

आंध्रप्रदेश केंद्रीय विश्वविद्यालय  
**CENTRAL UNIVERSITY OF ANDHRA PRADESH**  
**Ananthapuramu**

**Undergraduate Programme Structure  
as per the UGC Credit Framework (NEP 2020)**



*Vidya Dadati Vinayam*  
(Education gives humility)

***B.Sc. (Hons.) Computer Science  
and  
Artificial Intelligence***

*“Today’s AI is about new ways of connecting people to computers, people to knowledge,  
people to the physical world, and people to people.”*

- Patrick Winston



**Programme Structure**  
(With effect from AY 2024 - 25)

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**B.Sc. (Hons.) in Computer Science and Artificial Intelligence**

**Introduction to the Programme**

B. Sc (Hons) Computer Science and Artificial Intelligence is one of the new undergraduate programmes being offered by CUAP from 2024-25 academic year and the programme is designed as per NEP guidelines with multiple exit options. This Programme is an interdisciplinary field that combines the fundamentals of computer science with the cutting-edge technologies of artificial intelligence (AI). This program offers students a comprehensive understanding of both the theoretical foundations and practical applications of computer science and AI. Throughout the programme, students delve into various aspects of computer science, including programming languages, algorithms, data structures, computer architecture, and software engineering. Additionally, they explore the intricacies of artificial intelligence, including machine learning, deep learning, natural language processing, Blockchain Technologies, fundamentals of Data Science.

By integrating these two fields, Computer Science and Artificial Intelligence equips students with the knowledge and skills needed to tackle complex challenges in the digital age. Graduates of this programme are well-prepared to pursue diverse career paths in industries such as technology, healthcare, finance, gaming, and more. Overall, this program offers a dynamic learning experience that empowers students to become proficient computer scientists and AI specialists, ready to innovate and shape the future of technology.

**Programme Objectives**

- Provide students with a comprehensive understanding of computer science principles and theories, coupled with specialized knowledge in artificial intelligence technologies.
- Foster critical thinking and problem-solving skills by engaging students in practical applications and real-world challenges in computer science and AI domains.
- Equip students with the necessary technical expertise to develop innovative solutions leveraging artificial intelligence techniques for various applications.
- Prepare graduates for successful careers in industries such as technology, data science, robotics, and AI research, as well as for further academic pursuits in related fields.

**Programme Learning Outcomes**

On successful completion of the programme student should be able to:

- Understand the core principles and advanced theories spanning across the disciplines of Computer Science and Artificial Intelligence, including foundational topics such as Data



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Structures, Algorithms, Computer Architecture, Software Engineering, as well as advanced concepts in Artificial Intelligence, Machine Learning, Speech Processing, Natural Language Understanding and Robotics.

- Integrate knowledge from diverse fields including AI, Machine Learning, and Data Engineering to design innovative and efficient systems that address complex real-world problems.
- Demonstrate readiness to pursue further education and research in Artificial Intelligence, staying abreast of emerging technologies and methodologies, and contributing to the advancement of AI for the betterment of society.

### **Pedagogy of the Program**

The pedagogy of the program is designed with an amalgamation of Student-Centric Learning, Group Discussions focusing on contemporary issues in Computer Science and Artificial Intelligence, Interactive Sessions, Internships and Project-based Learning, Research Orientation, Seminars & Workshops on current advancements, Tutorial & Assignments, and Class tests/Open book tests. Its objective is to furnish students with essential knowledge, skills, and competencies required to thrive in various roles within the realm of Computer Science and Artificial Intelligence. The combination of theoretical understanding, hands-on experiences, and immersive opportunities equips students to adeptly navigate intricate technological landscapes and contribute significantly to their organizations and society at large.

### **Programme Structure**

- The B. Sc (Hons) Computer Science and Artificial Intelligence programme is a four-year course divided into eight semesters with a total of around 169 credits.
- The programme is designed with the combination of Core Courses, Minor Courses, Inter-disciplinary Electives (IDE), Ability Enhancement Courses (AEC), Skill Enhancement Courses (SEC) and Value-Added Courses (VAC).
- Students will undergo for two-month summer internship after semester IV and submit internship report in semester V.
- In semester VIII students will undergo Project Work / Dissertation.



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(Semester and Course Wise Credits)

Semester	Discipline Specific Core (Major) (DSC) (L+T+P)	Minor (DSM) (L+T+P)	Inter-Disciplinary Courses	Ability Enhancement courses (language)	Skill Enhancement courses /Internship /Dissertation	Common Value Added Courses	Total Credits
I	DSC 1 (4) DSC 2 (4)	DSM 1 (4)	MOOCs (3)	Modern Indian Language – I (2)	Modern English Grammar & Pronunciation (3)	Indian Knowledge System (2)	22
II	DSC 3 (4) DSC 4 (4)	DSM 2 (4)	MOOCs (3)	Any Course on English Language (MOOCs) (2)	Writing for Media (3)	Environmental Studies – I (2)	22
III	DSC 5 (4) DSC 6 (4)	DSM 3 (4)	MOOCs (3)	Modern Indian Language – II (2)	Introduction to Python Programming (4)	-	21
IV	DSC 7 (4) DSC 8 (4)	DSM 4 (4)	-	Building Mathematical Ability (4)	Internship (2)	Environmental Studies – II (2)	20
V	DSC 9 (4) DSC 10 (4) DSC 11 (4) DSC 12 (4)	DSM 5 (4)	-	-	-	-	20
VI	DSC 13 (4) DSC 14 (4) DSC 15 (4) DSC EL-I (4)	DSM 6 (4)	-	-	Dissertation I (4)	-	24
VII	DSC 16 (4) DSC 17 (4) DSC EL-II (4)	DSM EL-I (4) DSM EL-II (4)	-	-	--	-	20
VIII	DSC 18 (4) DSC EL-III (4)	-	-	-	Dissertation II (12)	-	20
<b>Total</b>	<b>84</b>	<b>32</b>	<b>9</b>	<b>10</b>	<b>28</b>	<b>6</b>	<b>169</b>
<b>Percentage</b>	<b>49.70</b>	<b>18.93</b>	<b>5.32</b>	<b>5.91</b>	<b>16.56</b>	<b>3.55</b>	<b>100</b>

As per UGC Credit Framework minimum credit requirements to award the degree under each category: Major(Core) 80 Credits, Minor 32 Credits, Multidisciplinary 9 Credits, Ability Enhancement course (AEC) 8 Credits, Skill Enhancement courses (SEC) 9 Credits, Value Added Course(VAC) 6-8 Credits, Summer Internship 2-4 credits, Research Project/Dissertation 12 credits. Minimum Total Credits per Programme :160



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**Programme Structure as per UGC Credit Framework**

Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
<b>Semester I</b>						
1	BCS 101	Computer Fundamentals & Programming in C	4	3	0	1
2	BCS 102	Discrete Mathematics	4	3	1	0
3	BCS 111	Fundamentals of AI and Applications	4	3	1	0
4	BCS 112	MOOCs (IDE)	3	3	0	0
5	BCS 113	Modern Indian Language (English)- I (AECC)	2	2	0	0
6	BCS 114	Modern English Grammar & Pronunciation (SEC)	3	2	1	0
7	BCS 115	Indian Knowledge System (VAC)	2	2	0	0
<b>Total</b>			<b>22</b>	<b>18</b>	<b>3</b>	<b>1</b>
<b>Semester II</b>						
1	BCS201	Introduction to OOPs Using C++	4	3	0	1
2	BCS202	Web Technologies	4	3	0	1
3	BCS 211	Introduction to Machine Learning	4	3	1	0
4	BCS 212	MOOCs (IDE)	3	3	0	0
5	BCS 213	Any Course on English Language (MOOCs) (AEC)	2	2	0	0
6	BCS 214	Writing for Media (SEC)	3	2	1	0
7	BCS 215	Environmental Studies -I (VAC)	2	2	0	0
<b>Total</b>			<b>22</b>	<b>18</b>	<b>2</b>	<b>2</b>
<b>Semester III</b>						
1	BCS 301	Introduction to Java Programming	4	3	0	1
2	BCS 302	Computer Organization and Architecture	4	3	0	1
3	BCS 311	Introduction to Deep Learning	4	3	1	0
4	BCS 312	MOOCs (IDE)	3	3	0	0
5	BCS 313	Modern Indian Language (English)- II (AECC)	2	2	0	0
6	BCS 314	Introduction to Python Programming (SEC)	4	3	0	1
<b>Total</b>			<b>21</b>	<b>17</b>	<b>1</b>	<b>3</b>



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Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
<b>Semester IV</b>						
1	BCS 401	Operating Systems	4	3	0	1
2	BCS 402	Fundamentals of Data Structures	4	3	0	1
3	BCS 411	Natural Language Processing	4	3	1	0
4	BCS 413	Building Mathematical Ability (AECC)	4	4	0	0
5	BCS 415	Environmental Studies -II (VAC)	2	2	0	0
6	BCS 416	Summer Internship Project (SIP)	2	2	0	0
<b>Total</b>			<b>20</b>	<b>17</b>	<b>1</b>	<b>2</b>
<b>Semester V</b>						
1	BCS 501	Database Management Systems	4	3	0	1
2	BCS 502	Fundamentals of Data Science using Python	4	3	0	1
3	BCS 503	Design and Analysis of Algorithms	4	3	1	0
4	BCS 504	Basics of Cloud Computing	4	3	1	0
5	BCS 511	Ethics and Social Implications of AI	4	3	1	0
<b>Total</b>			<b>20</b>	<b>15</b>	<b>3</b>	<b>2</b>
<b>Semester VI</b>						
1	BCS 601	Data Mining & Data Warehousing	4	3	0	1
2	BCS 602	Computer Networks	4	3	0	1
3	BCS 603	Introduction to Information Security	4	3	1	0
4	<b>Any one of the following Electives: (Major Elective-I)</b>		4	3	1	0
	BCS 604	Advanced Database Management Systems				
	BCS 605	Distributed Systems				
	BCS 606	Fundamentals of IOT				
5	BCS 611	Data Analysis and Visualization	4	3	1	0
6	BCS 612	Dissertation -I	4	0	0	4
<b>Total</b>			<b>24</b>	<b>15</b>	<b>3</b>	<b>6</b>



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Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
<b>Semester VII</b>						
1	BCS 701	Advanced Java Programming	4	3	0	1
2	BCS 702	Software Engineering	4	3	0	1
3	<b>Any one of the following Electives: (Major Elective-II)</b>		4	3	1	0
	BCS 703	Mobile Application Development				
	BCS 704	Introduction to Blockchain Technology				
	BCS 705	Fundamentals of Digital Forensics				
4	<b>Any one of the following Electives: (Minor Elective-I)</b>		4	3	1	0
	BCS 711	Introduction to Reinforcement Learning				
	BCS 712	Speech Recognition Systems				
	BCS 713	Information Retrieval				
5	<b>Any one of the following Electives: (Minor Elective-II)</b>		4	3	1	0
	BCS 715	Computational Intelligence				
	BCS 716	Fundamentals of Generative AI				
	BCS 717	Introduction to Robotics				
	BCS 718	AI in Clinical Information Systems				
<b>Total</b>			<b>20</b>	<b>15</b>	<b>3</b>	<b>2</b>
<b>Semester VIII</b>						
1	BCS 801	Big Data Analytics	4	3	1	0
2	<b>Any one of the following Electives: (Major Elective-III)</b>		4	3	1	0
	BCS 802	Free Open-Source Software (FOSS)				
	BCS 803	Software Testing				
	BCS 804	Introduction to Wireless Sensor Networks				
3	BCS 811	Dissertation -II	12	0	0	12
<b>Total</b>			<b>20</b>	<b>6</b>	<b>2</b>	<b>12</b>

\*L: Lecture; T: Tutorial; P: Practical

**IDE:** Interdisciplinary Elective

**AECC:** Ability Enhancement Compulsory Course

**SEC:** Skill Enhancement Courses

**VAC:** Value-Added Courses

\* **MOOCs:** Massive Open Online Course

**Note:** MOOCs are chosen by the student based on the availability of the courses offered on SWAYAM platform.





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**Credit Distribution**

<b>Semester</b>	<b>Total Credits</b>	<b>Cumulative Credit at the end of the Semester</b>
<b>I</b>	22	22
<b>II</b>	22	44
<b>III</b>	21	65
<b>IV</b>	20	85
<b>V</b>	20	105
<b>VI</b>	24	129
<b>VII</b>	20	149
<b>VIII</b>	20	169

**Assessment Pattern for Theory Courses:** 40% of internal [formative evaluation – two best out of three tests (for a maximum of 15 marks each = 30 marks) and seminar/ assignments/attendance (10 marks)] and 60% (summative evaluation – end of the semester examination)

***End Semester Examination***

Maximum Marks: 60                  Time: 3 Hours

**Assessment Pattern for Theory with laboratory Courses:** 60% of internal [formative evaluation – two best out of three tests (for a maximum of 15 marks each = 30 marks), practical lab (20 marks) and seminar/ assignments/attendance (10 marks)] and 40% (summative evaluation – end of the semester examination)

***End Semester Examination***

Maximum Marks: 40                  Time: 2 Hours

**Dissertation / Project Report**

Dissertation Evaluation - 60 Marks Seminar and Viva-Voce- 40 Marks



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### Important Information to Students

- I. Programme: B.Sc. (Hons.) in Computer Science and Artificial Intelligence
- II. Eligibility: A minimum of 50% marks in 10+2 with Mathematics as one of the optional subjects from any recognized board in India.
- III. The minimum duration for completion of any UG Programme is eight semesters (four academic years) and the total duration for completing the programme shall not exceed 7 years or as per amendments made by the regulatory bodies from time to time.
- IV. A student should attend at least 75% of the classes, seminars, practicals/ lab in each course of study.
- V. All theory courses in the programme carry a Continuous Internal Assessment (CIA) component to a maximum of 40 marks and End Semester Examination (ESE) for a maximum of 60 marks. The minimum pass marks for a course is 40%.
- VI. In case of courses with lab component Continuous Internal Assessment (CIA) component shall be of 60 marks and Semester-end component for 40 marks. The minimum pass marks for a course are 40%.
- VII. The student is given three Continuous Internal Assessment (CIA) tests per semester in each course from which the best two performances are considered for the purpose of calculating the marks in CIA. A record of the continuous assessment is maintained by the academic unit. The three internal tests are conducted for 15 Marks each, out of which the best two tests' scores are considered for 30 marks. Out of the remaining 10 marks, 5 marks are awarded for assignments, class presentations and class participation of the students and the remaining 5 marks are awarded for punctuality, and attendance of the student.

#### Marks for the Attendance will be considered as follows:

S. No	Attendance (%)	Marks
1	95% or more	5
2	90-94%	4
3	85-89%	3
4	80-84%	2
5	75-79%	1

- VIII. A student should pass separately in both CIA and the ESE, i.e., a student should secure 16 (40% of 40) out of 40 marks for theory in the CIA. A student should secure 24 (40% of 60) out of 60 marks for theory in the end semester examination (ESE).
- IX. Semester-end examination shall consist of objective type questions, descriptive type questions and short answer questions or any other recommended by the BOS.



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- X. A student failing to secure the minimum pass marks in the CIA is not allowed to take the end semester examination of that course. She/he has to redo the course by attending special classes for that course and get the pass percentage in the internal tests to become eligible to take the end semester examination.
- XI. Students failing a course due to lack of attendance should redo the course.
- XII. Re-evaluation is applicable only for theory papers and shall not be entertained for other components such as practical/ thesis/ dissertation/ internship etc.
- XIII. An on- campus elective course is offered only if a minimum of ten or 40% of the students registered, whichever is higher, exercise their option for that course.