JOY UNIVERSITY

Established vide Tamil Nadu State Pvt. Universities Act 2019

SCHOOL OF COMPUTATIONAL SCIENCE

Outcome Based Curriculum Framework with

CBCS

for

BACHELOR OF TECHNOLOGY (MATHEMATICS and COMPUTING)

(B. Tech Mathematics and Computing)

Students admitted from 2025 -26 onwards

JOY UNIVERSITY
semper paratus

VISION

♣ To create and nurture a multidisciplinary global university with highest academics, research and ethical standards in a creative and innovative environment.

MISSION

♣ To be a premier University of choice for all stakeholders and contribute for academic demographic dividend. To inculcate quality, integrity, team work, compassion, ethics in new generation students for catering to various needs of society.

QUALITY OBJECTIVES

- To disseminate knowledge with skills through teaching, training, seminars, workshops, conferences and symposia in Engineering and Technology, Art and Design, Management and Commerce, Allied Health Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences, Law and Agricultural Sciences to enable students to meet the current needs and trends of industries, business and society.
- To provide technical and scientific solutions to real time problems posed by industries, business and society in all Schools of Joy University.
- To inculcate quality, integrity, team work, compassion, ethics in new generation students for catering to various needs of society.
- To promote the spirit of entrepreneurship in the young generation to help and create more career opportunities in the society by incubating a nurturing technology product idea backed by Technology Business Incubation.
- To identify and nurture leadership and innovate skills in students to become future leaders to enrich society.
- To develop collaborations and partnerships with International global and reputed Universities, research establishments, Government and NGO's, industries and businesses. To support both faculties and students for international exposure.

SCHOOL OF COMPUTATIONAL SCIENCE

VISION

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PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: To ensure that the graduates will have the ability and attitude to acquire new skills and adapt recent technological changes.
PEO2: To prepare the graduates to serve in the industries related to Computer Science and Engineering or to do higher education and research.
PEO3: To ensure that the graduates will work with professionalism and ethics by contributing to the advancement of the society

GRADUATE ATTRIBUTES

The Graduate Attributes of B. Tech (Mathematics and Computing) are:

- **Strong Mathematical and Analytical Skills**: Ability to apply advanced mathematical concepts to solve real-world and computational problems.
- **Proficiency in Computing and Programming**: Skilled in modern programming languages and software tools for algorithmic design and data analysis.
- **Problem-Solving and Critical Thinking**: Capable of formulating and solving complex problems using logical reasoning and quantitative techniques.
- **Research and Innovation**: Ability to engage in research, model development, and innovative solution-building across interdisciplinary domains.
- **Ethical and Professional Responsibility**: Understanding of ethical standards, professional responsibilities, and societal impact of computing solutions.
- **Effective Communication and Teamwork**: Proficient in communicating technical information and working collaboratively in diverse teams.

PROGRAMME OUTCOMES

On completion of the **B. Tech (Mathematics and Computing) Programme,** students should be able to:

- **PO1 – Engineering Knowledge:**
Apply knowledge of mathematics, science, engineering fundamentals, and computing to solve complex engineering problems.

- **PO2 – Problem Analysis:**
Identify, formulate, and analyze complex problems using mathematical and computational techniques.

- **PO3 – Design/Development of Solutions:**
Design solutions for complex problems and develop systems, components, or processes that meet specified needs.

- **PO4 – Conduct Investigations:**
Use research-based knowledge and mathematical modeling to analyze and interpret data, and draw valid conclusions.

- **PO5 – Modern Tool Usage:**
Create, select, and apply appropriate mathematical tools, computing techniques, and modern software for analysis and solution of problems.

- **PO6 – The Engineer and Society:**
Apply contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to mathematical and computing practices.

- **PO7 – Environment and Sustainability:**
Understand the impact of computing and mathematical solutions in environmental and societal contexts, and demonstrate sustainable development.

- **PO8 – Ethics:**
Apply ethical principles and commit to professional ethics and responsibilities in mathematics and computing practices.

- **PO9 – Individual and Team Work:**
Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

- **PO10 – Communication:**
Communicate effectively on complex technical activities with the engineering community and with society at large through reports, documentation, and presentations.

- **PO11 – Project Management and Finance:**
Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own work and in team and project environments.

- **PO12 – Life-long Learning:**
Recognize the need for, and have the ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1 – Mathematical Modeling and Problem Solving:
Apply advanced mathematical concepts to formulate, model, and solve real-world problems in science, engineering, and industry using analytical and numerical methods.

PSO2 – Computational Skills and Software Proficiency:
Demonstrate proficiency in algorithm design, programming, and use of modern computational tools (such as Python, MATLAB, R, etc.) to analyze and solve complex mathematical and data-driven problems.

PSO3 – Interdisciplinary Applications and Research Aptitude:
Integrate mathematical and computing knowledge to contribute effectively to interdisciplinary domains such as data science, artificial intelligence, cryptography, finance, and scientific computing, with an aptitude for research and innovation.

Summary of Credits

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Credits	19	20	21	21	21	21	21	21	165
Contact Hrs./Week	24	22	21	21	21	21	21	06	157

SEMESTER WISE CREDIT STRUCTURE

Sl. No.	**Category of Courses**	**1st Year**		**2nd Year**		**3rd Year**		**4th Year**		**Total**
		Sem I	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Sem VII**	**Sem VIII**	
1.	Departmental Core	08	04	21	21	18	15	18	--	105
2.	Departmental Electives						03		06	09
3.	Allied Schools Electives	07	10				03			20
4.	Applied Sciences	04	04							08
5.	Seminar/ Summer Internships/ Independent Study and Seminar							03	--	03
6.	Project							6	12	18
7.	Extra Academic Activity									00
8.	Humanities/ Recent Trends		02							02
Total		**19**	**20**	**21**	**21**	**21**	**21**	**21**	**21**	**165**

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School of Computational Science

B. Tech (Cyber Security)

Semester – I
(Total Credits: 19)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25AEEN811	**Ability Enhancement Compulsory Course (AECC)** Effective Communication	3	0	0	3	3
2.	25BTMC113	**Core Course/ Allied** Real Analysis	3	1	0	3	4
3.	25BTMC114	**Core Course/ Applied Science** Physics I	3	1	0	3	4
4.	25BTMC111	**Core Course** / Major Fundamentals of Computing	3	0	0	3	3
5.	25BTMC112	**Core Course** / Major Introduction to Programming	3	0	0	3	3
6.	25BTMC211	**Core Course / Major** Fundamentals of Computing Lab	0	0	2	2	1
7.	25BTMC212	**Core Course / Major** Introduction to Programming Lab	0	0	2	2	1
8.	25BTMC911	**Value-Added Course** Performing Arts/Sports (Non-Graded)	3	0	0	3	0
		Total	**18**	**2**	**4**	**24**	**19**

Semester – II

(Total Credits: 20)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	23BTMC121	**Core Course** Python Programming	3	0	0	3	3
2.	23BTMC122	**Core Course - Allied** Probability, Statistics and Stochastic Processes	3	0	0	3	3
3.	23BTMC123	**Core Course – Allied** Linear Algebra	3	1	0	4	4
4.	23BTMC124	**Core Course – Applied Science** Physics II	3	0	0	3	3
5	23BTMC125	**Core Course – Allied** Discrete Structures for Computer Science	3	0	0	3	3
6	23BTMC221	**Core Course** Python Programming Lab	0	0	2	2	1
7	23BTMC222	**Core Course** Physics II Lab	0	0	2	2	1
8	23EVST921	**Value Added Course** Environmental Science	2	0	0	2	2
		TOTAL	**17**	**1**	**4**	**22**	**20**

Semester – III

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC131	**Core Course** Numerical Techniques	3	1	0	3	3
2.	25BTMC132	**Core Course** Data Structures and Algorithms	3	0	0	3	3
3.	25BTMC133	**Core Course** Object-Oriented Programming	3	0	0	3	3
4.	25BTMC134	**Core Course** Digital Design	3	0	0	3	3
5.	25BTMC231	**Core Course** Data Structures and Algorithms Lab	0	0	3	3	3
6.	25BTMC232	**Core Course** Object-Oriented Programming Lab	0	0	3	3	3
7.	25BTMC233	**Core Course** Algebra	3	0	0	3	3
		Total	**15**	**1**	**06**	**21**	**21**

Semester – IV

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC141	**Core Course** Introduction to Stochastic Process	3	0	0	3	3
2.	25BTMC142	**Core Course** Database Management Systems	3	0	0	3	3
3.	25BTMC143	**Core Course** Multivariable Calculus	3	0	0	3	3
4.	25BTMC144	**Core Course** Operating Systems	3	0	0	3	3
5.	25BTMC241	**Core Course** Statistics with R	0	0	3	3	3
6	25BTMC242	**Core Course** Database Management Systems Lab	0	0	3	3	3
7	25BTMC243	**Core Course** Design and Analysis of Algorithms Lab	0	0	3	3	3
		Total	**12**		**09**	**21**	**21**

Semester – V

(Total Credits: 21)

SI. No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC151	**Core Course** Complex Analysis	3	0	0	3	3
2.	25BTMC152	**Core Course** Linear and Nonlinear optimization	3	0	0	3	3
3.	25BTMC153	**Core Course** Software Engineering	3	0	0	3	3
4.	25BTMC154	**Core Course** Theory of Computation	3	0	0	3	3
5.	25BTMC251	**Core Course** Introduction to Blockchain and Cryptocurrency Lab	0	0	3	3	3
6	25BTMC252	**Core Course** Programming with Java Lab	0	0	3	3	3
7	25BTMC253	**Core Course** Stochastic Models and Applications	3	0	0	3	3
		Total	**12**	**0**	**09**	**21**	**21**

Semester – VI

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC161	**Core Course** Ordinary Differential Equations	3	0	0	3	3
2.	25BTMC162	**Core Course** Complier Design	3	0	0	3	3
3.	25BTMC061/ 25BTMC062/ 25BTMC063/ 25BTMC064/ 25BTMC065	**Discipline Specific Elective I** Combinatorics Social Network Analysis Graph Theory Approximation Algorithms Fixed Point Theory	3	0	0	3	3
4.	25BTMC361/ 25BTMC362/ 25BTMC363/ 25BTMC364/ 25BTMC365/ 25BTMC366	**Generic Elective I** Computational Fluid Dynamics Advanced Machine Learning Approximation Algorithms Random Processes Computational Learning Theory Introduction to Dynamical Systems Theory	3	0	0	3	3
5.	25BTMC261	**Core Course** Natural Language Processing Lab	0	0	3	3	3
6	25BTMC262	**Core Course** Compiler Design Lab	0	0	3	3	3
7	25BTMC263	**Core Course** Statistical Inference & Multivariate Analysis	3	0	0	3	3
		Total	**12**	**0**	**06**	**21**	**21**

Semester – VII

(Total Credits: 21)

SI. No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC171	High Performance Computing	3	0	0	3	3
2.	25BTMC172	Partial Differential Equations	3	0	0	3	3
3.	25BTMC173	Web Technology	3	0	0	3	3
4.	25BTMC174	Matrix Computations Lab	0	0	3	3	3
5.	25BTMC176	Project I	0	0	3	3	6
6	25BTMC271	High Performance Computing Lab	0	0	3	3	1.5
7	25BTMC272	Web Technology Lab	0	0	3	3	1.5
		Total	**9**	**0**	**12**	**21**	**21**

Semester – VIII

(Total Credits: 21)

SI.No	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Credits
1.	25BTMC581	Linear and Nonlinear optimization	3	0	3	3	3
2.	25BTMC081/ 25BTMC082/ 25BTMC083/ 25BTMC084/ 25BTMC085	**Discipline Specific Elective II** Game Theory Semantic Web Technology Web Application Security Web data Mining Numerical Optimization	3	0	0	3	3
3.	25BTMC086/ 25BTMC087/ 25BTMC088/ 25BTMC089/ 25BTMC090	**Discipline Specific Elective III** Evolutionary Computation Biometric Security Numerical Linear Algebra Design of Internet of Things Augmented Intelligence	3	0	0	3	3
4.	25BTMC582	Project II	0	0	3	3	12
		Total	**06**	**0**	**03**	**09**	**21**