

Sl. No.	Course Code	Section Name	Prerequisite Code	Program Name	Ending Semester Code	Ending Semester Name	Course Type	Base PS	Base 2021	Change in Base PS	Change in course/Mature	Change in Pedagogy	Change in evaluation	Change in instruction method	Add on course	Changes Yes: Revised No: Not Revised
301	SICSR, Pune	30142	MSc(CA)	GEN002	Project		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	GEN003	Internship		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	GEN004	Dissertation		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	GEN005	Non Catalog Courses		Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T0100	Research Publication		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T2351	Technological Entrepreneurship		Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T2843	Research Methodology		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3003	Android Technologies		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3005	ASP. Net Programming		Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3008	Cloud Programming using Web Services		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3009	Best Programming Practices		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3012	Java SE		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3015	Network Programming		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3017	Python Programming		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3018	R Programming		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3022	Cryptography		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)				Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3025	Linux Scripting		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3032	Computer Forensics - Detection and Prevention of IT Frauds		Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3034	Database and Application Security		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3044	Security Management Practices		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3048	Essentials of System Administration		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3049	Internetworking		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3050	IS Risk Analysis and System Audit		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3051	Network Infrastructure		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3052	Network Operating Systems		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3053	Server Security and Hardening		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3054	Vulnerability Assessment and Penetration Testing		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3056	Wireless Networks		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3061	IT Infrastructure Library		Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3063	Data Centre Infrastructure Management		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3065	Network Operations, Design, Optimization and Management		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3111	Data Mining and Algorithms		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3114	Object Oriented Analysis Design		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3120	Software Project Management		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3122	Software Quality Models		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3124	Software Verification and Validation		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3198	Introduction to Python		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3213	Introduction to Operating System		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3268	Fuzzy Logic		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3271	Systems Programming		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3278	Applied Cryptography		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3279	Database Administration - I		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3280	Database Administration - II		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3281	Data Warehousing		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3293	Software Architectures		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3344	DevOps		Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3356	NoSQL Databases		Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3360	Digital Transformation		Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3367	Social Media Analytics		Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3416	Computer Forensic - Detection & Prevention of Frauds		Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3418	Advanced Vulnerability Assessment and Penetration Testing		Core	Base PS	No Change	No						



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Sl. No.	Course Name	Program Code	Program Name	Course Code	Course Name	Course Type	2020	Batch 2021	Change in Title/Type/No.	Change in course/Nature	Change in Prerequisite	Change in evaluation	Change in credit/weightage	Add or course	Changes Yes/ Revised No/ Not Revised
301	SICSR, Pune	30142	MSc(CA)	T3419	Cloud Development and Administration	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3420	Essentials of Vulnerability Assessment and Penetration Testing	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3424	Server Hardening	Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3431	DevOps Services	Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3448	Text Analytics	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3506	Analytics Applications	Elective	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3527	Big Data - Systems, Programming and Management	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3536	Web UI and Content Management	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3537	Scripting Languages	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3540	Identity and Access Management	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3542	Information System Audit	Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3543	Virtualization and Security	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3545	Fundamentals of Computer Networking	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3555	Operating System Fundamentals	Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3566	Artificial Neural Network and Deep Learning	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3567	Data Analysis and Visualization	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3568	Natural Language Processing	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3569	Data Science for IOT	Elective	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3573	Data Structures	Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3574	Design and Analysis of Algorithms	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3575	Software Engineering (Agile Practices)	Core	Base PS	Dropped	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3576	Computation Methods	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3577	Data Analysis Using Python	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3578	Image Processing	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3579	Machine Learning Algorithms	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3580	Relational Database Management System	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T3590	Design of Content Management System	Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3617	Security Standards	Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3618	IT Audit and Risk Management	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3619	Web Application Security	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3625	Network Security Testing	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3645	Secure Software Engineering	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T3672	Blockchain and it's Applications	Elective		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	T4005	Integrated Disaster Management	Core	Base PS	No Change	No						
301	SICSR, Pune	30142	MSc(CA)	T7674	Cyber Security	Core		Added	Yes						
301	SICSR, Pune	30142	MSc(CA)	TH4272	Certificate in COVID-19 Care for the Community	Core		Added	Yes						



**SYMBIOSIS INSTITUTE OF  
COMPUTER STUDIES AND RESEARCH**  
Symbiosis International (Deemed University)

(Established under section 3 of the UGC Act, 1956)

Re-accredited by NAAC with 'A' grade (3.58/4) | Awarded Category - I by UGC

Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)



Celebrating 50 Years of Excellence

**Syllabus revision AY 2020-2021 to 2021-2022**

Name of the Institute : Symbiosis Institute of Computer Studies and Research

Name of the Program : Master of Science (Computer Applications)

**INDEX**

Academic Year	Particulars	Page Number
2021 - 2022	Modification Table	1 - 2
2020 - 2021	Program Approved Letter	4
2020 - 2021	Approved Program Structure	5 - 12
2021 - 2022	Program Approved Letter	13 - 14
2021 - 2022	Approved Program Structure	15 - 23

*Dr Parag Kaveri*

Dr Parag Kaveri

Professor, MSc(CA) Program Coordinator





## SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

(Established under section 3 of the UGC Act 1956)

Re - accredited by NAAC with 'A' Grade

Founder: Prof. Dr. S. B. Mujumdar, MSc, Ph.D. (Awarded Padma Bhushan and Padma Shri by President of India)

SIU/U-110(SICSR,Pune)/2020/1705 (B)

Date: 15/05/2020

To  
The Director  
Symbiosis Institute of Computer Studies & Research, Pune

**Subject: Approval of the Programme Structure/s for the academic year 2020-2021**

Dear Sir/Madam,

This is to inform you that the following Programme Structure has been duly approved by the Academic Council for the Academic Year 2020-2021.

Sr.No.	Programme	Batch
1	Master of Science (Computer Applications)	2020-2022

You may download the same using your login credentials using the link and the path mentioned-

Link: <http://eduwiz.intechsolutionspune.in/eduwiz/login.html>

Path: [Academics->Catalogue->Programme Structure-> View Course Structure -> Select Institute -> Select Academic Year -> Select Programme -> Select Batch -> Show Course Structure -> Print Programme Structure.](#)

Thanking you.

Sincerely,

Dr. Pravin Dange  
Head- Academics

Copy to: Controller of Examinations, SIU



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

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1.	<b>OBJECTIVE</b>	This programme will equip students with knowledge highly relevant to emerging technologies. This programme aims to provide a comprehensive framework for understanding by integrating theoretical foundations with extensive practical work in the labs and hands-on experience. The programme offers following areas of specializations: i. Software Development ii. Systems Administration iii. Data Science			
2.	<b>DURATION (IN MONTHS)</b>	24 (Full Time)			
3.	<b>INTAKE</b>	30			
4.	<b>RESERVATION</b>	<b>I. Within the sanctioned intake</b>	<b>a) SC (In Percentage)</b>	<b>b) ST (In Percentage)</b>	<b>c) Differently abled (In Percentage)</b>
			15	7.5	3
		<b>II. Over and above the sanctioned intake</b>	<b>a) Kashmiri Migrants (In Seats)</b>	<b>b) International Students (In Percentage)</b>	
			2	15	
5.	<b>ELIGIBILITY</b>	Graduate from any recognised University/ Institution of National Importance with a minimum of 50% marks or equivalent grade (45% marks or equivalent grade for Scheduled Caste / Scheduled Tribes).			
6.	<b>SELECTION PROCEDURE</b>	Symbiosis National Aptitude Test, Group Exercise, Personal Interaction and Writing Ability Test (GE-PIWAT)			
7.	<b>MEDIUM OF INSTRUCTION</b>	English			
8.	<b>PROGRAMME PATTERN</b>	Semester			
9.	<b>COURSE &amp; SPECIALIZATION</b>	Attached as Annexure A			
10.	<b>FEE</b>		<b>Academic Fee p.a</b>	<b>Institute Deposit</b>	<b>Total</b>
		<b>Indian Students</b>	390000	20000	410000
		<b>International Students (USD equivalent to INR)</b>	585000	20000	605000
11.	<b>ASSESSMENT</b>	All internal courses will have 100% component as internal evaluation at the institute level. All external courses will have 60% internal component and 40% component as external [University] examination.			
12.	<b>STANDARD OF PASSING</b>	The assessment of the student 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 examination separately 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 minimum CGPA of 4 out of maximum of 10 CGPA for the programme.
13.	<b>AWARD OF DEGREE/ DIPLOMA/ CERTIFICATE</b>	Master of Science (Computer Applications) will be awarded at the end of 4th semester examination by taking into consideration the performance of all 4 semesters examinations after obtaining minimum 4.00 CGPA out of 10.00 CGPA.

**14. NATURE WISE DISTRIBUTION OF CREDITS**

Semester	Generic Core	Generic Elective	Specialization Core	Specialization Elective	Open Elective	Audit	Total
1	18	0	8	0	0	0	26
2	8	0	8	6	0	1*	22
3	0	0	10	6	0	2*	16
4	16	0	0	0	0	0	16
<b>Total</b>	<b>42</b>	<b>0</b>	<b>26</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>80</b>

\* Satisfactory completion of the non letter grade courses 'Integrated Disaster Management' and 'Research Publication' and 'Certificate in COVID-19 Care for the Community' is mandatory for award of degree.

The revised programme structure supersedes the previously approved programme structure dated 20/04/2021 for the programme.

**This Programme Structure is aligned with the norms laid down by the University and is approved by the Academic Council. Hereafter changes (if any) which conform to the policy on "Curriculum Development and Review" would be permissible, subject to revision of the Programme Structure, following the specified processes.**

**Head - Academics**

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**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
<b>Semester : 1</b>							
<b>Generic Core Courses</b>							
T3017	0301420101	Python Programming		3	90	60	150
T3555	0301420102	Operating System Fundamentals		3	150	0	150
T3545	0301420103	Fundamentals of Computer Networking		3	90	60	150
T3573	0301420104	Data Structures		3	150	0	150
T3574	0301420105	Design and Analysis of Algorithms		3	90	60	150
T3580	0301420106	Relational Database Management System		3	90	60	150
<b>Total</b>				<b>18</b>	<b>660</b>	<b>240</b>	<b>900</b>
<b>Specialization Core Courses : Software Development</b>							
T3012	0301420107	Java SE	Software Development	4	120	80	200
T3575	0301420108	Software Engineering (Agile Practices)	Software Development	4	120	80	200
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Core Courses : System Administration</b>							
T3049	0301420109	Internetworking	System Administration	3	90	60	150
T3051	0301420110	Network Infrastructure	System Administration	3	90	60	150
T3061	0301420111	IT Infrastructure Library	System Administration	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Core Courses : Data Science</b>							
T3012	0301420107	Java SE	Data Science	4	120	80	200
T3575	0301420108	Software Engineering (Agile Practices)	Data Science	4	120	80	200
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Semester : 2</b>							
<b>Generic Core Courses</b>							
T3527	0301420201	Big Data: Systems, Programming and Management		4	200	0	200
T3009	0301420202	Best Programming Practices		2	100	0	100
T3701	0301420203	Dissertation		2	100	0	100
T4005	0301420204	Integrated Disaster Management *		0	0	0	Non Letter Grade
<b>Total</b>				<b>8</b>	<b>400</b>	<b>0</b>	<b>400</b>
<b>Specialization Core Courses : Software Development</b>							



Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3114	0301420205	Object Oriented Analysis Design	Software Development	4	120	80	200
T3120	0301420206	Software Project Management	Software Development	4	120	80	200
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Core Courses : System Administration</b>							
T3052	0301420207	Network Operating Systems	System Administration	3	90	60	150
T3537	0301420208	Scripting Language	System Administration	3	90	60	150
T3420	0301420209	Essentials of Vulnerability Assessment and Penetration Testing	System Administration	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Core Courses : Data Science</b>							
T3120	0301420206	Software Project Management	Data Science	4	120	80	200
T3576	0301420210	Computation Methods	Data Science	2	60	40	100
T3577	0301420211	Data Analysis Using Python	Data Science	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Elective : Software Development</b>							
T3003	0301420212	Android Technologies	Software Development	3	90	60	150
T3281	0301420213	Data Warehousing	Software Development	3	90	60	150
T3025	0301420214	Linux Scripting	Software Development	3	90	60	150
T3356	0301420215	NOSQL Databases	Software Development	3	90	60	150
T3018	0301420216	R Programming	Software Development	3	90	60	150
T3124	0301420217	Software Verification and Validation	Software Development	3	90	60	150
T3431	0301420218	DevOps Services	Software Development	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Elective : System Administration</b>							
T3356	0301420215	NOSQL Databases	System Administration	3	90	60	150
T3124	0301420217	Software Verification and Validation	System Administration	3	90	60	150





Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3431	0301420218	DevOps Services	System Administration	3	150	0	150
T3279	0301420219	Database Administration - I	System Administration	3	90	60	150
T3022	0301420220	Cryptography	System Administration	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Elective : Data Science</b>							
T3281	0301420213	Data Warehousing	Data Science	3	90	60	150
T3025	0301420214	Linux Scripting	Data Science	3	90	60	150
T3356	0301420215	NOSQL Databases	Data Science	3	90	60	150
T3018	0301420216	R Programming	Data Science	3	90	60	150
T3268	0301420221	Fuzzy Logic	Data Science	3	90	60	150
T3506	0301420222	Analytics Applications	Data Science	3	150	0	150
T3567	0301420223	Data Analysis and Visualization	Data Science	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Semester : 3</b>							
<b>Generic Core Courses</b>							
T0100	0301420301	Research Publication *		0	0	0	Non Letter Grade
TH4272	0301420330	Certificate in COVID-19 Care for the Community *		0	0	0	Non Letter Grade
<b>Total</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Specialization Core Courses : Software Development</b>							
T3293	0301420302	Software Architectures	Software Development	4	120	80	200
T3536	0301420303	Web UI and Content Management	Software Development	4	120	80	200
T3802	0301420304	Pilot Project	Software Development	2	100	0	100
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Core Courses : System Administration</b>							
T3053	0301420305	Server Security and Hardening	System Administration	4	120	80	200
T3418	0301420306	Advanced Vulnerability Assessment and Penetration Testing	System Administration	2	60	40	100
T3416	0301420307	Computer Forensic - Detection & Prevention of Frauds	System Administration	2	60	40	100
T3048	0301420308	Essentials of System Administration	System Administration	2	100	0	100



Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Core Courses : Data Science</b>							
T3802	0301420304	Pilot Project	Data Science	2	100	0	100
T3578	0301420309	Image Processing	Data Science	4	120	80	200
T3579	0301420310	Machine Learning Algorithms	Data Science	4	120	80	200
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Elective : Software Development</b>							
T3008	0301420311	Cloud Programming using Web Services	Software Development	3	90	60	150
T3111	0301420312	Data Mining and Algorithms	Software Development	3	90	60	150
T3015	0301420313	Network Programming	Software Development	3	90	60	150
T3122	0301420314	Software Quality Models	Software Development	3	90	60	150
T3271	0301420315	Systems Programming	Software Development	3	90	60	150
T3005	0301420316	ASP. Net Programming	Software Development	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Elective : System Administration</b>							
T3015	0301420313	Network Programming	System Administration	3	90	60	150
T3360	0301420317	Digital Transformation	System Administration	3	150	0	150
T3280	0301420318	Database Administration - II	System Administration	3	90	60	150
T3050	0301420319	IS Risk Analysis and System Audit	System Administration	3	90	60	150
T3065	0301420320	Network Operations, Design, Optimization and Management	System Administration	3	90	60	150
T3278	0301420321	Applied Cryptography	System Administration	3	90	60	150
T3419	0301420322	Cloud Development and Administration	System Administration	3	90	60	150
T3063	0301420323	Data Centre Infrastructure Management	System Administration	3	90	60	150
T3056	0301420324	Wireless Networks	System Administration	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>240</b>	<b>60</b>	<b>300</b>
<b>Specialization Elective : Data Science</b>							



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

**Annexure A**

Celebrating 50 Years of Excellence


Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3008	0301420311	Cloud Programming using Web Services	Data Science	3	90	60	150
T3448	0301420325	Text Analytics	Data Science	3	90	60	150
T3367	0301420326	Social Media Analytics	Data Science	3	150	0	150
T3566	0301420327	Artificial Neural Network and Deep Learning	Data Science	3	90	60	150
T3568	0301420328	Natural Language Processing	Data Science	3	90	60	150
T3569	0301420329	Data Science for IOT	Data Science	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Semester : 4</b>							
<b>Generic Core Courses</b>							
T3916	0301420401	Industry Internship		16	480	320	800
<b>Total</b>				<b>16</b>	<b>480</b>	<b>320</b>	<b>800</b>



Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2020-22**

Semester	Internal Credits	External Credits	Total Credits	Total Marks
<b>Software Development</b>				
Semester 1	6	20	26	1300
Semester 2	8	14	22	1100
Semester 3	2	14	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>16</b>	<b>64</b>	<b>80</b>	<b>4000</b>
<b>System Administration</b>				
Semester 1	6	20	26	1300
Semester 2	8	14	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>19</b>	<b>61</b>	<b>80</b>	<b>4000</b>
<b>Data Science</b>				
Semester 1	6	20	26	1300
Semester 2	8	14	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>19</b>	<b>61</b>	<b>80</b>	<b>4000</b>

  
 Dr. Pooja Kulkarni  
 Prog. Head, MSc (CA)





head academics &lt;head\_academics@siu.edu.in&gt;

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Subject: First Approval Lettter



SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

(Established under section 3 of the UGC Act 1956)

Re - accredited by NAAC with 'A' Grade

Founder: Prof. Dr. S. B. Mujumdar, M.Sc.,Ph.D. (Awarded Padma Bhushan and Padma Shri by President of India)

SIU/U-110(SICSR,Pune)/2021/1902

Date: 12/05/2021

To

The Director

Symbiosis Institute of Computer Studies & Research, Pune

Subject: Approval of the Programme Structure/s for the academic year 2021-2022

Dear Sir/Madam,

This is to inform you that the following Programme Structure has been duly approved by the Academic Council for the Academic Year 2021-2022.

Academic Year : 2021-2022

Sr.No.	Programme	Batch
1	Master of Science (Computer Applications)	2021-2023

You may download the same using your login credentials using the link and the path mentioned-

Link:

<http://eduwiz.intechsolutionspune.in/eduwiz/login.html>

Path:

Academics->Catalogue->Programme Structure-> View Course Structure -> Select Institute -> Select Academic Year -> Select Programme -> Select Batch -> Show Course Structure -> Print Programme Structure.

Thanking you.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Dr. Pravin Dange', with a vertical line extending downwards from the end of the signature.

Dr. Pravin Dange  
Head- Academics

Copy to: Controller of Examinations, SIU

1 Of 1



Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

1.	<b>OBJECTIVE</b>	<p>This programme will equip students with knowledge highly relevant to emerging technologies. This programme aims to provide a comprehensive framework for understanding by integrating theoretical foundations with extensive practical work in the labs and hands-on experience.</p> <p>The programme offers following areas of specializations:</p> <ul style="list-style-type: none"> <li>i. Software Development</li> <li>ii. Systems Administration</li> <li>iii. Data Science</li> <li>iv. System Security</li> </ul>				
2.	<b>DURATION (IN MONTHS)</b>	24 (Full Time)				
3.	<b>INTAKE</b>	30				
4.	<b>RESERVATION</b>	<b>I. Within the sanctioned intake</b>	<b>a) SC (In Percentage)</b>	<b>b) ST (In Percentage)</b>	<b>c) Differently abled (In Percentage)</b>	<b>d) Defence (In Percentage)</b>
			15	7.5	3	0
		<b>II. Over and above the sanctioned intake</b>	<b>a) Kashmiri Migrants (In Seats)</b>		<b>b) International Students (In Percentage)</b>	
			2		15	
5.	<b>ELIGIBILITY</b>	Graduate from any recognised University/ Institution of National Importance with a minimum of 50% marks or equivalent grade (45% marks or equivalent grade for Scheduled Caste / Scheduled Tribes).				
6.	<b>SELECTION PROCEDURE</b>	Symbiosis National Aptitude Test, Group Exercise, Personal Interaction and Writing Ability Test (GE-PIWAT)				
7.	<b>MEDIUM OF INSTRUCTION</b>	English				
8.	<b>PROGRAMME PATTERN</b>	Semester				
9.	<b>COURSE &amp; SPECIALIZATION</b>	Attached as Annexure A				
10.	<b>FEE</b>		<b>Academic Fee p.a</b>	<b>Institute Deposit</b>	<b>Total</b>	
		<b>Indian Students</b>	390000	20000	410000	
		<b>International Students (USD equivalent to INR)</b>	585000	20000	605000	
11.	<b>ASSESSMENT</b>	All internal courses will have 100% component as internal evaluation at the institute level. All external courses will have 60% internal component and 40% component as external [University] examination.				

12.	<b>STANDARD OF PASSING</b>	The assessment of the student 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 examination separately 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 minimum CGPA of 4 out of maximum of 10 CGPA for the programme.					
13.	<b>AWARD OF DEGREE/ DIPLOMA/ CERTIFICATE</b>	Master of Science (Computer Applications) will be awarded at the end of 4th semester examination by taking into consideration the performance of all 4 semesters examinations after obtaining minimum 4.00 CGPA out of 10.00 CGPA.					
14.	<b>CLASSIFICATION OF CREDITS</b>						
Semester	Generic Core	Generic Elective	Specialization Core	Specialization Elective	Open Elective	Audit	Total
1	26	0	0	0	0	1*	26
2	8	0	8	6	0	1*	22
3	0	0	10	6	0	1*	16
4	16	0	0	0	0	0	16
<b>Total</b>	<b>50</b>	<b>0</b>	<b>18</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>80</b>
* Satisfactory completion of the non letter grade courses 'Integrated Disaster Management', 'Research Publication' 'Certificate in COVID-19 Care for the Community' is mandatory for award of degree.							
The revised programme structure supersedes the previously approved programme structure dated 12/02/2022 for the programme.							

This Programme Structure is aligned with the norms laid down by the University and is approved by the Academic Council. Hereafter changes (if any) which conform to the policy on "Curriculum Development and Review" would be permissible, subject to revision of the Programme Structure, following the specified processes.

Head - Academics

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Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
<b>Semester : 1</b>							
<b>Generic Core Courses</b>							
T3590	0301420101	Design of Content Management System		4	120	80	200
T3545	0301420102	Fundamentals of Computer Networking		3	90	60	150
T3537	0301420103	Scripting Language		3	90	60	150
T3574	0301420104	Design and Analysis of Algorithms		3	90	60	150
T3580	0301420105	Relational Database Management System		3	90	60	150
T3009	0301420106	Best Programming Practices		2	60	40	100
T3213	0301420107	Introduction to Operating System		2	60	40	100
T3198	0301420108	Introduction to Python		2	60	40	100
T7674	0301420109	Cyber Security		2	60	40	100
T2843	0301420110	Research Methodology		2	60	40	100
TH4272	0301420111	Certificate in COVID-19 Care for the Community *		0	0	0	Non Letter Grade
<b>Total</b>				<b>26</b>	<b>780</b>	<b>520</b>	<b>1300</b>
<b>Semester : 2</b>							
<b>Generic Core Courses</b>							
T3527	0301420201	Big Data: Systems, Programming and Management		4	200	0	200
T3344	0301420202	DevOps		2	60	40	100
T3701	0301420203	Dissertation		2	100	0	100
T4005	0301420204	Integrated Disaster Management *		0	0	0	Non Letter Grade
<b>Total</b>				<b>8</b>	<b>360</b>	<b>40</b>	<b>400</b>
<b>Specialization Core Courses : Software Development</b>							
T3114	0301420205	Object Oriented Analysis Design	Software Development	4	120	80	200
T3120	0301420206	Software Project Management	Software Development	4	120	80	200
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Elective : Software Development</b>							
T3356	0301420207	NOSQL Databases	Software Development	3	90	60	150
T3281	0301420208	Data Warehousing	Software Development	3	90	60	150



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3018	0301420209	R Programming	Software Development	3	90	60	150
T3003	0301420210	Android Technologies	Software Development	3	90	60	150
T3025	0301420211	Linux Scripting	Software Development	3	90	60	150
T3124	0301420212	Software Verification and Validation	Software Development	3	90	60	150
T3672	0301420213	Blockchain and It's Applications	Software Development	3	150	0	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Core Courses : System Administration</b>							
T3052	0301420214	Network Operating Systems	System Administration	3	90	60	150
T3424	0301420215	Server Hardening	System Administration	3	90	60	150
T3420	0301420216	Esseentials of Vulnerability Assessment and Penetration Testing	System Administration	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Elective : System Administration</b>							
T3356	0301420207	NOSQL Databases	System Administration	3	90	60	150
T3124	0301420212	Software Verification and Validation	System Administration	3	90	60	150
T3672	0301420213	Blockchain and It's Applications	System Administration	3	150	0	150
T3279	0301420217	Database Administration - I	System Administration	3	90	60	150
T3022	0301420218	Cryptography	System Administration	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Core Courses : System Security</b>							
T3022	0301420218	Cryptography	System Security	3	90	60	150
T3034	0301420219	Database and Application Security	System Security	3	90	60	150



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3617	0301420220	Security Standards	System Security	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Elective : System Security</b>							
T3124	0301420212	Software Verification and Validation	System Security	3	90	60	150
T3672	0301420213	Blockchain and It's Applications	System Security	3	150	0	150
T3619	0301420221	Web Application Security	System Security	2	60	40	100
T3618	0301420222	IT Audit and Risk Management	System Security	2	60	40	100
T3645	0301420223	secure software engineering	System Security	2	60	40	100
T3625	0301420224	Network Security Testing	System Security	2	60	40	100
<b>Total Required Credits</b>				<b>6</b>	<b>150</b>	<b>100</b>	<b>250</b>
<b>Specialization Core Courses : Data Science</b>							
T3120	0301420206	Software Project Management	Data Science	4	120	80	200
T3576	0301420225	Computation Methods	Data Science	2	60	40	100
T3577	0301420226	Data Analysis Using Python	Data Science	2	60	40	100
<b>Total</b>				<b>8</b>	<b>240</b>	<b>160</b>	<b>400</b>
<b>Specialization Elective : Data Science</b>							
T3356	0301420207	NOSQL Databases	Data Science	3	90	60	150
T3281	0301420208	Data Warehousing	Data Science	3	90	60	150
T3018	0301420209	R Programming	Data Science	3	90	60	150
T3025	0301420211	Linux Scripting	Data Science	3	90	60	150
T3672	0301420213	Blockchain and It's Applications	Data Science	3	150	0	150
T3567	0301420227	Data Analysis and Visualization	Data Science	3	90	60	150
T3268	0301420228	Fuzzy Logic	Data Science	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Semester : 3</b>							
<b>Generic Core Courses</b>							
T0100	0301420301	Research Publication *		0	0	0	Non Letter Grade



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
<b>Total</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Specialization Core Courses : Software Development</b>							
T3293	0301420302	Software Architectures	Software Development	4	120	80	200
T3536	0301420303	Web UI and Content Management	Software Development	4	120	80	200
T3802	0301420304	Pilot Project	Software Development	2	100	0	100
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Elective : Software Development</b>							
T3111	0301420305	Data Mining and Algorithms	Software Development	3	90	60	150
T3122	0301420306	Software Quality Models	Software Development	3	90	60	150
T2351	0301420307	Technological Entrepreneurship	Software Development	3	150	0	150
T3015	0301420308	Network Programming	Software Development	3	90	60	150
T3008	0301420309	Cloud Programming using Web Services	Software Development	3	90	60	150
T3271	0301420310	Systems Programming	Software Development	3	90	60	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Core Courses : System Administration</b>							
T3802	0301420304	Pilot Project	System Administration	2	100	0	100
T3053	0301420311	Server Security and Hardening	System Administration	4	120	80	200
T3418	0301420312	Advanced Vulnerability Assessment and Penetration Testing	System Administration	2	60	40	100
T3416	0301420313	Computer Forensic - Detection & Prevention of Frauds	System Administration	2	60	40	100
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Elective : System Administration</b>							
T3015	0301420308	Network Programming	System Administration	3	90	60	150
T3278	0301420314	Applied Cryptography	System Administration	3	90	60	150



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**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3419	0301420315	Cloud Development and Administration	System Administration	3	90	60	150
T3050	0301420316	IS Risk Analysis and System Audit	System Administration	3	90	60	150
T3280	0301420317	Database Administration - II	System Administration	3	90	60	150
T3063	0301420318	Data Centre Infrastructure Management	System Administration	3	90	60	150
T3056	0301420319	Wireless Networks	System Administration	3	90	60	150
T3065	0301420320	Network Operations, Design, Optimization and Management	System Administration	3	90	60	150
T2351	0301420321	Technological Entrepreneurship	System Administration	3	150	0	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Core Courses : System Security</b>							
T3802	0301420304	Pilot Project	System Security	2	100	0	100
T3054	0301420322	Vulnerability Assessment and Penetration Testing	System Security	4	120	80	200
T3044	0301420323	Security Management Practices	System Security	2	60	40	100
T3542	0301420324	Information System Audit	System Security	2	60	40	100
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Elective : System Security</b>							
T3032	0301420325	Computer Forensics - Detection and Prevention of IT Frauds	System Security	3	90	60	150
T3543	0301420326	Virtualization and Security	System Security	3	90	60	150
T3540	0301420327	Identity and Access Management	System Security	3	90	60	150
T2351	0301420328	Technological Entrepreneurship	System Security	3	150	0	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Specialization Core Courses : Data Science</b>							
T3802	0301420304	Pilot Project	Data Science	2	100	0	100
T3578	0301420329	Image Processing	Data Science	4	120	80	200
T3579	0301420330	Machine Learning Algorithms	Data Science	4	120	80	200
<b>Total</b>				<b>10</b>	<b>340</b>	<b>160</b>	<b>500</b>
<b>Specialization Elective : Data Science</b>							
T3008	0301420309	Cloud Programming using Web Services	Data Science	3	90	60	150



Celebrating 50 Years of Excellence

**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

**Annexure A**

Catalog Course Code	Course Code	Course Title	Specialization	Credit	Internal Marks	External Marks	Total Marks
T3448	0301420331	Text Analytics	Data Science	3	90	60	150
T3569	0301420332	Data Science for IOT	Data Science	3	90	60	150
T3566	0301420333	Artificial Neural Network and Deep Learning	Data Science	3	90	60	150
T3568	0301420334	Natural Language Processing	Data Science	3	90	60	150
T2351	0301420335	Technological Entrepreneurship	Data Science	3	150	0	150
<b>Total Required Credits</b>				<b>6</b>	<b>180</b>	<b>120</b>	<b>300</b>
<b>Semester : 4</b>							
<b>Generic Core Courses</b>							
T3916	0301420401	Industry Internship		16	480	320	800
<b>Total</b>				<b>16</b>	<b>480</b>	<b>320</b>	<b>800</b>



**Symbiosis Institute of Computer Studies and Research, Pune**  
**Master of Science (Computer Applications)**  
**Programme Structure 2021-23**

Celebrating 50 Years of Excellence

Semester	Internal Credits	External Credits	Total Credits	Total Marks
<b>Software Development</b>				
Semester 1	0	26	26	1300
Semester 2	9	13	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>14</b>	<b>66</b>	<b>80</b>	<b>4000</b>
<b>System Administration</b>				
Semester 1	0	26	26	1300
Semester 2	9	13	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>14</b>	<b>66</b>	<b>80</b>	<b>4000</b>
<b>System Security</b>				
Semester 1	0	26	26	1300
Semester 2	9	13	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>14</b>	<b>66</b>	<b>80</b>	<b>4000</b>
<b>Data Science</b>				
Semester 1	0	26	26	1300
Semester 2	9	13	22	1100
Semester 3	5	11	16	800
Semester 4	0	16	16	800
<b>Total</b>	<b>14</b>	<b>66</b>	<b>80</b>	<b>4000</b>