ST. XAVIER'S COLLEGE – MUMBAI

(Est. 1869)

(An Autonomous College affiliated with the University of Mumbai)

Syllabus for Undergraduate Programme as per National Education Policy (NEP-2020)

Programme: BSc in Microbiology

Academic year 2023–2024

APPROVED SYLLABUS

ST. XAVIER'S COLLEGE-AUTONOMOUS * MUMBAI-400 001 *

PRINCIPAL
ST. XAVIER'S COLLEGE
AUTONOMOUS
MUMBAI - 400 001.

Preamble:
The foundational principles of the National Education Policy 2020 (NEP 2020) released by MHRD are:

- Multidisciplinary and holistic education (student-centred), encompassing courses from multiple disciplines across the sciences, social sciences, arts, humanities, and commerce for a multidisciplinary world, with emphasis on outcome-based learning.
- 50-50 formulation, where 50% of the credits must be from the core discipline and the rest 50% from other disciplines. Also, 50% of the course must be conceptual and theory based and the rest 50% must be the application of the concepts into practice through student engagement in activities/apprenticeship and internship. Pedagogic methods must be problem-centred/ based and project-based learning and activities.
- Integration of technology into teaching-learning-evaluation resources, blended teaching-learning (face-to-face, online collaborative learning, hands-on and practicum and flipped learning), strengthening research pedagogy of the discipline.
- Integrating skilling and employability with curriculum and teaching-learning across disciplinary, inter-disciplinary, and multi-disciplinary studies.
- Multiple entry and exit options for students within an academic programme of study with credit transfer and accumulation of credits in the Academic Bank of Credits (ABC).
- Equality is the Goal, and Equity is a process to achieve equality and inclusion to promote students' sense of belonging.

The framework of the choice-based credit system

Major Subject: A single subject course of study pursued by a student as a mandatory requirement of the programme of study. Indian knowledge system (IKS) to be included in the core courses.

Elective Course: An elective course could be a project designed to acquire skills to supplement the major study.

Minor Subject: A second subject of study pursued by a student as an additional requirement of the programme of study.

OE: Open Elective - An elective course chosen generally from an unrelated discipline/subject, to seek multidisciplinary exposure.

AEC: Ability Enhancement Course - Mandatory Courses on content related to Language, and Literature (i) Compulsory – English communication (ii) Elective – any Indian language other than English.

IKS: Indian Knowledge System (Generic) – Mandatory course - an overview of the contribution of India towards multidisciplinary research and development.

VSC: Vocational Skill Course – Courses aimed at imparting practical skills, hands-on training, and soft skills to increase the employability of students. Specific or supporting the major subject is to be chosen from a basket/pool offered by the college.

SEC: Skill Enhancement Course – Courses aimed at imparting practical skills, hands-on training, and soft skills to increase students' employability. It could be chosen from a basket/pool offered by the college or a MOOC on Swayam or NPTEL platforms.

On-Job Training (OJT)/Internship/Field Project (FP)/Community Engagement Programme (CEP) Research Project (RP): Application of knowledge/concepts in solving or analyzing a real-life problem. All these are related to the major subject.

CC: Co-curricular Course – For the holistic development of students through Cultural activities such as performing art, visual art, NCC, NSS, Yoga, etc.

VEC: Value Education Course – Compulsory courses on (i) The Constitution of India and (ii) Environmental Education.

FYUGP Credit Structure with number of courses 2023-24													
Level	Sem	Sub-1/Major	Elective	Sub-2/Minor	OE	VSC	SEC	IKS generic	AEC	VEC	OJT, FP, RP, CEP, CC	Total	Degree/Cum Cr
4.5/100-199 (2023-24) First Year	Sem 1	1	0	1	2	1	1	1	1	1	0	9	44 credits UG certificate
	Sem 2	1	0	1	2	1	1	0	1	1	CC 1	9	
Introductory	Courses	2	0	2	4	2	2	1	2	2	1	18	
Exit option with a UG Certificate in Major &/or Minor with an additional 4 credits NSQF course/internship OR continue with Major & Minor													
5/200-299 (2024-25) Second Year	Sem 3	2	0	1	1	1	0	0	1	0	FP/CEP 1 (Sci) & CC 1	8	88 credits UG Diploma
	Sem 4	2	0	1	1	0	1	0	1	0	FP/CEP 1 (Art/Com) & CC 1	8	
Intermediate	Courses	8	0	4	6	3	3	1	4	2	5	34	
Exit option with a UG Diploma in Major & Minor with an additional 4 credits NSQF course/internship OR continue with Major & Minor													
5.5/300-399 (2025-26) Third Year	Sem 5	3	1	1	0	1	0	0	0	0	FP 1	7	132 credits UG Degree
	Sem 6	3	1	1	0	0	0	0	0	0	OJT 1 Internship	6	
Higher	Courses	12	2	6	6	4	3	1	4	2	7	47	
Exit option with a Three-Year Bachelor Degree with Major and Minor OR continue with Major & Minor (Fourth year by Papers)													
6/400-499 (2026-27) Fourth Year	Sem 7	3	1	RM 1	0	0	0	0	0	0	FP 1	6	176 credits UG Honours
	Sem 8	3	1	0	0	0	0	0	0	0	OJT 1 Internship	5	
Advanced	Courses	18	4	7	6	4	3	1	4	2	9	58	
Exit option with a Three-Year Bachelor Degree with Major and Minor OR continue with Major & Minor (Fourth year by Research)													
6/400-499 (2026-27) Fourth Year	Sem 7	3	1	RM 1	0	0	0	0	0	0	FP 1	6	176 credits UG Honours with Research
	Sem 8	3	1	0	0	0	0	0	0	0	RP 1	5	
Advanced	Courses	18	4	7	6	4	3	1	4	2	9	58	
Four-Year UG Honours with Research Degree with Major and Minor													

FYUGP Credit Structure from 2023-24 (Sci-Arts)										
Level	Sem	Major (Sub-1)	Elective	Minor (Sub-2)	OE	VSC SEC	IKS Generic AEC, VEC	OJT, FP, RP, CEP CC	Cum Cr/Sem	Degree/Cum Cr
4.5 (2023-24)	Sem 1	4	0	4	4	4	6	0	22	44 UG certificate
	Sem 2	4	0	4	4	4	4	2	22	
	Cum Cr	8	0	8	8	8	10	2	44	
A student will decide which of the 2 subjects (Sub-1 or Sub-2) will be major and minor at the end of the second semester (ie the first year) Major subject-specific IKS of 2 credits must be done as 2 units (could be 1 unit + 1 unit) from Sem 3 to Sem 6										
Exit option with a UG Certificate in Major with an additional 4 credits core NSQF course/internship OR continue with Major & Minor										
5 (2024-25)	Sem 3	8	0	4	2	2	2	4	22	88 UG Diploma
	Sem 4	8	0	4	2	2	2	4	22	
	Cum Cr	24	0	16	12	12	14	10	88	
Exit option with a UG Diploma in Major & Minor with an additional 4 credits core NSQF course/internship OR continue with Major & Minor										
5.5 (2025-26)	Sem 5	12	4	2	0	2	0	2	22	132 UG Degree
	Sem 6	12	4	2	0	0	0	4	22	
	Cum Cr	48	8	20	12	14	14	16	132	
6 (2026-27)	Sem 7	12	4	4	0	0	0	2	22	176 UG Honours
	Sem 8	12	4	0	0	0	0	6	22	
	Cum Cr	72	16	20	12	14	14	24	176	
Exit option with a Three-Year Bachelor Degree with Major and Minor OR continue with Major & Minor										
6 (2026-27)	Sem 7	10	4	4	0	2	0	4	22	176 UG Honours with Research
	Sem 8	10	4	0	0	0	0	8	22	
	Cum Cr	68	16	20	12	14	14	28	176	
Four-Year UG Honours with Research Degree with Major and Minor										

Programme Outcomes aligned to the Vision and Mission of St. Xavier's College (Autonomous), Mumbai (Bachelor's degree programme)

The students who complete three years of an undergraduate programme will be able to manifest skills and competencies in the following areas:

1. **Disciplinary knowledge and Core competencies/skills:**
   Demonstrate (i) a lucid understanding of the fundamentals of the subject-related curriculum and (ii) basic and global skills in the academic field of study.
2. **Critical and Creative thinking:**
   (i) Critically reflect on acquired knowledge and skills in areas of core competencies (ii) Explore new possibilities and be resourceful by generating relevant and practical ideas
3. **Problem-solving and Analytical reasoning:**
   Demonstrate skills in identifying and investigating a problem. Collect relevant qualitative and quantitative data and analyze the results meaningfully.
4. **Research-related skills:**
   (i) Apply comprehensive research-based knowledge and skills required for identifying issues, interpreting results, and synthesis of valid information. (ii) Communicate results of studies undertaken in an academic field effectively and accurately.
5. **Social Application of research and development:**
   Employ core competencies and skills to develop solutions for the improvement of social and environmental conditions.
6. **Industry-related skills:**
   Employ skills that are relevant to the industry and commit to strong work ethics and professionalism.
7. **Ethical and Moral Integrity:**
   Practice values such as honesty, transparency, and accountability and commit to interpersonal and social ethics.
8. **Empathy and Social Intelligence:**
   Cultivate and demonstrate affective, interpersonal, social, and spiritual intelligence.
9. **Collaboration, Teamwork, and Multidisciplinary competence:**
   Apply knowledge and skills as an individual, team member or leader to manage ventures in monodisciplinary and interdisciplinary settings.
10. **Leadership and Management:**
    Demonstrate effective strategic planning, and efficient organizational and transformational leadership skills to manage a mission embarked upon.
11. **Social Concern:**
    Demonstrate (i) empathy and care for the marginalized and disadvantaged, (ii) respect, compassion, and concern for others.
12. **Social responsibility and inclusion:**
    (i) Strive for social justice, harmony, and solidarity (ii) Value cultural pluralism and diversity.
13. **Environmental Wellbeing**
    Investigate and design strategies to care for and enhance the well-being of the environment.
14. **Self-motivation and Lifelong learning:**
    Develop a passion for ongoing personal and professional growth.

Abbreviations:

- OE: Open Electives
- AEC: Ability Enhancement Course
- VSC: Vocational Skill Course
- SEC: Skill Enhancement Course

List of Courses offered from Semesters 1-2 in Microbiology (Refer to the credit structure for your faculty

Level	Semester	Major (Sub-1) Course titles	Minor (Sub-2) Course titles	OE Course title/s	VSC Course title/s	SEC
4.5 100-199	Sem 1	Introduction to the world of Microbiology	-	-	Basic techniques in molecular biology	-
	Sem 2	Elements of microbial nutrition, growth & control	-	-	Basic techniques in molecular biology	-

Composition of the Board of Studies in Microbiology 2023 – 2024

Sr.No.	Composition	Name
1	Head of the Department concerned (Chairman)	Sangeeta Chavan
2	Entire faculty of each specialisation	Dr. Karuna Gokarn Dr. Aparna Shetye Dr. Pampi Chakraborty Kaushik Inamdar (June2023-Apr 2024) Alister Dsouza (June 2023-Apr 2024)
3	Two subject experts (other University)	Dr. Dipshikha Chakravortty

		Dr. Avik Chakraborty
4	VC nominee	Dr. Anuradha Pendse
5	Representative from industry/corporate sector/allied	Dr. Abhishek Mule
6	PG meritorious alumnus	Dr. Shamlan Reshamwala
7	(a) Experts from outside the college (co-opted)	-
	(b) Other members of staff of the same faculty	Dr. Lolly Jain

Four-Year Undergraduate Programme in Microbiology

Year of Implementation	Semester	Course Code	BOS Date	Academic Council Date
2023-2024	1	USMIC4501CR1	08/04/2023	21/04/2023
2023-2024	1	USMIC4501VS1	08/04/2023	21/04/2023
2023-2024	2	USMIC4502CR1	08/04/2023	21/04/2023
2023-2024	2	USMIC4501VS1	08/04/2023	21/04/2023

Programme Specific Outcomes

Sr. No.	On completing B.Sc. Microbiology, the student will be able to:
PSO 1	Demonstrate thorough knowledge of the principles and concepts of basic and applied microbiology.
PSO 2	Demonstrate how the study of microorganisms can provide insights into the working of higher organisms.
PSO 3	Demonstrate the presence of microorganisms using simple microscopy techniques, and cultivate, isolate, identify, enumerate and preserve them.
PSO 4	Employ safe laboratory practices and follow the rules of biosafety.
PSO 5	Appreciate inquiry-based learning, understand elements of research methodology, review published literature, design and execute experiments.
PSO 6	Understand microbial life processes, and devise strategies using microorganisms to obtain industrially valuable products.

PSO 7	Evaluate data, perform relevant qualitative and/or quantitative analyses and draw appropriate inferences.
PSO 8	Communicate experimental/research work orally and in written form.
PSO 9	Apply the knowledge of her/his core competency to develop solutions to social problems.
PSO 10	Practice science in an ethical and responsible manner.