	T1
15	Describe research approaches, techniques and strategies in the appropriate manner for decision	forecasting techniques	T1
16	Demonstrate knowledge and understanding of data analysis and interpretation in relation to the	time series analysis	T1

XI MAPPING COURSE OBJECTIVES 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
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 Lakshmi Revathi, Associate Professor

HOD, CSE