



# **University of Madras**

**Chepauk, Chennai 600 005**

[Est. 1857, State University, NAAC 'A++' Grade, CGPA 3.59, NIRF 2019 Rank: 20]

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## **Postgraduate Programme in M.Sc. Computer Science**

**Curriculum and Syllabus  
(with effect from the Academic Year 2023-24)**

**June 2023**

### **Learning Outcome Based Curriculum Framework**

**Note: The Board of Studies is designed Learning Outcomes Based Curriculum Framework of Post Graduate Computer Science Programme prescribed by UGC**

<b>REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION</b>	
<b>Programme</b>	<b>M.Sc. Computer Science</b>
<b>Programme Code</b>	
<b>Duration</b>	<b>PG - Two Year</b>
<b>Programme Outcomes (POs)</b>	<ul style="list-style-type: none"> <li>○ To possess advanced knowledge of Computing, Mathematical basics for contemporary Computing Specialization and Knowledge of defined problem domain</li> <li>○ To identify a prospective domain, review research literature and analyze the problems using mathematical methods and suggest</li> <li>○ To have the Ability to use design tools, design software as per needs and specifications</li> <li>○ To apply acquired knowledge of the domain in investigating the software design, from design of experiments, analysis of data to provision of valid conclusions.</li> <li>○ To possess the skills to use modern software and hardware tools to analyze problems.</li> <li>○ To possess the knowledge of ethical and legal principles and cyber regulations</li> <li>○ To Possess ability for self-education and attitude for life-long learning in the broadest context of technological change</li> <li>○ To possess the ability to communicate scientific facts effectively in both verbal and written form to the society</li> <li>○ To possess the ability to understand the impact of IT solutions in a global and societal context</li> <li>○ To possess the skill to find out the right opportunity for entrepreneurship for the betterment of an individual and society at large</li> </ul>
<b>Programme Specific Outcomes (PSOs)</b>	<ul style="list-style-type: none"> <li>● Implement the concept of theory and technology with classical and modern techniques for solving the complex problems in Computer Science.</li> <li>● Be more curious towards learning new and emerging technologies that adapt quickly to changes.</li> <li>● Design, execute and evaluate computing projects in academia and industries using appropriate technologies.</li> <li>● Know the contextual knowledge in computing science research and communicate effectively with stakeholders with the society at large for enhancing the quality of life.</li> <li>● Be honest in upholding the ethical principles and social responsibilities along with socio-economic innovations.</li> </ul>

**PROGRAMME OUTCOMES (PO) - PROGRAMME SPECIFIC OUTCOMES  
(PSO) MAPPING**

<b>PROGRAMME SPECIFIC OUTCOMES (PSO)</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>PSO1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>PSO2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>PSO3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>PSO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>PSO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>

**Level of Correlation between PO's and PSO's**

*(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

Assign the value

**1 – Low**

**2 – Medium**

**3 – High**

**0 – No Correlation**

<b>METHODS OF EVALUATION</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	<b>25 Marks</b>
	Assignments / Snap Test / Quiz	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	<b>75 Marks</b>
<b>Total</b>		<b>100 Marks</b>
<b>METHODS OF ASSESSMENT</b>		
<b>Remembering (K1)</b>	<ul style="list-style-type: none"> <li>• The lowest level of questions require students to recall information from the course content</li> <li>• Knowledge questions usually require students to identify information in the textbook.</li> </ul>	
<b>Understanding (K2)</b>	<ul style="list-style-type: none"> <li>• Understanding of facts and ideas by comprehending organizing, comparing, translating, interpolating and interpreting in their own words.</li> <li>• The questions go beyond simple recall and require students to combined together</li> </ul>	
<b>Application (K3)</b>	<ul style="list-style-type: none"> <li>• Students have to solve problems by using / applying a concept learned in the classroom.</li> <li>• Students must use their knowledge to determine a exact response.</li> </ul>	
<b>Analyze (K4)</b>	<ul style="list-style-type: none"> <li>• Analyzing the question is one that asks the students to break down something into its component parts.</li> <li>• Analyzing requires students to identify reasons causes or motives and reach conclusions or generalizations.</li> </ul>	
<b>Evaluate (K5)</b>	<ul style="list-style-type: none"> <li>• Evaluation requires an individual to make judgment on something.</li> <li>• Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem.</li> <li>• Students are engaged in decision-making and problem-solving.</li> <li>• Evaluation questions do not have single right answers.</li> </ul>	
<b>Create (K6)</b>	<ul style="list-style-type: none"> <li>• The questions of this category challenge students to get engaged in creative and original thinking.</li> <li>• Developing original ideas and problem solving skills</li> </ul>	

Course	Number of Credits	Hours Per Week	Examination Duration (hrs)	Marks		
				I. A	ESE	Total
<b>Semester - I</b>						
436C1A: Core – I Theory Advanced Data Structures and Algorithms	4	5	3	25	75	100
436C1B: Core – II Theory Advanced Python Programming	4	5	3	25	75	100
436C1C: Core – III Practical Advanced Data Structures and Algorithms Practical	3	5	3	40	60	100
436C1D: Core – IV Practical Advanced Python Programming Practical	3	5	3	40	60	100
Elective – I Theory (Any one) 436E1A: Cloud Computing 436E1B: Internet of Things 436E1C: Advanced Computer Architecture	3	5	3	25	75	100
Elective – II Theory (Any one) 436E1D: Principles of Compiler Design 436E1E: Natural Language Processing 436E1F: Distributed Database Systems	3	5	3	25	75	100
	<b>20</b>	<b>30</b>				

Course	Number of Credits	Hours Per Week	Examination Duration (hrs)	Marks		
				I. A	ESE	Total
<b>Semester - II</b>						
436C2A: Core -V Theory Data Mining and Warehousing	4	5	3	25	75	100
436C2B: Core – VI Theory Web Technology and Advanced Java	4	5	3	25	75	100
436C2C: Core – VII Practical Data Mining and Warehousing Practical	4	5	3	40	60	100
436C2D: Core – VIII Practical Web Technology and Advanced Java Practical	3	4	3	40	60	100
Elective - III (Any one) 436E2A: Artificial Intelligence 436E2B: Software Development Technologies 436E2C: Artificial Neural Networks and Deep Learning	3	5	3	25	75	100
Elective – IV (Any one) 436E2D: Computer Vision 436E2E: Agile Software Engineering 436E2F: Human Computer Interaction	3	4	3	25	75	100
436S2A: SEC-I - Fundamentals of Human Rights	2	2	3	25	75	100
	<b>23</b>	<b>30</b>				

Course	Number of Credits	Hours Per Week	Examination Duration (hrs)	Marks		
				I. A	ESE	Total
<b>Semester – III</b>						
536C3A: Core IX Theory Data Science and Analytics	4	4	3	25	75	100
536C3B: Core X Theory Machine Learning	4	5	3	25	75	100
536C3C: Core XI Theory Theory of Computation	3	5	3	25	75	100
536C3D: Core XII Practical Data Science and Analytics Practical	3	5	3	40	60	100
536C3E: Core XIII Practical Machine Learning Practical	3	5	3	40	60	100
Elective –V (Any one) 536E3A: Network Security 536E3B: Cryptography 536E3C: Parallel and Distributed Computing	3	4	3	25	75	100
536S3A: SEC–II-Cyber Security	2	2	3	25	75	100
536S3B: Internship Industrial Activity	2	-	-	-	100	100
	<b>24</b>	<b>30</b>				

Course	Number of Credits	Hours Per Week	Examination Duration (hrs)	Marks		
				I. A	ESE	Total
<b>Semester – IV</b>						
536C4A: Core - XIV Theory Digital Image Processing	4	5	3	25	75	100
536C4B: Core - XV Project with Viva voce	14	18		20	60+20	100
Elective – VI (Any one) 536E4A: Robotic Process Automation For Business 536E4B: Block Chain Technology 536E4C: Embedded Systems	3	4	3	25	75	100
Skill Enhancement/ Professional Competency Skill (Any one) 536S4A: UML Practical 536S4B: Documentation and Interview skills for Software Engineers	2	3	3	40	60	100
536V4A: Extension Activity	1					
	<b>24</b>	<b>30</b>				
<b>Total Credits</b>	<b>91</b>					

#### Component wise Credit Distribution

Credits	Sem I	Sem II	Sem III	Sem IV	Total
<b>Part A</b>	<b>14</b>	<b>15</b>	<b>17</b>	<b>18</b>	<b>64</b>
<b>Part B</b>					
<b>(i) Discipline– Centric/Generic Skill</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>3</b>	<b>20</b>
<b>(ii) Soft Skill</b>		<b>2</b>		<b>2</b>	<b>4</b>
<b>(iii) Summer Internship/Industrial Training</b>			<b>2</b>		<b>2</b>
<b>Part C</b>				<b>1</b>	<b>1</b>
<b>Total</b>	<b>20</b>	<b>23</b>	<b>24</b>	<b>24</b>	<b>91</b>