DEPARMENT OF COMPUTER SCIENCE
KAKTIYA UNIVERSITY, HANUMAKONDA

Department Profile

Kakatiya University started MCA programme with the assistance from UGC in 1993. Later M.Sc. (Computer Science) M.Sc. (Information Systems) B.C.A. and PGDCA programs were also added. In 2001, the above programmes are made to be offered by a full-fledged department, Department of Informatics (the name later was changed to **Department of Computer Science**). The Department is updating the syllabus keeping in view the latest trends in the IT industry. The department has the best infrastructural facilities to facilitate the students to work on emerging technologies of the industry.

Vision

To produce the competent and ethically strong professionals with a bent towards research and innovation and thus the societal development.

Mission

To educate the students to create, share and apply knowledge in the Computer Science and related domains and be successful, ethical, effective problem-solvers and life-long learners, leading their careers always for the economical well-being of out region in particular and the nation in general.

Courses offered by the Department

- **Master of Computer Applications (MCA) 2 Years duration**
- **Master of Science in Computer Science (M.Sc(CS)) 2 Years duration**
- **Ph.D. Programme in Computer Science**

Master of Computer Applications (MCA): Students are selected through a state level entrance test (TSICET) conducted by a State University**.** Two categories of seats are available – Regular category (40 seats) and Self Finance category (20 seats).

Master of Science in Computer Science (M.Sc(CS)): Students are selected through a state level Common Post Graduate Entrance Test (CPGET) conducted by a State University under Self Finance category with an intake of 45. Recently the intake has been increased to 60 which would be taken up with effect from the academic year 2022-23 onwards.

Ph.D. Programme in Computer Science: The post graduate students are selected through entrance test conducted by Kakatiya University for the Ph.D. programme in Computer Science. The intake depends on the available vacancies of the approved Research Supervisors.

- **NRI Students:** NRI students can also be admitted directly for this programme through Centre for Foreign Relations, Research & Consultancy (CFRAC), Kakatiya University subject to all the necessary requirements.

Master of Computer Applications (MCA) Programme

Programme Objectives

- Provide students with knowledge, general competence, and analytical skills in Computer Science on an advanced level.
- Prepare them for academics, industry, and research.
- Provide hands-on experience to apply computing skills in all other fields of study like Mathematics, Geography, Bio Sciences, Physics, Chemistry, Linguistics, Music, Medical Sciences etc.

Programme Outcomes

PO1 To apply knowledge of Computing fundamentals, Computing specialization, Mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PO2 To identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.

PO3 To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO4 To create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO5 To understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PO6 To recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.

PO7 To demonstrate knowledge and understanding of computing 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.

PO8 To communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO9 To identify a timely opportunity and using innovation to pursue that opportunity for the societal development at large.

Programme Specific Outcomes

Students will

- Become technology-oriented with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society as a whole.
- Acquire some development experience within a specific field of Computer Science, through project work.
- Gain ability to apply knowledge of Computer Science to the real-world issues.
- Get familiar with current research trends in various fields of Computer Science.
- Use creativity, critical thinking, analyses and research skills.
- Get prepared for placement by developing personality and soft skills.
- Gain ability to communicate scientific information in a clear and concise manner.
- Build up programming, analytical and logical thinking abilities.
- Know the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.
- Get an ability to participate in debates, discussions in the society constructively.
- Gain management skills to cater the corporate sector.

Course Outcomes

Paper Code	Course / Paper Title	Course Outcomes
MCA111	**C and Data Structures**	1. To explore the concepts of problem solving using structured programming language 2. To improve ability in applying logical skills in problem solving 3. To improve the expertise in C Programming concepts. 4. To improve ability of using memory management techniques like pointers, files, dynamic memory allocation in c programming 5. To understand basic data structures and its usage in handling real world applications 6. To know representing the data using linear data structures such as queues, circular queues, dequeue,priority queue, and using non-linear data structures such as trees 7. To know representing and retrieving the data in the form of various types of trees and graph data structures 8. To have an idea of searching for data with the help of various search methods, to sort data using various sorting 9. methods, and to effectively store and retrieve data, using various hashing methods 10. To be aware of Graph representations
MCA112	**Operating Systems**	1. To understand functionality of OS 2. To understand process management and various related algorithms 3. To Schedule CPU time using scheduling algorithm for processors 4. To understand memory management and various related algorithms 5. To understand about different File management algorithms 6. To understand about different Main Memory allocation techniques 7. To Compare Memory allocation using Best fit, Worst fit, and first fit policies 8. To Apply page replacement policies for dynamic memory management 9. To study about the significance of virtual memory under memory management.
MCA113	**Java Programming**	1. To learn about OOP language concepts 2. To learn basic programming using Java 3. To handle abnormal termination of a program using exception handling 4. To create flat files and packages 5. To design UI using Swing and AWT 6. To have exposure on multithreading

MCA114	**Computer Networks**	1. To know about computer network architecture and reference model 2. To be aware of different types of data link and medium access control protocols 3. To understand various routing algorithms and internet working 4. To understand about network protocols for real time applications
MCA115	**Probability and Statistical Methods**	1. To organize, manage and present data. 2. To analyze statistical data graphically using frequency distributions and cumulative frequency distributions. 3. To analyze statistical data using measures of central tendency, dispersion and location. 4. To define the principal concepts about probability. 5. To express the concept of probability and its features. 6. To explain the concept of a random variable and the probability distributions. 7. To calculate the expected value and the moments. 8. To explain major distributions of random variables.
MCA121	**Python Programming**	1. To have exposure on the basic programming constructs of Python 2. To know the scope of applicability of Python as a programming language in different domains 3. To developing adequate skills in Python programming 4. To implement of various applications using Python
MCA122	**Database Management Systems**	1. To understand the different issues involved in the design of a database system 2. To know data manipulation language for updating and managing a database 3. To identify functional dependencies to normalize the relations of database 4. To understand transaction Processing, Concurrency Control and Recovery
MCA123	**Software Engineering**	1. To learn the phases of software development 2. To understand process models and process system models 3. To gather, understand, analyze and specify requirements 4. To elicit, analyze and model requirements 5. To understand the components of Unified Modelling Language 6. To know the different types design concepts 7. To know the metrics for different software and analyze the quality of a software

MCA124	**Cryptography and Network Security**	1. To learn fundamentals of cryptography and its application to network security. 2. To understand network security threats, security services, and countermeasures. 3. To acquire background on well known network security protocols such as IPSec, SSL, and WEP. 4. To acquire background on hash functions; authentication; firewalls; intrusion detection techniques. 5. To classify the symmetric encryption techniques 6. To Illustrate various Public key cryptographic techniques 7. To know the authentication and hash algorithms and authentication applications
MCA125	**Principles and Practice of Management**	1. To understand management as a process 2. To critically analyse and evaluate management theories and practices 3. To plan and make decisions for organisations 4. To do staffing and related HRD functions 5. To know and aware about quality standards 6. To understand the marketing basics
MCA211	**Data Mining**	1. To know the fundamental theories and concepts of data warehouse and data mining 2. To be aware of pre-processing techniques, basic algorithms and techniques for mining frequent patterns, associations and correlations 3. To understand popular classification and prediction techniques 4. To know about clustering techniques, web mining and business applications of data mining 5. Analyse datasets with the following unsupervised learning methods: for dimensionality reduction, principal component analysis; for grouping, kmeans clustering and hierarchical clustering.
MCA212	**Web Technologies**	1. To acquire knowledge about functionalities of world wide web 2. To explore mark-up languages features and create interactive web pages using them 3. To learn and design Client side validation using scripting languages 4. To acquire knowledge about Open source JavaScript libraries 5. To design front end web page and connect to the back end databases 6. To do Client-side and Server-side scripting 7. To develop web applications
MCA213	**Theory of**	1. To construct finite state machines and the equivalent regular expressions

	Computation	2. To identifying the given language is regular or not 3. To design pushdown automata and the equivalent context free grammars 4. To design Turing machines
MCA214	**Elective – I (a)** **Mobile Application Development**	1. To design effective user interface required by mobile applications 2. To know the aspects of mobile application development and resource constraints 3. To develop mobile applications to access World Wide Web using J2ME 4. To know the characteristics of mobile applications on the Android platform
	Elective – I (b) **Cloud Computing**	1. To understand the principles and paradigm of Cloud Computing 2. To have the ability to design and deploy Cloud Infrastructure 3. To understand cloud security issues and solutions 4. To analyze the virtualization and cloud computing concepts. 5. To learn the architecture, deployment models, and infrastructure models of Cloud Computing.
	Elective – I (c) **R-Programming**	1. To know the basics of statistical computing and data analysis 2. To explore the usage of R for analytical programming 3. To implement data structures in R 4. To know about R loop functions and debugging tools 5. To be aware of Object-oriented programming concepts in R 6. To visualize the data in R 7. To write custom R functions
MCA215	**Elective – II (a)** **Internet of Things**	1. To understand the definition and significance of the Internet of Things 2. To describe what IoT is and how it works 3. To recognise the factors that contributed to the emergence of IoT 4. To secure the elements of an IoT device 5. To define the infrastructure for supporting IoT deployments 6. To discuss the architecture, operation, and business benefits of an IoT solution 7. To understand the application areas of IOT 8. To have the ability to realize the revolution of Internet in Mobile Devices, Sensor Networks 9. To understand building blocks of Internet of Things and characteristics.
	Elective – II (b) **Big Data Analytics**	1. To know about essentials of Big data management and applications 2. To have an idea of data analytics and

		reporting 3. To explore hadoop map reduce framework for developing Big data applications 4. To develop big data applications capable with Hadoop distributed file system
	Elective – II (c) **Mobile Computing**	1. To know about essentials of wireless networks and protocols 2. To understand wireless network communication, LAN technology and standards 3. To study about mobile computing and medium access control mechanisms 4. To understand mobile network and transport layer protocols
MCA221	**Artificial Intelligence**	1. To understand concept of knowledge representation and predicate logic and transform the real life information in different representation. 2. To understand state space and its searching strategies. 3. To understand machine learning concepts and range of problems that can be handled by machine learning. 4. To understand the numerous applications and huge possibilities in the field of AI 5. Solve real-world problems in organizational processes and workflows by applying critical thinking, problem-solving, and cognitive computing skills.
MCA222	**Elective-III (a)** **Foundations of Block Chain Technologies**	1. To describe the basic concepts and technology used for blockchain. 2. To describe the primitives of the distributed computing and cryptography related to blockchain. 3. To Illustrate the concepts of Bitcoin and their usage. 4. To implement Ethereum block chain contract. 5. To apply security features in blockchain technologies. 6. To have an idea of smart contract in real world applications
	Elective-III (b) **Cyber Security**	1. To be aware of current cyber threats and cyber security site references 2. To know about government-mandated directives and compliance requirements 3. To know about roles that are required to successfully design secure systems 4. To understand the attack cycle execution by malicious hackers

		5. To have an idea of security zones and detailed logging augment information assurance 6. To design cryptographic solutions for securing communications
	Elective-III (c) **E-Commerce**	1. To know about various types of e-commerce applications and the benefits & risks of using e-payment methods in E-Commerce applications 2. To understand inter organizational and intra organizational electronic commerce issues 3. To have an idea of dimensions of inter e-commerce systems and marketing on the internet 4. To study about information searching and retrieval in e-commerce application and digital video usage in e-commerce
MCA223	**Elective-IV (a)** **Digital Image Processing**	1. To study the image fundamentals and mathematical transforms necessary for image processing. 2. To study the image enhancement techniques 3. To study image restoration procedures. 4. To study the image compression procedures.
	Elective-IV (b) **Machine Learning**	1. To know about intelligent searching techniques for problem solving 2. To have essential knowledge representations and deduction techniques in intelligent 3. application developments 4. To understand machine learning fundamentals and statistical classification methods 5. To study reinforcement learning and linear models for machine learning
	Elective-IV (c) **Language Processors**	1. To know about different compiler construction tools and compiler design 2. To describe grammars and language definition 3. To understand syntax directed translation and symbol table 4. To study code optimization techniques and machine code generation
MCA224	**Major Project work**	1. To apply the software engineering principles on a real software project 2. To have problem based and project based learning 3. To choose major project in one of the selected areas of specialization with substantial multi-disciplinary component 4. To nurture the analytical and research skills 5. To develop team work, leadership and interpersonal skills

Master of Science in Computer Science Programme

The Master of Science in Computer Science Programme provides the students with knowledge, general competence, and analytical skills on an advanced level, needed in academics, industry, research.

Programme Objectives

- To develop core competence in Computer Science
- To prepare the students to carry out research and development work
- To prepare the students to take up a career in the IT industry.

Programme Outcomes

PO1 To apply the knowledge of computer application to find solutions for real-life application.

PO2 To analyze, design, develop and maintain the software application with latest technologies

PO3 To utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

PO4 To inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

PO5 To provides technology-oriented students with the knowledge and ability to develop creative solutions.

PO6 To develop skills to learn new technologies

PO7 To apply computer science theory and software development concepts to construct computing-based solutions.

PO8 To design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications.

Programme Specific Outcomes

Students will

- Understand the role of Computer Science in solving real time problems in society.
- Know the recent developments IT, future possibilities and limitations, and understand the value of lifelong learning
- Become technology-oriented with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society as a whole.

- Acquire some development experience within a specific field of Computer Science, through project work.
- Gain ability to apply knowledge of Computer Science to the real-world issues.
- Get familiar with current research trends in various fields of Computer Science.
- Use creativity, critical thinking, analyses and research skills.
- Get prepared for placement by developing personality and soft skills.
- Gain ability to communicate scientific information in a clear and concise manner.
- Build up programming, analytical and logical thinking abilities.
- Know the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.
- Get an ability to participate in debates, discussions in the society constructively.
- Gain management skills to cater the corporate sector.

Course Outcomes

Paper Code	Course / Paper Title	Course Outcomes
MSCCS111	**Discrete Mathematics**	1. To learn necessary mathematical concepts that are prerequisite for computer related subjects namely database management systems, knowledge based systems and artificial intelligence 2. To know about first-order logic , quantifier logic and predicator logic 3. To understand elementary combinations and permutations with repetitions, different methods of solving recurrence relations 4. To understand concepts and algorithms related to various types of graphs, trees and applications to real life problems
MSCCS112	**Java Programming**	1. To learn about OOP language concepts 2. To learn basic programming using Java 3. To handle abnormal termination of a program using exception handling 4. To create flat files and packages 5. To design UI using Swing and AWT 6. To have exposure on multithreading
MSCCS113	**Operating Systems**	1. To understand functionality of OS 2. To understand process management and various related algorithms 3. To Schedule CPU time using scheduling algorithm for processors 4. To understand memory management and various related algorithms 5. To understand about different File management algorithms 6. To understand about different Main Memory allocation techniques 7. To Compare Memory allocation using Best fit, Worst fit, and first fit policies 8. To Apply page replacement policies for dynamic memory management 9. To study about the significance of virtual memory under memory management.
MSCCS114	**Computer Networks**	1. To know about computer network architecture and reference model 2. To be aware of different types of data link and medium access control protocols 3. To understand various routing algorithms and internet working 4. To understand about network protocols for real time applications
MSCCS115	**Oops with Java Lab**	• To train the students in implementing all the concepts learnt as a part of the syllabus using Java as a programming language
MSCCS116	**Operating System**	• To train the students in implementing all the

	Lab	concepts learnt as a part of the syllabus using any programming language
MSCCS117	**Computer Networks Laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus using NS2 tool.
MSCCS118	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.
MSCCS121	**Computer Organization**	1. To understand the anatomy of the computer and how the functional units operate, interact, and communicate 2. To represent the data at the machine level and to know how computations are performed at the machine level **3.** To know the working procedure of various input/output devices and transfer of data from different modes
MSCCS122	**Advanced Java**	1. To understand the basics of networking 2. To get an overview about the RPC and RMI applications 3. To learn how to use JDBC technology and different types of drivers 4. To get resultset metadata particulars 5. To know how to illustrate precompiled and call stored procedures 6. To get an idea about server-side technology and to understand how to write, deploy, and invoke java servlets 7. To know the advantages of JSP over other similar technologies 8. To understand how to create and use custom tags and to access databases
MSCCS123	**Unix Network Programming**	1. To know UNIX environment and basic UNIX commands 2. To understand fundamentals of shell programming. 3. To practice implementing different CPU scheduling algorithms, page replacement algorithms and dead 4. lock avoidance algorithm 5. To know the different types of file organization techniques
MSCCS124	**Software Engineering**	1. To learn the phases of software development 2. To understand process models and process system models 3. To gather, understand, analyze and specify requirements 4. To elicit, analyze and model requirements 5. To understand the components of Unified Modelling Language 6. To know the different types design concepts

		7. To know the metrics for different software and analyze the quality of a software
MSCCS125	**Advanced java laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus using Java, Servlets and JSP with database connectivity.
MSCCS126	**Unix Network Programming laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus in the UNIX environment.
MSCCS127	**Software Engineering laboratory**	• To train the students in implementing all the concepts learnt as a part of the syllabus using different CASE tools.
MSCCS128	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.
MSCCS211	**Automata Theory and Finite Languages**	1. To construct finite state machines and the equivalent regular expressions 2. To identifying the given language is regular or not 3. To design pushdown automata and the equivalent context free grammars 4. To design Turing machines
MSCCS212	**Data Warehousing and Mining**	1. To know the fundamental theories and concepts of data warehouse and data mining 2. To be aware of pre-processing techniques, basic algorithms and techniques for mining frequent patterns, associations and correlations 3. To understand popular classification and prediction techniques 4. To know about clustering techniques, web mining and business applications of data mining
MSCCS213	**Elective-1 (a) .Net Programming**	1. To gain programming knowledge in .Net Framework. 2. To introduce .Net IDE Component Framework. 3. To know the programming concepts in .Net Framework. 4. To understand of making use of various controls of .Net **5.** To design various console, window, web and database applications.
	Elective-1 (b) Python Programming	1. To have exposure on the basic programming constructs of Python 2. To know the scope of applicability of Python as a programming language in different domains 3. To developing adequate skills in Python

		programming 4. To implement of various applications using Python
MSCCS214	**Elective-2 (a) PHP Programming**	1. To aware of www and web evolution 2. To know about client side scripting languages 3. To design static web pages using HTML Tags, CSS properities, java script snippets 4. To get familiar with java script functions, events and objects 5. To know about server side scripting languages 6. To get accessing the data from the database using MySQL and different types of databases
	Elective-2 (b) Programming with R	1. To know the basics of statistical computing and data analysis 2. To explore the usage of R for analytical programming 3. To implement data structures in R 4. To know about R loop functions and debugging tools 5. To be aware of Object-oriented programming concepts in R 6. To visualize the data in R 7. To write custom R functions
MSCCS215	**Data Warehousing And Mining Lab**	**1.** To train the students in implementing all the concepts learnt as a part of the syllabus using WEKA tool. 2. Analyse datasets with the following unsupervised learning methods: for dimensionality reduction, principal component analysis; for grouping, kmeans clustering and hierarchical clustering.
MSCCS216	**Elective-1 (a) .Net Programming Lab**	• To train the students in developing console, windows, web and database applications on VB.NET platform.
	Elective-1 (b) Python Programming Lab	• To train the students in implementing all the concepts learnt as a part of the syllabus using different packages of Python.
MSCCS217	**Elective-2 (a) PHP Programming Lab**	• To train the students in developing variety of web applications using different client and server side scripting languages.
	Elective-2 (b) Programming with R Lab	• To train the students in implementing all the concepts learnt as a part of the syllabus in R environment
MSCCS218	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills.

		• To improve the ability to think and question critically.
MSCCS221	**Artificial Intelligence**	1. To understand concept of knowledge representation and predicate logic and transform the real life information in different representation. 2. To understand state space and its searching strategies. 3. To understand machine learning concepts and range of problems that can be handled by machine learning. 4. To understand the numerous applications and huge possibilities in the field of AI . 5. Solve real-world problems in organizational processes and workflows by applying critical thinking, problem-solving, and cognitive computing skills.
MSCCS222	**Elective -1 (a) Cryptography and Net Work Security**	1. To learn fundamentals of cryptography and its application to network security. 2. To understand network security threats, security services, and countermeasures. 3. To acquire background on well known network security protocols such as IPSec, SSL, and WEP. 4. To acquire background on hash functions; authentication; firewalls; intrusion detection techniques. 5. To classify the symmetric encryption techniques 6. To Illustrate various Public key cryptographic techniques 7. To know the authentication and hash algorithms and authentication applications
	Elective -1 (b) Mobile Computing	1. To know about essentials of wireless networks and protocols 2. To understand wireless network communication, LAN technology and standards 3. To study about mobile computing and medium access control mechanisms 4. To understand mobile network and transport layer protocols

MSCCS223	**Elective -2 (a)** **Big Data Analytics**	1. To know about essentials of Big data management and applications 2. To have an idea of data analytics and reporting 3. To explore hadoop map reduce framework for developing Big data applications 4. To develop big data applications capable with Hadoop distributed file system
	Elective -2 (b) **Cloud Computing**	1. To understand the principles and paradigm of Cloud Computing 2. To have the ability to design and deploy Cloud Infrastructure 3. To understand cloud security issues and solutions 4. To analyze the virtualization and cloud computing concepts. 5. To learn the architecture, deployment models, and infrastructure models of Cloud Computing.
MSCCS224	**Major Project Work**	1. To apply the software engineering principles on a real software project 2. To have problem based and project based learning 3. To choose major project in one of the selected areas of specialization with substantial multi-disciplinary component 4. To nurture the analytical and research skills 5. To develop team work, leadership and interpersonal skills
MSCCS225	**Seminar**	• To inculcate presentation skills, discussion skills, listening skills. • To improve the ability to think and question critically.

Doctor of Philosophy (Ph.D.) Programme in Computer Science

The Doctor of Philosophy programme promotes scientific research at the university level and encourages scientific publishing and actively contributes to the global progress in computing sciences.

Programme Objectives

1. To prepare the scholars to identify and design scientifically sound and ethical research to solve computational problems.
2. To prepare specialized and qualified scholars to meet the needs in applied scientific research in higher education locally and globally.
3. To contribute to the transfer of knowledge and experience, for the nation's scientific progress and building its applied research capabilities
4. Finding scientific solutions to the dilemmas facing society and its development by providing a high level of applied research and transfer of advanced technologies.

Programme Outcomes:

P01 To plan and conduct original research that addresses questions of significance in a particular subject area in Computer Science.

P02 To analyze and be able to articulate the scientific advances and limitations of results described in the research literature.

P03 To demonstrate the ability to effectively communicate research proposals and results.

P04 To demonstrate in-depth knowledge of a particular subject area and broad knowledge of other areas in Computer Science.

P05 To demonstrate an understanding of and ability to follow ethical standards in research, teaching, and professional service.

P06 To demonstrate the ability to teach concepts in Computer Science