DEPARTMENT OF COMPUTER SCIENCE
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COCHIN UNIVERSITY OF
SCIENCE AND TECHNOLOGY

PROGRAMME STRUCTURE & SYLLABUS
[2025 ADMISSIONS ONWARDS]

Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science)

Vision

- ❖ To globally excel in innovative research, teaching, and technology development inspired by social obligation.

Mission

- ❖ To contribute to knowledge development and dissemination.
- ❖ To facilitate learning and innovative research in frontier areas of computer science.
- ❖ To drive students for technology development to solve problems of interest.
- ❖ To create socially responsible professionals.

Program Outcomes: Integrated M.Sc.

PO1: Demonstrate a comprehensive understanding of fundamental principles and concepts in basic sciences.

PO2: Analyze, evaluate, and synthesize complex scientific information and data using appropriate methods and techniques.

PO3: Apply scientific reasoning and critical thinking adeptly to recognize, assess, and resolve problems encountered in various scientific contexts.

PO4: Utilize computational power, programming languages, and modern technologies proficiently to address scientific challenges, effectively integrating technological solutions into problem-solving processes.

PO5: Communicate scientific information effectively and demonstrate proficiency in the use of modern scientific tools and technologies for experimentation, data collection, analysis, and interpretation.

PO6: Adhere to ethical principles and practices in the conduct of scientific research and professional activities, and work collaboratively with others.

PO7: Engage in lifelong learning and professional development to enhance the knowledge and skills in basic sciences.

Programme Specific Outcomes

After the completion of Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science) programme, the students will have:

PSO 1: Deep understanding and proficiency in advanced topics such as Algorithms, Software Engineering, Artificial Intelligence and Data Science

PSO 2: Training in research methodologies, experimental design, and critical analysis to contribute to the advancement of computer science through original research

PSO 3: Specialization opportunities in areas such as Computer Vision, Natural Language Processing, Bioinformatics, Software Engineering, Cyber Security, and Cyber Physical Systems based on personal interests and career goals

PSO 4: Understanding the ethical implications of technology and the responsibility of computer scientists to develop and use technology in an ethical and society responsible way.

I. Academic programme pathways offered by the Department of Computer Science

A. Computer Science (Artificial Intelligence & Data Science) Major

1. **3-year UG Programme**: B.Sc. in Computer Science will be awarded to those who complete a three-year degree programme securing a minimum of 133 credits, out of which a minimum of 68 credits should be from Computer Science discipline and have satisfied the minimum course requirements as mentioned in Table No 1.

2. **4-year UG Programme (Honours with Research): B.Sc. (Honours with Research) in Computer Science (Artificial Intelligence & Data Science)** will be awarded to those who complete a four-year degree programme securing a minimum of 177 credits, out of which a minimum of 104 credits(including 12 credits Research Project) should be from Computer Science (Artificial Intelligence & Data Science) discipline and have satisfied the minimum course requirements as mentioned in Table No 1 and 2.

3. **4-year UG Programme (Honours): B.Sc. (Honours) in Computer Science (Artificial Intelligence & Data Science)** will be awarded to those who complete a four-year degree programme securing a minimum of 177 credits, out of which a minimum of 104 credits should be from Computer Science (Artificial Intelligence & Data Science) discipline and have satisfied the minimum course requirements as given in Table No 1 and 2.

4. **5-year Integrated PG Degree** : **Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science)** will be awarded to those who complete a five-year degree programme securing a minimum of 221 credits out of which a minimum of 148 credits should be from Computer Science (Artificial Intelligence & Data Science) discipline and have satisfied the minimum course requirements as given in Table No 1,2 and 3.

B. Minor Degree in Computer Science

1. **3-year UG Programme**: Minor Degree in Computer Science will be awarded to those who complete a three-year degree programme in any of the discipline mentioned in the FYUGP regulations and completed a minimum of 27 credits in Computer Science, out of

which 25 credits should be from CS Minor-DSC courses and 03 credits from a Skill Enhancement Course -CS SEC

2. **4-year UG Programme**: Minor Degree in Computer Science will be awarded to those who complete a four-year degree programme in any of the discipline mentioned in the FYUGP regulations and completed a minimum of 35 credits in Computer Science, out of which 32 credits should be from CS Minor DSC courses and 03 credits from a CS Skill Enhancement Course-CS SEC

C. Discipline mention in Computer Science:

A Discipline mention in Computer Science will be awarded to those who complete a three year or four-year degree programme in any of the discipline mentioned in the FYUGP regulations and completed a minimum of 12 credits in Computer Science DSC Course in the first three years of the progamme.

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Five Year Integrated M.Sc. in Computer Science
(Artificial Intelligence & Data Science)
Scheme (2025 Admission onwards)

Table 1 : Semester 1 to 6 Scheme for the Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science) 2025 Admission onwards

Semester	Computer Science Major	Computer Science Minor	Foundation Courses MDC: Multi-Disciplinary Courses AEC: Ability Enhancement Courses* SEC: Skill Enhancement Courses VAC: Value Added Courses*				
	Major **4 credits**	**Minor** **4 credits**	**MDC*** **3 credits**	**AEC*** **3 credits**	**SEC** **3 credits**	**VAC*** **3 credits**	**Total credits**
I	1	2	1	2*			21
II	1	2	1	2*			21
III	1	2	1			2*	21
IV	4				1	1*	22
V	5				1		23
VI	5 (Out of the five courses one course is a 4 credit Mini Project)				1		23
		Internship**					2
Total credits(courses)	**68 (17)**	**25 (6)**	**9 (3)**	**12 (4)**	**9 (3)**	**9 (3)**	**133**

*Courses offered commonly to all Integrated M.Sc. programme at University Level

**Not counted as a course

Minor Degree in Computer Science: Total Credits required= 27 [25 credits should be from CS Minor-DSC courses and 03 credits from a CS Skill Enhancement Course(CS SEC)]

Exit option 1(Major Degree): B.Sc. in Computer Science (Total credit requirements = 133)

Table 2 : Semester 7 and 8 Scheme for the Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science) 2025 Admission onwards

Semester		Computer Science Major 4 credits	Seminar 2 credits	Laboratory 2 credits	Mini Project	Elective 4 Credits	Computer Science Minor 4 credits	Foundation Courses	Total Credits
VII		4	1				1*		22
VIII	B.Sc. Honors with Research**			1	12 Credits	1	1*		22
	B.Sc. Honors			1	4 Credits	3	1*		22
Total credits(courses)	B.Sc. Hons. (Research)²	80 (20)	2(1)	2(1)	16(2)	4(1)	32(8)	39(13)	177
		Total Credit Requirements from Computer Science discipline =104							
	B.Sc. Hons¹	80 (20)	2(1)	2(1)	8(2)	12(3)	32(8)	39(13)	177
		Total Credit Requirements from Computer Science discipline =104 Credits							

*4-year UG Programme students seeking minor Degree in Computer Science must earn 8 more credits in the Fourth year.

**Eligibility for a student to be considered for the 4-year UG Degree (Honors with Research) programme is CGPA 8.0 up to sixth semester. The number of seats and the selection criteria shall be fixed by the DCS Department Council.

[1]**Exit option 2 : B.Sc. (Honours with Research) in Computer Science (Artificial Intelligence & Data Science)**

[2]**Exit option 3:   B.Sc. (Honours) in Computer Science (Artificial Intelligence & Data Science)**

Table 3 : Semester 9 and 10 Scheme for the Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science) 2025 Admission onwards

Semester	Computer Science (Artificial Intelligence & Data Science) Major	Seminar (2 credits)	Lab (2 credits)	Project	Elective 4 Credits	Computer Science Minor 4 Credits	Foundation Courses	Total credits
IX				Project Phase I (14 Credits)	2			22
X				Project Phase II (22 Credits)				22
Total credits(Courses)	80(20)	2(1)	2 (1)	Honours with Research 52(4) / Honours 44(4)	Honours with Research 12(3) / Honours 20(5)	32(8)	39	221
	Total Credit Requirements from Computer Science discipline =148 Credits							

Five Year Integrated M.Sc. in Computer Science (Artificial Intelligence & Data Science)

Five Year Integrated M.Sc. in Computer Science
(Artificial Intelligence & Data Science)
Course structure

(2025 Admission onwards)

Semester I

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/ week L-T-P	CA	ESE	Total
25-813-0101	100-199	Computational Thinking with Python	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0102	100-199	Practical Applications of AI	CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-0103	100-199	Computational Thinking for Problem Solving	CS MDC	3	3-1-0	50	50	100
Credit Requirements		21 Credits (AEC: 6 Credits, MDC: 3 Credits, Major pathway: 4, Minor pathway: 8 Credits) Cumulative credits: 21						

L: Lecture, T: Tutorial, P: Practicum

CS Major-DSC: Core course for students Majoring in Computer Science

CS Minor-DSC: Core course for students Minoring in Computer Science

CS Disci-DSC: Core course for students who choose discipline mention in Computer Science

CS MDC: Multidisciplinary course offered to students whose Major or Minor pathways are different from Computer Science

AEC: Ability Enhancement Course(Offered at University Level

Semester II

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/ week L-T-P	CA	ESE	Total
25-813-0201	100-199	Fundamentals of Programming	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0202	100-199	Computer Fundamentals 1	CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-0203	100-199	Foundations of Programming	CS MDC	3	3-1-0	50	50	100
Credit Requirements		21 Credits(AEC: 6, MDC: 3, Major pathway: 4, Minor pathway: 8) Cumulative credits: 42						

Semester III

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution CA	ESE	Total
25-813-0301	200-299	Data Structures	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0302	200-299	Computer Fundamentals II	CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-0303	200-299	Fundamentals of Data Structures	CS MDC	3	3-1-0	50	50	100
Credit Requirements		21 (VAC: 6, MDC: 3, Major pathway: 4, Minor pathway: 8) Cumulative credits: 63						

Semester IV

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution CA	ESE	Total
25-813-0401	200-299	Advanced Programming with Java	CS Major -DSC	4	4-1-2	50	50	100
25-813-0402	200-299	Digital Logic and Computer Organization	CS Major -DSC	4	4-1-0	50	50	100
25-813-0403	200-299	Introduction to Artificial Intelligence	CS Major -DSC	4	4-1-0	50	50	100
25-813-0404	200-299	Database Management Systems	CS Major -DSC	4	4-1-2	50	50	100
25-813-0405	200-299	Python for Data Science and Machine Learning	CS SEC	3	3-1-2	50	50	100
Credit Requirements		22 (VAC: 3, SEC: 3, Major pathway: 16) Cumulative credits:85						

Semester V

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution		
						CA	ESE	Total
25-813-0501	300-399	Mathematics for Computing	CS Major -DSC	4	4-1-0	50	50	100
25-813-0502	300-399	Fundamentals of Data Science	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-0503	300-399	Operating System	CS Major -DSC	4	4-1-0	50	50	100
25-813-0504	300-399	Theory of Computation	CS Major -DSC	4	4-1-0	50	50	100
25-813-0505	300-399	Design and Analysis of Algorithms	CS Major -DSC	4	4-1-2	50	50	100
25-813-0506	200-299	R for Data Science	CS-SEC	3	3-1-2	50	50	100
Credit Requirements		23 (SEC: 3, Major pathway: 20) Cumulative credits: 108						

Semester VI

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution		
						CA	ESE	Total
25-813-0601	300-399	Machine Learning	CS Major -DSC CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0602	300-399	Agile Software Engineering	CS Major -DSC	4	4-1-0	50	50	100
25-813-0603	300-399	Computer Networks	CS Major -DSC CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-0604	300-399	Natural Language Processing	CS Major -DSC	4	4-1-0	50	50	100
25-813-0605	300-399	Mini Project -1	CS Major -DSC	4	0-0-4	50	50	100
25-813-0606	200-299	Web Technologies	CS -SEC	3	3-1-2	50	50	100
Credit Requirements		23 (SEC: 3, Major pathway: 20) Cumulative credits: 131						
Internship(2 Credits)								
Students have to complete an internship of 2 credits (60 Hours of work) before the beginning of Semester VII. Cumulative credits: 133								

Semester VII

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution		
						CA	ESE	Total
25-813-0701	400-499	Deep Learning	CS Major -DSC	4	4-1-0	50	50	100
25-813-0702	300-399	Bigdata Analytics	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0703	400-499	Cloud Computing and virtualization	CS Major -DSC	4	4-1-0	50	50	100
25-813-0704	400-499	Cyber Security	CS Major -DSC	4	4-1-0	50	50	100
25-813-0705	300-399	Image Processing and Computer Vision	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-2	50	50	100
25-813-0706	400-499	Seminar	CS Major -DSC	2	0-0-2	100		100
Credit Requirements		22 (Major pathway: 22) Cumulative credits: 155						

Semester VIII(Honours with Research)

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/ week L-T-P	Marks distribution		
						CA	ESE	Total
25-813-0801	300-399	Bioinformatics	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-080X	400-499	Elective -1	CS Major -DSE,	4	4-1-0	50	50	100
25-813-0802	400-499	Research Project	CS Major -DSC	12	0-0-12	50	50	100
25-813-0803	400-499	Full Stack AI Lab	CS Major -DSC	2	0-0-2	50	50	100
Credit Requirements			22 (Major pathway: 22) Cumulative credits: 177					

Semester VIII(Honours)

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/ week L-T-P	Marks distribution		
						CA	ESE	Total
25-813-0801	400-499	Bioinformatics	CS Major -DSC, CS Minor-DSC CS Disci	4	4-1-0	50	50	100
25-813-080X	400-499	Elective -1	CS Major -DSE,	4	4-1-0	50	50	100
25-813-0809	400-499	Elective -2 (MOOC*)	CS Major -DSE	4	0-0-0			100
25-813-0810	400-499	Elective -3 (MOOC*)	CS Major -DSE	4	0-0-0			100
25-813-0811	400-499	Mini Project -2	CS Major -DSC	4	0-0-0	50	50	100
25-813-0803	400-499	Full Stack AI Lab	CS Major -DSC	2	0-0-2	50	50	100
Credit Requirements			22 (Major pathway: 22) Cumulative credits: 177					

 *A credit-based MOOC course of minimum 12 weeks duration from SWAYAM/NPTEL/CUSAT any other platforms approved by the Department. Students may be permitted to enrol MOOC courses approved by Department Council at any time during the programme and acquire the required credits before completing the programme.

List of Electives

25-813-0804 Advanced Optimization Techniques

25-813-0805 Blockchain Technology

25-813-0806 Information Retrieval and Web search

25-813-0807 Number Theory and Cryptography

25-813-0808 Large Language Models

Semester IX

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution CA	ESE	Total
25-813-0901	500-599	Major Project Phase- I	CS Major -DSC	14	0-0-14	50	50	100
25-813-0902	500-599	Elective -4 (MOOC*)	CS Major -DSE	4	0-0-0			100
25-813-0903	500-599	Elective -5(MOOC*)	CS Major -DSE	4	0-0-0			100
Credit Requirements		22 (Major pathway: 22) Cumulative credits: 199						

*A credit-based MOOC course of minimum 12 weeks duration from SWAYAM/NPTEL/CUSAT any other platforms approved by the Department. Students may be permitted to enrol MOOC courses approved by Department Council at any time during the programme and acquire the required credits before completing the programme.

Semester X

Course Code	Course Level	Course Name	The course can be taken towards obtaining credits for:	Credits	Hours/week L-T-P	Marks distribution CA	ESE	Total
25-813-1001	600-699	Major Project Phase- II	CS Major -DSC	22	0-0-22	50	50	100
Credit Requirements		22 (Major pathway: 22) Cumulative credits: 221						