M.Sc. (Computer Science)

Modified

PROGRAMME PROJECT REPORT (PPR) from July 2024 Admission Cycle onwards

1. Introduction

The school of Sciences & Emerging Technologies of Jagat Guru Nanak Dev Punjab State Open University, Patiala has planned to start Master of Science (Computer Science) from the session 2023-24. The university has adopted choice-based credit system that has been introduced by University Grant Commission (UGC). This is a broad-based programme covering disciplinary, interdisciplinary and skill-based courses. The Master of Science (Computer Science) has 80 credits consisting of 4 categories namely Core Courses, Discipline Specific Courses, Ability Enhancement Course and Skill Enhancement Courses. This 2-Years Programme has 4 semesters. In 1st, 2nd and 3rd semesters, each semester consists of 4 theory courses and 2 practical courses. 4th Semester consists of 2 theory courses, major project and seminar.

2. Programme Mission & Objectives

2.1 Mission Statement

To educate learners with high quality theoretical, practical, ethical, technological and skill-oriented education in the area of computer science and other related disciplines that can help them in their professional career and prepare them for academics, industry and research.

2.2 Objectives

The Programme has been framed to achieve the following main objectives:

- To develop an understanding and knowledge of the fundamentals of computer science with good foundation on theory, systems and applications.
- To apply computer science theory and software development concepts to construct computing-based solutions.
- To become technology-oriented learners with the knowledge and ability to develop innovative solutions.

- To provide some development experience within a specific field of computer science, through project work.
- To provide the knowledge about the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.
- To enhance the computing, management, communication and soft skills of learners through project work and seminars.

3. Relevance of the Programme

In this age of computers and everything being digitalized, knowledge about computer technology is very important. Presently, computer scientist is one of the fastest-growing job titles in the industry. To cater the need of the industry, a Programme in Computer Science will prove to be very helpful for learners and professionals those want to take up the job in the field of computer science. A 2 Years degree Programme in Computer Science will provide foundation skills and information not only about Computer Science but also in the related fields, this will give a strong foundation to the learner. One also gets to learn programming languages used in Computer Science along with information about various tools and approaches used in Computer Science. The master Programme in Computer Science of Jagat Guru Nanak Dev Punjab State Open University has been designed to supply trained man power in ever-growing IT and IT enabled industry. Main goal of MSc (Computer Science) Programme is to prepare learners for training in some specialized area of computer science, to prepare learners for jobs in IT industry, business or government, and to provide support courses for learners in the field of engineering, mathematics and management to enhance the computing, management, communication skills of learners.

4. Prospective Target Group

Having passed any recognized Bachelor's Degree of minimum3 Years' duration with Computer Science or Computer Applications or Mathematics or Statistics or Economics or Operation Research as one of the Courses in the Graduation Level from a university recognized by UGC.

Learners who have not been studied Computer Science or Computer Applications or Mathematics or Statistics or Economics or Operation Research as one of the courses in the Graduation Level, they may be admitted in M.Sc. (Computer Science) Programme, but they pass

a Bridge Course (Non- Credit Qualifying Course) during the Programme.

Learners with above said eligibility may join this course to improve their knowledge, skills, employability, and entrepreneurship ability. The working persons and who cannot study through regular mode can continue their education through this open learning mode.

5. Appropriateness of the Programme

The Programme will provide academic continuity to the learning community and will facilitate continuous professional development for the employees and entrepreneurs across the country and Punjab state, in particular. The Programme aims to reach the learners who are distant and those lacking access. To reach the unreached, the courses' instructions and specially prepared study material in the form of printed notes and audio-video lessons to the learners will be delivered at their door steps through postal correspondence and digital media like e-mail, website etc. Limited face-to-face contact sessions will be held at Learner Support Centres (LSC) set up by the university as close as possible to the learner's home. Communication with the university and interaction between the teacher and the learners will be further facilitated using electronic media options like telephone, e-mails, chat sessions, video conferencing and tele conferencing, if and when required. All of these characteristics will help learners to engage in relevant, purposeful and interesting lessons.

Apart from this, the learners will have the advantage to study at their own pace and convenience as the Programme can be completed in the time span ranging from two years to four years.

6. Instructional Design

The MSc (Computer Science) is a broad-based Programme covering disciplinary, interdisciplinary and skill-based courses. This Programme has 80 credits consisting of 4 categories namely Core Courses, Discipline Specific Courses, Ability Enhancement Course and Skill Enhancement Courses. This 2-Years Programme has 4 semesters. In 1st, 2nd and 3rd semesters, each semester consists of 4 theory courses and 2 practical courses. 4th Semester consists of two theory courses, major project and seminar courses.

The Programme can be completed in a minimum 2 Years period or maximum 4 Years period. This Programme is designed to provide the learners with the information and skills necessary to understand and analyze their world by introducing them to the main themes and topics of

disciplines in Computer Science, IT, Mathematics and Management. The Programme Code of MSc (Computer Science) is MSCS.

Note: The programme can be completed by earning the required number of credits in a minimum period of 2 Years (4 Semesters) or in the maximum period of 4 Years. The required number of credits is 80. A credit is equivalent to 30 hours of study time comprising all learning activities (i.e. reading and comprehending the print material, listening to audios, watching videos, attending counseling sessions, teleconferencing and writing assignment responses). The programme has a mix of different types of courses in each of the four semesters. However, the total number of credits to study in four semesters is 4x20 = 80 credits. Table I gives an overview of the programme structure showing the distribution of different types of courses across the four semesters of the programme.

Most courses of this programme are of four credits. This means that you will have to put in 120 hours (4x30) of study time to complete each of these courses. Laboratory related courses are of 2 credits. The programme has a mix of different types of courses in each of the four semesters.

Table I: An overview of M.Sc. (Computer Science) Programme Structure showing the Distribution of Different Courses across the four Semesters of the Programme

Semester-1						
S. No.	**Name of Course**	**Course Code**	**Internal Marks**	**External Marks**	**Total Marks**	**Credits**
1	Computer Programming	MSCS-1-01T	30	70	100	4
2	Computer Programming Lab	MSCS-1-01P	15	35	50	2
3	DBMS	MSCS-1-02T	30	70	100	4
4	DBMS Lab	MSCS-1-02P	15	35	50	2
5	Probability & Statistical Analysis	MSCS-1-03T	30	70	100	4
6	Fundamentals of Digital Marketing	MSCS-1-04T	30	70	100	4
Total			150	350	500	20

Semester-2						
S.	**Name of Course**	**Course Code**	**Internal**	**External**	**Total**	**Credits**

No.			Marks	Marks		
1	Operating Systems	MSCS-2-01T	30	70	100	4
2	Operating Systems Lab	MSCS-2-01P	15	35	50	2
3	Data Structure & Algorithms	MSCS-2-02T	30	70	100	4
4	Data Structure & Algorithms Lab	MSCS-2-02P	15	35	50	2
5	Introduction to Cyber Security	MSCS-2-03T	30	70	100	4
6	Software Engineering	MSCS-2-04T	30	70	100	4
Total			150	350	500	20

Semester-3						
S. No.	**Name of Course**	**Course Code**	**Internal Marks**	**External Marks**	**Total Marks**	**Credits**
1	Web Programming	MSCS-3-01T	30	70	100	4
2	Web Programming Lab	MSCS-3-01P	15	35	50	2
3	Data Mining & Visualization	MSCS-3-02T	30	70	100	4
4	Data Mining & Visualization Lab	MSCS-3-02P	15	35	50	2
5	Computer Networks	MSCS-3-03T	30	70	100	4
6	Introduction to Data Science	MSCS-3-04T	30	70	100	4
Total			150	350	500	20

Semester-4						
S. No.	**Name of Course**	**Course Code**	**Internal Marks**	**External Marks**	**Total Marks**	**Credits**
1	Machine Learning	MSCS-4-01T	30	70	100	4
2	Research Methodology and	MSCS-4-02T	30	70	100	4

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3	Major Project	MSCS-4-03P	60	140	200	10
4	Seminar	MSCS-4-04	50	0	50	2
Total			170	280	450	20

7. Procedure for Admissions

Notifications regarding admission will be published in the leading national and regional newspapers. In addition to this, all the required information will be updated regularly on the university website

7.1 Programme Duration: 2 Years to 4 Years

7.2 The Medium of Examination: English

7.3 Eligibility:

Having passed any recognized Bachelor's Degree of minimum3 Years' duration with Computer Science or Computer Applications or Mathematics or Statistics or Economics or Operation Research as one of the Courses in the Graduation Level from a university recognized by UGC.

Learners who have not been studied Computer Science or Computer Applications or Mathematics or Statistics or Economics or Operation Research as one of the courses in the Graduation Level, they may be admitted in M.Sc. (Computer Science) Programme, but they pass a Bridge Course (Non- Credit Qualifying Course) during the Programme.

Bridge Course

Objective:

Bridge courses for computer science master degree programme are typically oriented around covering one of two possible deficiencies in a candidate's educational background:

- Lack of computer science skills
- Lack of math and statistical skills

Bridge course tends to provide entry-level approaches suitable for learners coming in with no real background in computer science or math or statistical or economics or operation research courses.

Therefore, to bridge the gap between non-mathematical background learners, the university has introduced a bridge course that is based on computers and mathematic statistics. This theory paper is based on internal and external evaluation to evaluate the performance of the candidate. The detail structure of this bridge course is given below:

Sr. No.	Course Code	Course Name	Credit
1	BCCSD-01	Fundamentals of Statistics and Computer Science	-

7.4 Total Programme Fee:

Fee Head Details	Semester-1	Semester-2	Semester-3	Semester-4
Registration/ Continuation Fee	500	--	500	--
Tuition Fee	4000	4000	4000	4000
Examination Fee	1250	1250	1250	1250
I.T. and other Charges	750	750	750	750
Security Fee (Refundable)	--	--	--	--
Total Fee (Rs.)	6500	6000	6500	6000

Note:

- The Fee can be change at any point of time, as per the recommendations of academic and concerned committee

7.5 Instructional Delivery Mechanisms:

The Programme has been designed with the aim to reach the distant and those lacking access to a regular mode of education. The courses' instructions and specially prepared study material will be made available through Learner Support Centres (LSCs) and digital media like e-mail, website etc. Limited face to face contact sessions will be held at the study centers set up by the university as close as possible to the learner's home. Communication with the university and interaction between the teacher and the learners will be further facilitated using electronic

media options like telephone, e-mails, chat sessions, video conferencing and tele conferencing, if and when required.

Besides this, Counseling Sessions will be held at all the LSCs regularly during weekends. The university will also conduct live/virtual classes for learners using modern ICT methods. However, to ensure learner participation and interaction, online classes will be blended with face to face discussions and meetings with the learners.

8. Evaluation

The learners' progress is measured through the means of continuous evaluation and end semester examinations.

8.1 Continuous Internal assessment through assignments

Assignments help the learners to recapitulate the theory and go back to the text again in case they are unable to answer a particular question. Thus, assignments also help to reinforce learning in distance and open learning system of education. The assignments will consist of a set of questions and activities that have to be answered by the programme participants by remaining at their own place.

Four assignments will be submitted for a 4 credits course and two assignments will be submitted by the learner for a 2 credits course. The assignments will cover all or any types of questions (long answer type, short answer type, objective type, multiple choice questions and case studies).

Learners will be required to obtain 40% marks as pass percentage in each assignment separately. Each assignment will carry 50 marks. In the final result, assignments will carry 30% weightage.

8.2 Semester End Examination

Semester end examination is the major component of the evaluation system and carries 70% weightage in the final result. The university will conduct end semester examination twice a year i.e., in June and in December. The learners can take the examination only after the completion of the course, failing which they can take the same in December or June of subsequent years but within the total span of the programme. In case any student fails to get a passing score in the semester end examination, they will be eligible to reappear in the next semester end

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examination for that course as and when it is held but within the total span of the programme only.

In order to claim Master's Degree in Science (Computer Science), the learner is required to score at least 40% marks in both continuous evaluations (i.e.in assignments) as well as in semester end examinations separately.

8.3 Updated Notification for the Learners

The information regarding the university policies and procedures, academic activities like assignment submissions, question papers, results and other notices related to examination and evaluation will be uploaded on the official website of the university.

9. Laboratory Support

Modernize Computer Labs at the Learner Support Centres (LSCs) will be provided with all latest computers and software required for this Programme.

10. Library Resources

The students may avail the library facilities at their Learner Support Centres (LSCs).

11. Cost Estimation

The cost of the programme will be as per the fee decided upon.

12. Quality Assurance Mechanism

The university has constituted a "Centre of Internal Quality Assurance (CIQA) as per UGC (Open and Distance Learning) Regulations, 2017.

13. Programme Outcomes (POs)

Programme: MSc (Computer Science)

Programme Outcomes (POs)	
On successful completion of this programme, the students will be able to:	
PO1	Develop an understanding of basic theoretical principles in computer science and perspectives in computer science by critical thinking.
PO2	Identify, formulate, review research literature, and analyze problems reaching substantiated conclusions using principles of computer science

PO3	Design solutions for problems and design system processes that meet the specified needs with appropriate consideration for the public health and safety, and the environmental considerations.
PO4	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.
PO5	Create, select and use appropriate techniques, skills, and modern IT tools necessary for computing practice with an understanding of the limitations.
PO6	Apply ethical principles in their research and professional activities and familiar with the professional standards and practices of the field of computer science.
PO7	Work collaboratively with others, both within and outside of their discipline, to solve complex problems and develop innovative solutions.
PO8	Communicate their ideas and research findings effectively to both technical and non-technical audiences, through written reports, oral presentations, and other media.
PO9	Demonstrate knowledge and understanding of the science and management principles and apply these to one's own work, as a member and leader of diverse teams, to manage projects and in multidisciplinary environments.
PO10	Recognize the need for, and have the preparation and ability to engage in continuing professional development and life-long learning in the broadest context of technological change.

14. Programme Specific Outcomes (PSOs)

Programme: MSc (Computer Science)

Programme Specific Outcomes (PSOs)	
On successful completion of this programme, the students will be able to:	
PSO1	Design and implement software solutions to complex problems using computer programming languages.
PSO2	Understand computer systems, including operating systems, networks, and databases for designing and developing computer-based systems.
PSO3	develop professional skills such as communication, teamwork, and project management that are essential for success in the computer science industry.
PSO4	Apply software engineering principles to develop and manage software projects, including requirements analysis, design, implementation, and testing.
PSO5	Gain ability to apply knowledge of Computer Science to the real-world issues.

15. Course Outcomes (COs)

Course Outcomes (COs) of Courses of Semester-1

Course#1

Course: Computer Programming

Course Code: MSCS-1-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the basic language implementation techniques.
CO2	Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.
CO3	Understand the concept of object oriented programming language.
CO4	Develop ability to learn and write small programs in C and C++.
CO5	Understand the concepts of OOPs including inheritance.

Course#2

Course: Computer Programming Lab	
Course Code: MSCS-1-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop C programs to solve simple mathematical and decision making problems.
CO2	Develop, Debug and Execute programs to demonstrate the applications of arrays in C
CO3	Develop, Debug and Execute programs to demonstrate decision making and looping constructs in C
CO4	Develop, Debug and Execute programs to demonstrate the basic concepts of pointers in C
CO5	Demonstrate the use of various OOPs concepts with the help of programs.

Course#3

Course: DBMS	
Course Code: MSCS-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental elements of database management system.
CO2	Understands the three level architecture of DBMS and mapping between these levels.
CO3	Familiar with the hierarchical model, network model, entity relationship model and relational model.
CO4	Acquire knowledge of normalization technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies.
CO5	Apply SQL and PL/SQL to solve problems

Course#4

Course: DBMS Lab	
Course Code: MSCS-1-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement Basic DDL, DML and DCL commands.

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CO2	Understand Data selection and operators used in queries and restrict data retrieval and control the display order.
CO3	Use Aggregate and group functions to summarize data.
CO4	Join multiple tables using different types of joins.
CO5	Understand the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.

Course#5

Course: Probability & Statistical Analysis	
Course Code: MSCS-1-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Apply measures of central tendency for analysis of data.
CO2	Learn tabulated and graphical representation techniques for discrete and continuous data.
CO3	Infer the concept of correlation and regression for two or more related variables.
CO4	Understand the fundamentals of statistics to apply descriptive measures and probability for data analysis.
CO5	Understand the concepts of Random Variable, Probability Mass Function and Density Function.

Course#6

Course: Digital Marking	
Course Code: MSCS-1-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify the core concepts of digital marketing and its role in businesses or organizations.
CO2	Understand digital marketing strategies to reach the target audience.
CO3	Analyze marketing approaches and recognize areas for enhancing performance.
CO4	Resolve digital marketing issues and offer solutions based on the vital examination of digital marketing information.
CO5	Work on social media platforms such as Twitter, Facebook and Instagram

Course Outcomes (COs) of Courses of Semester-2

Course#7

Course: Operating Systems
Course Code: MSCS-2-01T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Understand the structure of computing systems, from the hardware level through the operating system level and onto the applications level.
CO2	Understand basics of operating system viz. system programs, system calls, user mode and kernel mode.
CO3	Learn the working with CPU scheduling algorithms for specific situation, and analyze the environment leading to deadlock and its rectification.
CO4	Explore the memory management techniques viz. caching, paging, segmentation, virtual memory, and thrashing.
CO5	Apply Methods for Handling Deadlocks, Deadlock Prevention, and Recovery from Deadlock.

Course#8

Course: Operating Systems Lab	
Course Code: MSCS-2-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate the installation process of various operating systems.
CO2	Implement virtualization by installing Virtual Machine software.
CO3	Apply UNIX/LINUX operating system commands.
CO4	Understand different UNIX/LINUX shell scripts
CO5	Implement and execute various shell programs.

Course#9

Course: Data Structure & Algorithms	
Course Code: MSCS-2-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand basic data structures such as arrays, linked lists, stacks and queues.
CO2	Solve problem involving graphs, trees and heaps.
CO3	Apply stack for evaluation of arithmetic expressions, and conversion from infix to post fix and recursion.
CO4	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO5	Design algorithm in context of space and time complexity and apply asymptotic notation.

Course#10

Course: Data Structure & Algorithms Lab
Course Code: MSCS-2-02P
Course Outcomes (COs) After the completion of this course, the students will be able to:

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CO1	Implement basic data structures such as arrays and linked list.
CO2	Develop programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO3	Implement various searching and sorting algorithms.
CO4	Develop programs to demonstrate the implementation of various operations on stack
CO5	Develop programs to demonstrate the implementation of various operations on queue

Course#11

Course: Introduction to Cyber Security	
Course Code: MSCS-2-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand network security threats, security services, and countermeasures.
CO2	Understand principles of network security by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.
CO3	Develop cyber security strategies and policies
CO4	Measure the performance and troubleshoot cyber security systems.
CO5	Understand various Cryptographic Techniques

Course#12

Course: Software Engineering	
Course Code: MSCS-2-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the software development life cycle which increases the growth opportunity.
CO2	Learn the detail knowledge of software requirement analysis.
CO3	Understands the detailed knowledge of software design and coding.
CO4	Understand the software testing that is relevant to the industry.
CO5	Acquire the detail knowledge of the fundamentals, including terminology; the nature and need for maintenance; maintenance costs and software evolution

Course outcomes of Courses of Semester-3

Course#13

Course: Web Programming
Course Code: MSCS-3-01T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
CO2	Develop skills in analysing the usability of a web site.
CO3	Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
CO4	Learn techniques of responsive web design, including media queries.
CO5	Derive information from data and implement data into applications

Course#14

Course: Web Programming Lab	
Course Code: MSCS-3-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop fully working applications that can be used on cross-platforms.
CO2	Create forms and check for data accuracy
CO3	Apply intermediate and advanced web development practices.
CO4	Create Web Pages that function using external data.
CO5	Develop a fully functioning website and deploy on a web server.

Course#15

Course: Data Mining & Visualization	
Course Code: MSCS-3-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand Data Warehouse fundamentals and Data Mining tools.
CO2	Understand Data Mining Techniques
CO3	Apply clustering methods like K means, hierarchical clustering, agglomerative clustering, divisive clustering to solve problems and evaluate clusters
CO4	Gain knowledge related to application areas of data mining
CO5	Understand the components involved in data visualization design.

Course#16

Course: Data Mining & Visualization Lab	
Course Code: MSCS-3-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explore WEKA Data Mining/Machine Learning Toolkit.
CO2	Perform data pre-processing tasks and Demonstrate performing association rule mining on data sets.
CO3	Demonstrate the performance of Naïve-Bayes and K-Nearest Neighbor classifiers on data sets.

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CO4	Evaluate the performance of Naïve-Bayes and k-Nearest Neighbor classifiers through ROC Curves
CO5	Explore visualization features of Weka to visualize the clusters.

Course#17

Course: Computer Networks	
Course Code: MSCS-3-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Build an understanding of the fundamental concepts of computer networking.
CO2	Identify the different types of network topologies and protocols.
CO3	Understand the concept of networking models, protocols, functionality of each layer
CO4	Identify the function of a firewall, and how it keeps a computer secure and safe from viruses.
CO5	Understand the concept of Firewalls for Network Security.

Course#18

Course: Introduction to Data Science	
Course Code: MSCS-3-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand tools and techniques to analyze and extract insights from data received from different data sources such as social media, IoT devices, and sensors.
CO2	Understand the general techniques and frameworks that can be used to handle special types of data, such as acoustic, image, sensor, and network data
CO3	Apply mathematical or logical operations to the data to derive new insights.
CO4	Apply tools for understanding complex data structures and relationships.
CO5	Explore various applications of data science in the field of business, energy, health care, biotechnology, manufacturing, telecommunication, pharmaceuticals etc.

Course outcomes of Courses of Semester-4

Course#19

Course: Machine Learning	
Course Code: MSCS-4-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental concepts and principles of machine learning.
CO2	Apply and evaluate various supervised learning algorithms
CO3	Explore and apply unsupervised learning techniques
CO4	Apply machine learning techniques to solve real-world problems

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CO5	Evaluate the strengths and limitations of different machine learning approaches

Course#20

Course: Research Methodology and IPR	
Course Code: MSCS-4-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Illustrate research problem formulation.
CO2	Analyze research related information and research ethics
CO3	Summarize the present day scenario controlled and monitored by Computer and Information Technology, where the future world will be ruled by dynamic ideas, concept, creativity and innovation.
CO4	Explain how IPR would take such important place in growth of individuals & nation, to summarize the need of information about Intellectual Property Right to be promoted among student community in general & engineering in particular.
CO5	Relate that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about economic growth and social benefits.

Course#21

Course: Major Project	
Course Code: MSCS-4-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate a sound technical knowledge of their selected project topic.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.
CO3	Design solutions to problems utilizing a systems approach.
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Course#22

Course: Seminar	
Course Code: MSCS-4-04	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Enhance soft skill through oral presentation.
CO2	Gain ability to present literature survey, problem formulation and solution.
CO3	Prepare the proper documentation of software project following the standard guidelines

CO4	Develop technical report writing
CO5	Gain ability of discussion and questions handling.

16. Multiple Entry and Exit in M.Sc. (Computer Science)

The multiple exit and enter option for learners is facilitated. Learners are allowed to exit the Programme with Post-Graduate Diploma in Computer Science and re-enter the same Programme at a later time. The award of Diploma/Degree is as follows:

Levels	Qualification Title	Credit Requirements
Level 8	**Post-Graduation Diploma in Computer Science or Post-Graduation Diploma in Computer Applications (PGDCA)** for those who exit after the successful completion of the first year (two Semesters) of the two years M.Sc. (Computer Science) Programme (Programme Duration: first year or two semesters)	36-40
Level 9	**Master' Degree in Computer Science (M.Sc. (Computer Science))** (Programme Duration: two years or four semesters after obtaining a Bachelor' Degree)	72-80
Level 9	**Master' Degree in Computer Science (M.Sc. (Computer Science))** (Programme Duration: one year or two semesters after obtaining Post-Graduation Diploma in Computer Science with 36-40 credits or Post-Graduation Diploma in Computer Applications (PGDCA) with 36-40 credits)	36-40

A learner will be allowed to enter/re-enter only at the odd semester and can only exit after the even semester. Learners who have completed a certain number of credits may be able to enter a program at a more advanced stage, rather than starting from the beginning.