Symbiosis Institute of Computer Studies and Research, Pune Bachelor of Computer Applications (Honours/Honours with Research)
Programme Structure 2023-27

<table>
<tr><td>1.</td><td>OBJECTIVE</td><td colspan="5">BCA (Honours) offers the prequalification for professionals heading for smart career in the ITfield, which measures up to international standards. On completing this course one can do higher studies in any UGC recognized universities or in any other reputed institution in India or abroad.
BCA (Honours) with specialization will prepare students to progress their career inthe software industry, academia, research, entrepreneurial pursuit and other Information technology enabled services in one of the area in Data Science, Artificial Intelligence and Machine Learning, Cloud Computing, and Data security.</td></tr>
<tr><td>2.</td><td>DURATION (IN MONTHS)</td><td colspan="5">48 (Full Time) With Multiple Entry and Multiple Exit Options</td></tr>
<tr><td>3.</td><td>INTAKE</td><td colspan="5">180</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">RESERVATION</td><td rowspan="2">I.Within the sanctioned intake</td><td>a) SC (In Percentage)</td><td>b) ST (In Percentage)</td><td>c) Differently abled (In Percentage)</td><td>d) Defence (In Percentage)</td></tr>
<tr><td>15</td><td>7.5</td><td>3</td><td>5</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">II.Over and above the sanctioned intake</td><td colspan="2">a) Kashmiri Migrants (In Seats)</td><td colspan="2">b) International Students(In Percentage)</td></tr>
<tr><td colspan="2">2</td><td colspan="2">15</td></tr>
<tr><td>5.</td><td>ELIGIBILITY</td><td colspan="5">Passed Standard XII (10+2) or equivalent government approved Diploma in Engineering/ Technology from any recognised Board with a minimum of 50% marks or equivalent grade (45% marks or equivalent grade for Scheduled Caste/Scheduled Tribes).

Students who wish to opt for Honours with Research must earn 7.5 CGPA and above at the end of Semester-6

Eligibility Criteria for the Multiple entries would be as per University’s Lateral Entry Rules for FYUG Programmes</td></tr>
<tr><td>6.</td><td>SELECTION PROCEDURE</td><td colspan="5">Symbiosis Entrance Test, Personal Interaction and Writing Ability Test (PI-WAT).</td></tr>
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		Selection Procedure for the Multiple Entry would be as per the University's Lateral Entry Rules for FYUG Programmes			
7.	**MEDIUM OF INSTRUCTION**	English			
8.	**PROGRAMME PATTERN**	Semester			
9.	**COURSE & SPECIALIZATION**	The details of the courses are given in Annexure A. **List of Majors Offered-** 1. Data Science 2. Artificial Intelligence and Machine Learning 3. Cloud Computing 4. Data Security **List of Minors Offered-** 1. Software Development 2. System Administration 3. Database Administration			
10.	**FEE**		**Academic Fee p.a**	**Institute Deposit**	**Total**
		Indian Students			
		International Students (USD equivalent to INR)			
11.	**ASSESSMENT**	All internal courses will have 100% component as internal evaluation at the institute level. All external courses will have 40% internal component and 60%external component [University] examination.			
12.	**STANDARD OF PASSING**	The assessment of students for each examination is done, based on relative performance. Maximum Grade Point (GP) is 10 corresponding to O (Outstanding).For all courses, a student is required to pass both internal and external examinationseparately with a minimum Grade Point of 4 corresponding to Grade P. Students securing less than 40% absolute marks in each head of passing will be declared FAIL. The University awards a degree to the student who has achieved a minimumCGPA of 4 out of maximum of 10 CGPA for the programme.			

13.	**AWARD OF DEGREE/ DIPLOMA/ CERTIFICATE**	Bachelor of Computer Applications (Honours) with the applicable major and applicable minor will be awarded at the end of semester VIII examination by taking into considerationthe performance of all semester examinations after obtaining minimum 4.00 CGPAout of 10 CGPA. Bachelor of Computer Applications (Honours with Research) with the applicable major and applicable minor will be awarded at the end of semester VIII examination by taking into considerationthe performance of all semester examinations after obtaining minimum 4.00 CGPAout of 10 CGPA. Bachelor of Computer Applications (B.C.A.) with the applicable major and applicable minor will be awarded at the end of semesterVI examination by taking into consideration the performance of all semester examinations after obtaining minimum 4.00 CGPA out of 10 CGPA. Diploma in Computer Applications will be awarded at the end of semester IV by taking into consideration the performance of all semester examinations after obtaining minimum 4.00 CGPA out of 10 CGPA and the successful completion of the 4 credit Vocational Course in the summer. Certificate in Computer Applications will be awarded at the end of semester II by taking into consideration the performance of all semester examinations after obtaining minimum 4.00 CGPA out of 10 CGPA and the successful completion of the 4 credit Vocational Course in the summer.

14	Category-wise Distribution of the Credits across the Programme									
Semester	**Major**	**Minor**	**Multi-disciplinary**	**Ability Enhancement**	**Skill Enhancement**	**Value Added**	**Summer Internship**	**Research Project / Dissertation**	**Non-letter Grade Mandatory**	**Total Credits**
I	4	4	3	3	3	3				**20**
II	4	4	3	3	3	3				**20**
III	8	2	3	3	4					**20**
IV	12	8								**20**
V	16	4								**20**
VI	14	2					4			**20**
VII	12	4						4		**20**
VIII	10	6						4		**20**
Total	**80**	**34**	**9**	**9**	**10**	**6**		**8**	**0**	**160**
The students exiting the programme after semester-II and semester-IV should complete one 4-credit vocational course in the summer to obtain the Certificate/Diploma.										
* Satisfactory completion of the non-letter grade courses ‘Vasudhaiv Kutumbkam-1 Credit, 'Core Environmental Studies -2 Credits, 'Fitness for Life'-1 Credit, ‘Emotional Wellbeing- 1 Credit and 'Integrated Disaster Management- 1 Credit is mandatory for the award of degree.										

Annexure A

Semester: I					
Course Title	Major / Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Web Technologies	Major	4	100	0	100
Major Courses- Students to Choose ANY ONE					
***					
Minor Courses- Compulsory					
Computational Thinking	Major	4	40	60	100
Minor Courses- Choose ANY ONE (cannot be the same as Major specialization)					
****					
Multidisciplinary Courses - (To choose from SIU Basket)					
MD1		3	75	00	**75**
Ability Enhancement Course- Compulsory/ Choose any one/two – whichever is applicable					
Communication Skills	Minor	3	75	00	**75**
Skill Enhancement Course- Compulsory					
Introduction to Python Programming	Skill Enhancement	3	30	45	**75**
Common Value-Added Courses (To choose from SIU Basket)					
CVAC1	Value added course	3	75	00	**75**
Total		**20**	**395**	**105**	**500**
Notes:					

Semester: II					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Relational Database Management System	Major	4	40	60	**100**
Major Courses- Students to Choose ANY ONE					
***					
Minor Course- Compulsory					
Data Structures and Algorithms	Minor	4	40	60	**100**
Minor Courses- Choose any one (cannot be the same as Major specialization)					
***					
Multidisciplinary Courses - (To choose from SIU Basket)					
MD1		3	75	00	75
Ability Enhancement Course- Compulsory/ Choose any one/two – whichever is applicable					
Business and Managerial Communication		3	75	00	75
Skill Enhancement Course- Compulsory					
Data Analysis Using Python		3	30	45	75
Common Value-Added Courses (To choose from SIU Basket)					
CVAC1		3	75	00	**75**
Total					
Vocational Courses (Summer): Only for students who wish to exit after the First Year with a Certificate					
Applications of Spreadsheets in Business		4	100	00	**100**
Total		**20**			
Notes:					

Semester: III					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Operating System	Major	4	40	60	100
Structured Query Language	Major	2	20	30	50
Network Essentials	Major	2	20	30	50
Major Courses- Students to Choose ANY ONE					
****					
Minor Course- Compulsory					
Software Engineering	Minor	2	20	30	50
Minor Courses- Choose any one (cannot be the same as Major specialization)					
****					
Multidisciplinary Courses - (To choose from SIU Basket)					
MD1		3	75	00	75
Ability Enhancement Course- Compulsory/ Choose any one/two – whichever is applicable					
Creative Writing		3	75	00	75
Skill Enhancement Course- Compulsory					
Server Side Web Technology		4	40	60	100
Common Value-Added Courses (To choose from SIU Basket)					
*****					
	Total	**20**			
Notes:					

Semester: IV					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Introduction to Cloud Computing	Major	4	40	60	**100**
Foundations of Data Warehousing and Data Mining	Major	4	40	60	**100**
Internet of Things	Major	2	20	30	**50**
Lean Startup	Major	2	20	30	**50**
Major Courses- Students to Choose ANY ONE					
********					
Minor Course- Compulsory					
Java Programming	Minor	4	40	60	**100**
Network Security Essentials	Minor	4	40	60	**100**
Minor Courses- Choose any one (cannot be the same as Major specialization)					
********					
Multidisciplinary Courses - (To choose from SIU Basket)					
****					
Ability Enhancement Course- Compulsory/ Choose any one/two – whichever is applicable					
********					
Skill Enhancement Course- Compulsory/ Choose any one/two – whichever is applicable					
********					
Common Value-Added Courses (To choose from SIU Basket)					
****					
Total					
Vocational Courses (Summer): Only for students who wish to exit after the Second Year with a Diploma					
Applications of Spreadsheets in Business		4	100	00	**100**
Total		**20**			
Notes:					

Semester: V					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Introduction to Best Programming Practices	Major	4	40	60	**100**
Research Methodology	Major	4	40	60	**100**
Major Courses- Students to Choose ANY ONE Group A or group B or Group C or Group D					
Major Group A: Data Science					
Data Science I		4	40	60	**100**
Essentials of Business Intelligence		4	40	60	**100**
Major Group B : Artificial Intelligence and Machine Learning					
Introduction to Artificial Intelligence		4	40	60	**100**
Machine Learning		4	40	60	**100**
Major Group C: Cloud Computing					
Cloud Computing Platforms		4	40	60	**100**
Cloud Architectures and Security		4	40	60	**100**
Major group D : Data Security					
Introduction to Vulnerability Assessment Penetration Testing		4	40	60	**100**
System and Security Audit		4	40	60	**100**
Minor Course- Compulsory					
*********					
Minor Courses- Choose any one (cannot be the same as Major specialization) Choose any 1: group D or group E or Group F					
Group D :Software development					
Mobile Programming		4	40	60	**100**
Group E :System administration					
Network Administration		4	40	60	**100**
Group F : Database administration					
Advanced Databases		4	40	60	**100**
	Total	**20**	**200**	**300**	**500**
Notes:					

Semester: VI					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Java Enterprise Technologies	Major	4	40	60	**100**
Block Chain	Major	2	20	30	**50**
Major Courses- Students to Choose ANY ONE **Choose any 1 group A or group B or Group C or Group D (Continue with the previous Semester group)**					
Major group A: Data Science					
Big Data: Storage and Analytics		4	40	60	**100**
Open Source Tools for Data Science		4	40	60	**100**
Major group B:Artificial Intelligence and Machine Learning					
Predictive Analytics		4	40	60	**100**
Supervised Machine Learning and Advances		4	40	60	**100**
Major group C: Cloud Computing					
Fog Computing and edge computing		4	40	60	**100**
Cloud administration and Management		4	40	60	**100**
Major group D : Data Security					
Data Privacy and identity Access Control		4	40	60	**100**
Cryptography		4	40	60	**100**
Minor Course- Compulsory					
*****					
Minor Courses- Choose any one (cannot be the same as Major specialization): **Choose any 1 group D or group E or Group F (Continue with the previous Semester group)**					
Group D : Software development					
Introduction to web services		2	20	30	**50**
Group E : System administration					
Network Design		2	20	30	**50**
Group F : Database administration					
NoSQL Databases		2	20	30	**50**
Summer Internship	Internship	4	40	60	**100**
	Total	**20**	**200**	**300**	500
Notes:					

Semester: VII (Honours)					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Web UI and Content Management	Major	4	40	60	**100**
Design Thinking and Problem Solving	Major	2	20	30	**50**
Major Courses- Students to Choose ANY ONE Group A or Group B or Group C or Group D (Continue with the previous Semester group)					
Major group A: Data Science					
Python for Data Science		4	40	60	**100**
Data Analytics using MS-Excel		2	20	30	**50**
Major group B : Artificial Intelligence and Machine Learning					
Natural Language and Responsive AI		4	40	60	**100**
Deep learning		2	20	30	**50**
Major group C: Cloud Computing					
Grid Computing and Utility computing		4	40	60	**100**
Cloud-based Solution Architecture		2	20	30	**50**
Major group D : Data Security					
Advanced Cyber Security		4	40	60	**100**
Security Management Practices		2	20	30	**50**
Minor Course- Compulsory					
******					
Minor Courses- Choose any 1 group D or group E or Group F (Continue with the previous Semester group)					
Group D :Software development					
Advance Android Programming		4	40	60	**100**
Group E :System administration					
Network Monitoring and Troubleshooting		4	40	60	**100**
Group F : Database administration					
Database Security & Performance Tuning		4	40	60	**100**
Dissertation					
Dissertation		4	100	00	**100**
	Total	**20**	**260**	**240**	500
Notes:					

Semester: VIII (Honours)					
Course Title	Major/ Minor	Credits	Internal Marks	External Marks	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Software Quality Management and Standards	Major	4	40	60	**100**
Major Courses- Students to Choose ANY ONE Choose any 1 group A or group B or Group C or Group D (Continue with the previous Semester group)					
Major group A: Data Science					
Statistical Machine Learning		4	40	60	**100**
Text Mining		2	20	30	**50**
Major group B:Artificial Intelligence and Machine Learning					
Data Visualisation		4	40	60	**100**
Multimodal Machine Learning		2	20	30	**50**
Major group C: Cloud Computing					
Cloud data Centre management		4	40	60	**100**
High Performance Computing		2	20	30	**50**
Major group D : Data Security					
Server Security and Hardening		4	40	60	**100**
Information Risk Management		2	20	30	**50**
Minor Course- Compulsory					
DevOps		2	20	30	**50**
Minor Courses- Choose any 1 group D or group E or Group F (Continue with the previous Semester group					
Group D :Software development					
Advance Web Scripting		4	40	60	**100**
Group E :System administration					
Computer Forensics - Detection and Prevention of IT Frauds		4	40	60	**100**
Group F : Database administration					
Database Technologies		4	40	60	**100**
Project	Project	4	100	00	100
	Total	20	260	240	**500**
Notes:					

Semester: VII (Honours with Research)					
Course Title	**Major/ Minor**	**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Literature Review		4	40	60	**100**
Scientific Paper Writing		4	40	60	**100**
Ethics in Research		4	40	60	**100**
R Programming		4	40	60	**100**
Major Courses- Students to Choose ANY ONE					
***					
Minor Course- Compulsory					
***					
Minor Courses- Choose any one (cannot be the same as Major specialization)					
Dissertation/ Research Project					
Dissertation		4	100	0	**100**
	Total	**20**	**260**	**240**	**500**
Notes:					

Semester: VIII (Honours with Research)					
Course Title	**Major/ Minor**	**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
Discipline-Specific Courses/Major Courses- Compulsory					
Intellectual Property Rights		4	40	60	**100**
Research Funding		4	40	60	**100**
Major Courses- Students to Choose ANY ONE					
Minor Course- Compulsory					
****					
Minor Courses- Choose any one (cannot be the same as Major specialization)					
****					
Research Project/ Dissertation					
Research Project		12	120	180	**300**
	Total	**20**	**200**	**300**	**500**
Notes:					