

SRI KRISHNA ARTS AND SCIENCE COLLEGE

An Autonomous College, Affiliated to Bharathiar University
Coimbatore – 641 008, Tamil Nadu, India.

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

**B.Sc. Microbiology
(III to VI SEMESTER)**

for 2022 - 2023 admitted students

DEPARTMENT OF BIOSCIENCE



SRI KRISHNA ARTS AND SCIENCE COLLEGE

COIMBATORE – 641008

DEPARTMENT OF MICROBIOLOGY

(2022 - 2023)

| I. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) | |
|--|--|
| PEO 1 | Get ability to apply the process of science by formulating hypotheses and design experiments based on the scientific method. |
| PEO 2 | Analyze and interpret results from a variety of microbiological methods and using quantitative reasoning by using mathematical calculations and graphing skills to solve problems in microbiology. |
| PEO 3 | Communicate and collaborate with other disciplines by effectively communicating the fundamental concepts of microbiology in written and oral format. |
| PEO 4 | Understand the relationship between science and society by recognizing and discussing logical, scientific and ethical issues in microbiology. |

| II. PROGRAMME LEARNING OUTCOMES (PLOs) | |
|--|--|
| No. | The Graduates of B.Sc. Microbiology programme will be able to: |
| PLO1 | Knowledge: To acquire current/recent specific knowledge in the respective discipline with proficiency in practical skills and leadership skills for a successful career. <i>(Cognitive)</i> |
| PLO2 | Critical Thinking: Critical thinking ability by way of solving problems with analytical approaches and data analytics using basic microbiology and biochemistry or chemistry concepts. <i>(Cognitive)</i> |
| PLO3 | Practical Skills: Demonstrate the basic experimental techniques and methods in the areas of microbiology, biotechnology and chemistry/biochemistry. <i>(Psychomotor)</i> |
| PLO4 | Teamwork Skills: Develop an overall personality by making them participate in various social and cultural activities voluntarily. <i>(Affective)</i> |
| PLO5 | Communication Skills: Communicate effectively with the computing community as well as society to comprehend effective documentation and presentation. <i>(Affective)</i> |
| PLO6 | Digital Skills: Incorporate advanced digital skills in designing, developing, managing and deploying in media and technical field. <i>(Affective)</i> |
| PLO7 | Numeracy skills: Analyze the given scientific data critically and systematically and the ability to draw the objective conclusions. <i>(Cognitive)</i> |
| PLO8 | Leadership Skills: To learn, adapt and disseminate knowledge in a world of constantly evolving technology. <i>(Affective)</i> |
| PLO9 | Lifelong Learning: Recognize the need and ability to involve independent and life-long learning in the changing era of technology. <i>(Affective)</i> |
| PLO10 | Entrepreneurial Skills: Successful candidates will be able to analyze, design standards, resolve and troubleshoot problems in implementation or standardization of Life sciences protocols coping up to suit in a position in academia or industry or Institutions and to pursue a career in research. <i>(Affective)</i> |
| PLO11 | Ethics and Professionalism: Successful candidates will be aware of their role and responsibility in handling and use of microbes including genetically modified microorganisms. <i>(Affective)</i> |

| III. PROGRAMME LEARNING OUTCOMES VS GRADUATE ATTRIBUTES VS TAXONOMY OF VERBS | | | | | | | | | | | | | | |
|--|---------------------|-------------------|------------------|-----------------|----------------------|----------------|-----------------|-------------------|-------------------|------------------------|--------------------------|-----------|-------------|-----------|
| PLO | Graduate Attributes | | | | | | | | | | | Blooms | | |
| | Knowledge | Critical Thinking | Practical Skills | Teamwork Skills | Communication Skills | Digital Skills | Numeracy Skills | Leadership Skills | Lifelong Learning | Entrepreneurial Skills | Ethics & Professionalism | Cognitive | Psychomotor | Affective |
| 1 | ✓ | | | | | | | | | | | ✓ | | |
| 2 | | ✓ | | | | | | | | | | ✓ | | |
| 3 | | | ✓ | | | | | | | | | | ✓ | |
| 4 | | | | ✓ | | ✓ | | | | | | | | ✓ |
| 5 | | | | | ✓ | ✓ | | | | | | | | ✓ |
| 6 | | | | | | ✓ | | | | | | | | ✓ |
| 7 | | | | | | | ✓ | | | | | ✓ | | |
| 8 | | | | | | | | ✓ | | | ✓ | | | ✓ |
| 9 | | | | | | | | | ✓ | | ✓ | | | ✓ |
| 10 | | | | | | | | | | ✓ | ✓ | | | ✓ |
| 11 | | | | | | | | | | | ✓ | | | ✓ |

| IV. PROGRAMME LEARNING OUTCOMES VS PROGRAMME EDUCATIONAL OBJECTIVES | | | | |
|---|-------|-------|-------|-------|
| PLO | PEO 1 | PEO 2 | PEO 3 | PEO 4 |
| PLO 1 | ✓ | | | |
| PLO 2 | ✓ | | | |
| PLO 3 | ✓ | | | ✓ |
| PLO 4 | | ✓ | | |
| PLO 5 | | | ✓ | |
| PLO 6 | | | ✓ | ✓ |
| PLO 7 | | | ✓ | |
| PLO 8 | | ✓ | | |
| PLO 9 | | | ✓ | ✓ |
| PLO 10 | | ✓ | | ✓ |
| PLO 11 | | ✓ | | ✓ |

| V. ADDITIONAL PROGRAMME OUTCOMES (APOs) | |
|---|---|
| APO 1 | The skills of observations and drawing logical inferences from the scientific experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions. |
| APO 2 | Developed scientific outlook not only with respect to science subjects but also in all aspects related to life. |
| APO 3 | Imbined ethical, moral and social values in personal and social life leading to highly cultured and civilized personality. |
| APO 4 | Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments. |
| APO 5 | Been able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems |

VI. PROGRAMME SPECIFIC OUTCOMES (PSO's)

| | |
|--------------|---|
| PSO 1 | Understand the nature and basic concepts of Microbiology, Microbial biochemistry, Microbial ecology and to analyze the relationships among microbes and plants/ animals/ humans |
| PSO 2 | Gain familiarity with applications of microbes for synthesis of valuable products through fermentation and to explore the application of genetic engineering to create GMO, transgenic plants, animals, Gene therapy, etc., |

VII. Curriculum Structure for B. Sc. Microbiology

Course Components, Credits & Marks Distribution

| Part No | Group | Basic Structure: Distribution of Courses | Number of Courses | Total Marks | Total Credits |
|--------------|-------|--|-------------------|-------------|---------------|
| I - IV | 1 | AEC – Ability Enhancement Courses | 10 | 1000 | 31 |
| III & IV | 2 | DSC – Discipline Specific Courses | 18 | 1500 | 55 |
| | 3 | DSE – Discipline Specific Electives | 10 | 1000 | 38 |
| | 4 | GEC – Generic Elective Courses | 5 | 500 | 16 |
| IV | 5 | ANCC I & II – Audit Non - Credit Courses | 3 | - | - |
| V | | ANCC III – Audit Non - Credit Course | 1 | Completed | |
| - | 6 | DTC – Drive Through Courses (SWAYAM - NPTEL, Coursera, any courses certified by statutory bodies, etc) | Any number | - | Addl. Credits |
| Total | | | | 4000 | 140 |

Group 1. Ability Enhancement Courses (AECs) (10 Courses)

AEC are the courses based upon the content that leads to knowledge enhancement. Ability Enhancement Courses (AEC) are the following:

| S. No. | Course Code | Course Title | Semester | Ownership Department | Contact Hours | Credits | Marks |
|--------|---|--|----------|----------------------|---------------|---------|-------|
| 1 | 22AEC02/ 22AEC07/ 22AEC11/ 22AEC17/ 22AEC21 | AEC Part I: Language – I Tamil-I – Tamizhum Ariviyalum/ Hindi - I/ French - I/ Malayalam - I/ Sanskrit - I | I | Language Dept. | 6 | 3 | 100 |
| 2 | 22AEC26 | AEC Part II: English - I: English for Professional Communication | I | English Dept. | 6 | 3 | 100 |
| 3 | 22AEC04/ 22AEC08/ 22AEC12/ 22AEC18/ 22AEC22 | AEC Part I: Language – II Tamil - II – Panpattu Padhivugalum Ariviyalargaum/ Hindi - II/ French - II/ Malayalam - II/ Sanskrit – II | II | Language Dept. | 6 | 3 | 100 |
| 4 | 22AEC28 | AEC Part II: English – II: Campus to Corporate | II | English Dept | 6 | 3 | 100 |
| 5 | 22AEC35 | AEC Part III: Academic Skills for Bioscience | II | Bioscience Dept. | 3 | 3 | 100 |

| | | | | | | | |
|--------------|---|--|-----|---------------------|---|-----------|-------------|
| 6 | 22AEC05/ 22AEC09/ 22AEC13/ 22AEC19/ 22AEC23 | AEC Part I: Language – III Tamil - III – Kappiyamum Meippadukalum/ Hindi - III/ French - III/ Malayalam - III/ Sanskrit - III | III | Language Dept. | 6 | 3 | 100 |
| 7 | 22AEC29 | AEC Part II: English - III: English through Literature | III | English Dept | 6 | 3 | 100 |
| 8 | 22AEC06/ 22AEC10/ 22AEC14/ 22AEC20/ 22AEC24 | AEC Part I: Language – IV Tamil - IV – Vazhakkarakalum Urainadaium/ Hindi - IV/ French - IV/ Malayalam - IV/ Sanskrit - IV | IV | Language Dept. | 6 | 3 | 100 |
| 9 | 22AEC30 | AEC Part II: English - IV: Anthology of Literature | IV | English Dept | 6 | 3 | 100 |
| 10 | 22AEC55 | AEC Part III: Capstone Project for Bioscience | IV | Bioscience Dept. | - | 4 | 100 |
| Total | | | | | | 31 | 1000 |

Group 2. Discipline Specific Courses (DSCs) (18 Courses)

These courses are to be studied compulsorily by the students as a core requirement. The students are required to take DSCs across six semesters. The courses designed under this category aim to cover the basics that a student is expected to imbibe in the particular discipline. It includes Major project.

| S. No. | Course Code | Course Title | Semester | Contact Hours | Credits | Marks |
|--------|---------------------|---|----------|---------------|---------|-------|
| 1 | 22MBU01 | DSC - 1: Integral Microbiology | 1 | 4 | 3 | 100 |
| 2 | 22MBU02/ 22BTU02 | DSC - 2: Biochemistry | 1 | 4 | 3 | 100 |
| 3 | 22BTU03 | DSC - 3: Lab in Cell Biology and Biochemistry | 1 | 5 | 3 | 50 |
| 4 | 22MBU04 | DSC - 4: Microbial Diversity | 2 | 3 | 3 | 100 |
| 5 | 22MBU05 | DSC - 5: Microbial Physiology and Metabolism | 2 | 3 | 3 | 100 |
| 6 | 22MBU06 | DSC - 6: Lab in Microbial Physiology and Metabolism | 2 | 4 | 3 | 50 |
| 7 | 22MBU07 | DSC - 7: Microbial Genetics and Molecular Biology | 3 | 3 | 3 | 100 |
| 8 | 22MBU08/ 22BTU08 | DSC - 8: Immunology | 3 | 3 | 3 | 100 |
| 9 | 22MBU09 | DSC - 9: Lab in Immunology and Molecular Biology | 3 | 3 | 3 | 50 |
| 10 | 22MBU10 | DSC - 10: Clinical Biochemistry | 3 | 3 | 3 | 100 |
| 11 | 22MBU11/ 22BTU11 | DSC - 11: rDNA Technology | 4 | 3 | 3 | 100 |
| 12 | 22MBU12 | DSC - 12: Fermentation Technology | 4 | 3 | 3 | 100 |
| 13 | 22MBU13 | DSC - 13: Lab in rDNA and Fermentation Technology | 4 | 4 | 3 | 50 |
| 14 | 22MBU14 | DSC - 14: Environmental and Agricultural Microbiology | 5 | 4 | 4 | 100 |
| 15 | 22MBU15 | DSC - 15: Food Microbiology | 5 | 5 | 4 | 100 |
| 16 | 22MBU16 | DSC - 16: Lab in Environmental, Agricultural and Food Microbiology | 5 | 5 | 4 | 100 |
| 17 | 22MBU17/ 22BTU17 | DSC - 17: Internship Training | 5 | Completed | | |

| | | | | | | |
|--------------|---------------------|-------------------------------|---|---|-----------|-------------|
| 18 | 22MBU18/ 22BTU18 | DSC - 18: Project Work | 6 | 5 | 4 | 100 |
| Total | | | | | 55 | 1500 |

Group 3. Discipline Specific Elective (DSEs) (10 Courses)

Discipline Specific Elective courses offered under the main discipline of study which may be specialized or advanced or supportive to the discipline of study. Students can choose any TEN courses from the following list.

| S. No. | Course Code | Course Title | Ownership Department | Contact Hours | Credits | Marks |
|------------------------|---------------------|---|--------------------------------|---------------|---------|-------|
| 1 | 22MBU19/ 22BTU19 | DSE - 1: Biophysics and Bioinstrumentation | Biotechnology | 5 | 4 | 100 |
| 2 | 22MBU20/ 22BTU20 | DSE - 2: Bioentrepreneurship | Biotechnology | | | |
| 3 | 22MBU21/ 22BTU21 | DSE - 3: Bioethics, Biosafety and IPR | Microbiology | 3 | 3 | 100 |
| 4 | 22MBU22/ 22BTU22 | DSE - 4 Industrial Exposure Training | Biotechnology/ Microbiology | 4 Weeks | | |
| 5 | 22MBU23/ 22BTU23 | DSE - 5: Human Physiology and Anatomy | Microbiology | 5 | 4 | 100 |
| 6 | 22MBU24 | DSE - 6: Therapeutic Microbiology | Microbiology | | | |
| 7 | 22MBU25/ 22BTU25 | DSE - 7: Ayush | Biotechnology | 4 | 3 | 100 |
| 8 | 22MBU26/ 22BTU26 | DSE - 8: Bionanotechnology | Biotechnology | 4 | 3 | 100 |
| 9 | 22MBU27 | DSE - 11: Medical Virology and Parasitology | Biotechnology | 6 | 5 | 100 |
| 10 | 22MBU28 | DSE - 12: Medical Bacteriology and Mycology | Microbiology | 6 | 5 | 100 |
| 11 | 22MBU29 | DSE - 13: Lab in Medical Microbiology | Microbiology | 6 | 5 | 100 |
| 12 | 22MBU30 | DSE - 9 Molecular Diagnosis | Microbiology | 4 | 3 | 100 |
| 13 | 22MBU31 | DSE - 10: Marine Microbiology | Microbiology | | | |
| 14 | 22MBU32/ 22BTU32 | DSE - 14: Bioinformatics | Bioinformatics | 3 | 3 | 100 |
| 15 | 22MBU33/ 22BTU33 | DSE - 15: Biocompost Technology and Bioinoculant | Microbiology | | | |
| Total (Any 10 Courses) | | | | | | 1000 |

Industrial Exposure Training (IET):

Students can opt for Industrial Exposure Training during fifth semester for a period of 4 weeks, in such case one DSE course will be exempted.

The Continuous Internal Assessment mark distribution for IET is as follows:

| Component | Mode of Conduct | Project Coverage | Marks |
|------------|-----------------|------------------|-----------|
| 3 Reviews | Presentation | Phase by Phase | 25 |
| Work Diary | Written | Phase by Phase | 10 |
| Report | Submission | Entire Process | 15 |

| | |
|--------------|-----------|
| Total | 50 |
|--------------|-----------|

Viva-voce Marks for the Industrial Exposure Training will be given based on the report and viva-voce examination, conducted by the Department.

Report : 30 Marks

Viva-voce : 20 Marks

Project Work:

During the Sixth semester, each student should undertake a project work and submit the report. A guide will be allotted to each student by the Department. A student can select any research topic in discussion with the guide. The project report will be evaluated jointly by the internal and external examiners for **50 Marks** and Viva-voce examination shall be conducted jointly for **50 Marks**.

Three Reviews should be conducted and marks have to be entered in Myclassroom portal as follows:

| | |
|-------------------|------------------------------|
| Review | – 25 Marks |
| Work Dairy | – 10 Marks |
| Report | – 15 Marks |
| Total | – 50 (Internal) Marks |

End Semester Viva-Voce will be conducted for 50 (External) Marks.
(Dissertation - 30 Marks & Viva - voce - 20 Marks)

Group 4. Generic Elective Courses (GECs) (5 Courses)

Generic Elective Courses are interdisciplinary in nature. They are additional courses based on expertise, specialization, requirements, scope, and need of the department. The student has to subscribe any 5 courses in the following list:

| Sl. No. | Course Code | Course Title | Semester | Ownership Department | Contact Hours | Credits | Marks |
|---------|---|---|----------|----------------------|---------------|---------|------------|
| 1 | 22GEU16A | GEC - 1: Biostatistics and Research Methodology | II | Mathematics | 3 | 2 | 50 |
| | 22GEU16B | Biostatistics and Research Methodology lab | | | 2 | 2 | 50 |
| 2 | 22GEU17A | Statistics for Bioscience | | | 3 | 2 | 50 |
| | 22GEU17B | Statistics for Bioscience Lab | | | 2 | 2 | 50 |
| 3 | 22GEU07 | GEC - 2: English for Research Writing | III | English | 3 | 3 | 100 |
| 4 | 22GEU08 | English for Persuasive Communication | | | | | |
| 5 | 22GEC01/ 22GEC02/ 22GEC03/ 22GEC04/ 22GEC05 | GEC - 3: Spoken Hindi/ Spoken Tamil/ Spoken Telugu/ Spoken Malayalam/ Spoken French | IV | Languages | 3 | 2 | 100 |
| 8 | 22GEU54 | GEC-4: A. Programming in ANSI C | IV | ICT | 3 | 2 | 50 |
| | 22GEU55 | B. Programming in ANSI C Lab | | | 2 | 2 | 50 |

| | | | | | | | |
|-------|---------------------|---|---|-------------|---|----|-----|
| 9 | 22GEU56/ 22GEU57 | A. Perl Programming B. Perl Programming Lab | | | 3 | 2 | 50 |
| | | | | | 2 | 2 | 50 |
| 6 | 22GEU22 | GEC - 5: Basic Mathematics for Competitive Examinations | V | Mathematics | 3 | 3 | 100 |
| 7 | 22GEU23 | Talent Enhancement Course: Logical Reasoning and Aptitude | | | | | |
| Total | | | | | | 16 | 500 |

Group 5. Audit Non - Credit Courses (ANCC)

Non - Credit Courses are intended for students who want to gain general knowledge, learn a new skill, upgrade existing skills, enrich their understanding of a wide range of topics, or develop personal interests. A student has to complete any two courses during Semester I and II.

| Part IV - ANCC | | |
|---|-------------|--------------------------------|
| S. No. | Course Code | Course Name |
| Semester I - ANCC 1 | | |
| 1. | 22ANC01 | Environmental Studies |
| Semester II - ANCC 2 - Values & Ethics | | |
| 2. | 22ANC02 | Human Rights |
| 3. | 22ANC03 | Women's Rights |
| 4. | 22ANC04 | Yoga for Human Excellence |
| 5. | 22ANC05 | Indian Culture and Heritage |
| 6. | 22ANC06 | Introduction to Cyber Security |
| 7. | 22ANC07 | Consumer Protection |
| 8. | 22ANC08 | Constitution of India |
| 9. | 22ANC09 | Waste Management |

Student has to take part in any one extension activity during their course of study.

| Part V - ANCC 3 - Extension Activities | | |
|--|-------------|-------------------------|
| S. No. | Course Code | Course Name |
| 1. | 22ANC10 | National Service Scheme |
| 2. | 22ANC11 | National Cadet Corps |
| 3. | 22ANC12 | Youth Red Cross |
| 4. | 22ANC13 | Red Ribbon Club |
| 5. | 22ANC14 | Rotaract Club |
| 6. | 22ANC15 | Sports |
| 7. | 22ANC16 | Association Activities |
| 8. | 22ANC17 | Club Activities |

Group 6.

i) Drive - Through Course (DTC) I & II – Additional Credits

These courses are intended to bring out and promote the self-learning initiative of the students – where their own motivation is what drives them to complete the course and not external compulsions. This fosters the habit of keeping oneself updated always by means of self-study. It gives opportunities to the students to explore new areas of interest and earn additional credits. Students can take any number of courses under this cafeteria system. The credits will not be taken for CGPA calculation. Additional 4 credits per Course will be given on submission of certificate.

1. SWAYAM - NPTEL
2. Coursera

3. Any courses certified by statutory bodies.

ii) Drive - Through Course (DTC – III) – To be Completed

Internship Training / Mini Project / Spoken Tutorial / Economic Talent test etc.

Students individually or with the maximum of four members per batch should take up either Internship training or mini project for a period of fifteen days during IV Semester vacation. The report will be evaluated and viva-voce examination will be conducted during 5th semester. Otherwise, the students have to complete one spoken tutorial course or any certification course suggested by the department.

VIII. Semester - wise Scheme

| Semester I | | | | | | | | | | |
|---|---|--------|--------------|----------------|-----------|----------|-------------|---------------|------------|----------|
| Course Code | Course Title | T/P/ E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N |
| 22AEC02/ 22AEC07/ 22AEC11/ 22AEC17/ 22AEC21 | AEC Part I: Language – I Tamil - I – Tamizhum Ariviyalum/ Hindi - I/ French - I/ Malayalam - I/ Sanskrit - I | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | L |
| | | | | | | | | | SD | N |
| | | | | | | | | | SD | G |
| | | | | | | | | | SD | R |
| | | | | | | | | | SD | N |
| 22AEC26 | AEC PART II: English - I: English for Professional Communication | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU01 | DSC - 1: Integral Microbiology | T | 3 | 4 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU02/ 22BTU02 | DSC - 2: Biochemistry | T | 3 | 4 | 50 | 50 | 100 | 3 | SD | N |
| 22MBU03 | DSC - 3: Lab in Microbiology and Biochemistry | P | 3 | 5 | 25 | 25 | 50 | 3 | SD | N |
| 22MBU19/ 22BTU19 | DSE - 1: Biophysics and Bioinstrumentation | T | 3 | 5 | 50 | 50 | 100 | 4 | SD | G |
| 22MBU20/ 22BTU20 | DSE - 2: Bioentrepreneurship | | | | | | | | EN | N |
| DTC - I - Additional Credit Courses (NPTEL/Coursera) | | | | | | | | 4 | | |
| 22ANC01 | ANCC - 1 (NF2F) Environmental Studies | T | - | 2 | - | - | Completed | | SD | G |
| Total | | | | 30+2 | | | 550 | 19 + 4 | | |
| | | | | | | | | | | |
| Semester II | | | | | | | | | | |
| Course Code | Course Title | T/P/ E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N |
| 22AEC04/ 22AEC08/ 22AEC12/ 22AEC18/ 22AEC22 | AEC Part I: Language – II Tamil - II – Panpattu Padhivugalum Ariviyalalargaum/ Hindi - II/ French - II/ | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | L |
| | | | | | | | | | | N |
| | | | | | | | | | | G |

| | Malayalam - II/ Sanskrit - II | | | | | | | | | R N |
|--|---|-------|--------------|----------------|-----------|----------|-------------|-------------|------------|--------------------------------------|
| 22AEC28 | AEC PART II: English - II: Campus to Corporate | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | G |
| 22AEC35 | AEC - 5 Academic Skills for Bioscience | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | N |
| 22MBU04 | DSC - 4: Microbial Diversity | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU05 | DSC - 5: Microbial Physiology and Metabolism | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU06 | DSC - 6: Lab in Microbial Physiology and Metabolism | P | 3 | 4 | 25 | 25 | 50 | 3 | SD | G |
| | GEC - 1: | | | | | | | | | |
| 22GEU16A | Biostatistics and Research Methodology | T | 3 | 3 | 25 | 25 | 50 | 2 | EN | G |
| 22GEU16B | Biostatistics and Research Methodology Lab | P | 3 | 2 | 25 | 25 | 50 | 2 | | |
| 22GEU17A | Statistics for Bioscience | T | 3 | 3 | 25 | 25 | 50 | 2 | | |
| 22GEU17B | Statistics for Bioscience Lab | P | 3 | 2 | 25 | 25 | 50 | 2 | | |
| 22ANC02 22ANC03 22ANC04 22ANC05 22ANC06 22ANC07 22ANC08 22ANC09 | ANCC-2 (NF2F) Human Rights Women's Rights Yoga for Human Excellence Indian Culture and Heritage Introduction to Cyber Security Consumer Protection Constitution of India Waste Management* | T | - | 2 | - | - | Completed | - | SD | G N G N G N N G |
| DTC II : Additional Credit Courses (NPTEL/Coursera) | | | | | | | | 4 | | |
| Total | | | | 30+2 | | | 650 | 22+4 | | |
| | | | | | | | | | | |
| Semester III | | | | | | | | | | |
| Course Code | Course Title | T/P/E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N |
| 22AEC05/ 22AEC09/ 22AEC13/ 22AEC19/ 22AEC23 | AEC Part I: Language – III: Tamil - III – Kappiyamum Meippadukalum/ Hindi - III/ French - III/ Malayalam - III/ Sanskrit - III | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | L N G R N |
| 22AEC29 | AEC - 7 English - III: English through Literature | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU07 | DSC - 7: Microbial Genetics and Molecular Biology | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU08/ 22BTU08 | DSC - 8: Immunology | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU09 | DSC - 9: Lab in Immunology and | P | 3 | 3 | 25 | 25 | 50 | 3 | SD | G |

| | Molecular Biology | | | | | | | | | | | |
|---|---|-----------|--------------------|----------------------|--------------|-------------|----------------|---------|------------------|-------------|--|--|
| 22MBU10 | DSC - 10: Clinical Biochemistry | T | 3 | 3 | 50 | 50 | 100 | 3 | EM | G | | |
| 22MBU21/ 22BTU21 | DSE - 3: Bioethics, Biosafety and IPR | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | N | | |
| 22GEC06 | GEC - 2: English for Research Writing | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G | | |
| 22GEC08 | English for Persuasive Communication | | | | | | | | | | | |
| Total | | | | 30 | | | 750 | 24 | | | | |
| | | | | | | | | | | | | |
| Semester IV | | | | | | | | | | | | |
| Course Code | Course Title | T/P/ E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N | | |
| 22AEC06/ 22AEC10/ 22AEC14/ 22AEC20/ 22AEC24 | AEC Part I: Language – IV Tamil - IV – Vazhakkarukalum Urainadaium/ Hindi - IV/ French - IV/ Malayalam - IV/ Sanskrit - IV | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | L | | |
| | | | | | | | | | | N | | |
| | | | | | | | | | | G | | |
| | | | | | | | | | | R | | |
| | | | | | | | | | | N | | |
| 22AEC30 | AEC- 9 English - IV: Anthology of Literature | T | 3 | 6 | 50 | 50 | 100 | 3 | SD | G | | |
| 22AEC55 | AEC – 10 Capstone Project for Bioscience | T | 3 | - | 50 | 50 | 100 | 4 | EM | N | | |
| 22MBU11/ 22BTU11 | DSC - 11: rDNA Technology | T | 3 | 3 | 50 | 50 | 100 | 3 | SD | G | | |
| 22MBU12 | DSC - 12: Fermentation Technology | T | 3 | 3 | 50 | 50 | 100 | 3 | EN | G | | |
| 22MBU13 | DSC - 13: Lab in rDNA and Fermentation Technology | P | 3 | 4 | 25 | 25 | 50 | 3 | EN | G | | |
| 22GEC01/ 22GEC02/ 22GEC03/ 22GEC04/ 22GEC05 | GEC - 3: Spoken Hindi/ Spoken Tamil/ Spoken Telugu / Spoken Malayalam/ Spoken French | T | 3 | 3 | 50 | 50 | 100 | 2 | SD | L | | |
| | | | | | | | | | | N | | |
| | | | | | | | | | | R | | |
| | | | | | | | | | | R | | |
| | | | | | | | | | | G | | |
| 22GEU54 | GEC - 5: A. Programming in ANSI C B. Programming in ANSI C Lab | T | 3 | 3 | 25 | 25 | 50 | 2 | SD | G | | |
| 22GEU55 | | P | 3 | 2 | 25 | 25 | 50 | 2 | | | | |
| 22GEU56 | A. Perl Programming B. Perl Programming Lab | T | 3 | 3 | 25 | 25 | 50 | 2 | | | | |
| 22GEU57 | | P | 3 | 2 | 25 | 25 | 50 | 2 | | | | |
| Total | | | | 30 | | | 750 | 25 | | | | |
| | | | | | | | | | | | | |
| Semester V | | | | | | | | | | | | |
| Course Code | Course Title | T/P/ E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N | | |

| | | | | | | | | | EN | |
|----------------------|--|--------|--------------|----------------|-----------|----------|-------------|---------|------------|----------|
| 22MBU22/ 22BTU22 | DSE - 4: Industrial Exposure Training | P | 3 | 4 Weeks | 50 | 50 | 100 | 4 | EN | N |
| OR | | | | | | | | | | |
| 22MBU23/ 22BTU23 | DSE - 5: Human Physiology and Anatomy | T | 3 | 5 | 50 | 50 | 100 | 4 | EM | N |
| 22MBU24 | DSE - 6: Therapeutic Microbiology | | | | | | | | SD | G |
| AND | | | | | | | | | | |
| 22MBU14 | DSC - 14: Environmental and Agricultural Microbiology | T | 3 | 4 | 50 | 50 | 100 | 4 | SD | G |
| 22MBU15 | DSC - 15: Food Microbiology | T | 3 | 5 | 50 | 50 | 100 | 4 | SD | G |
| 22MBU16 | DSC - 16: Lab in Environmental, Agricultural and Food Microbiology | P | 5 | 5 | 50 | 50 | 100 | 4 | EN | G |
| 22MBU25/ 22BTU25/ | DSE - 7: Ayush | T | 3 | 4 | 50 | 50 | 100 | 3 | EM | N |
| 22MBU26/ 22BTU26 | DSE - 8: Bionanotechnology | T | 3 | 4 | 50 | 50 | 100 | 3 | SD | G |
| 22GEU22 | GEC - 4: Basic Mathematics for Competitive Examinations | T | 3 | 3 | 50 | 50 | 100 | 3 | EM | G |
| 22GEU23 | Talent Enhancement Course: Logical Reasoning and Aptitude | | | | | | | | | |
| 22MBU17/ 22BTU17 | DTC - III: DSC - 17: Internship Training | P | - | - | - | - | Completed | | EM | N |
| Total | | | | 30 | | | 700 | 25 | | |
| Semester VI | | | | | | | | | | |
| Course Code | Course Title | T/P/ E | ESE Dur. Hrs | Ins. Hrs/ Week | CIA Marks | ES Marks | Total Marks | Credits | SD/ EM/ EN | G/L/ R/N |
| 22MBU27 | DSE - 9: Medical Virology and Parasitology | T | 3 | 6 | 50 | 50 | 100 | 5 | SD | G |
| 22MBU28 | DSE - 10: Medical Bacteriology and Mycology | T | 3 | 6 | 50 | 50 | 100 | 5 | SD | G |
| 22MBU29 | DSE - 11: Lab in Medical Microbiology | P | 9 | 5 | 50 | 50 | 100 | 5 | EM | G |
| 22MBU18/ 22BTU18 | DSC - 18: Project Work | P | 3 | 5 | 50 | 50 | 100 | 4 | EM | g |
| 22MBU30/ 22BTU30 | DSE - 12 Molecular Diagnosis | T | 3 | 4 | 50 | 50 | 100 | 3 | EM | N |
| 22MBU31 | DSE - 13: Marine Microbiology | | | | | | | | SD | G |
| 22MBU32/ 22BTU32 | DSE - 14: Bioinformatics | T | 3 | 4 | 50 | 50 | 100 | 3 | SD | G |
| 22MBU33/ 22BTU33 | DSE - 15: Biocompost Technology and | | | | | | | | EN | N |

| | | | | | | | | | | |
|---|-----------------------------|--|---|-----------|---|---|-------------------------------------|---------------|----|---|
| | Bioinoculant | | | | | | | | | |
| 22ANC10 | ANCC3: | | | | | | | | | N |
| 22ANC11 | Extension Activities | | | | | | | | | N |
| 22ANC12 | National Service Scheme/ | - | 3 | - | - | - | Grade | - | SD | N |
| 22ANC13 | National Cadet Corps/ | | | | | | | | | N |
| 22ANC14 | Youth Red Cross/ | | | | | | | | | L |
| 22ANC15 | Red Ribbon Club/ | | | | | | | | | N |
| 22ANC16 | Rotaract Club/ | | | | | | | | | L |
| 22ANC17 | Sports/ | | | | | | | | | L |
| | Association Activities | | | | | | | | | |
| | Club Activities | | | | | | | | | L |
| Total | | | | 30 | | | 600 | 25 | | |
| | | Total | | | | | 4000 | 140 +8 | | |
| Drive-Through Course (DTC): Courses offered in SWAYAM-NPTEL, Coursera OR Any courses certified by statutory bodies. | | Additional 4 credits per Course will be given on submission of Certificate | | | | | During Semester I to Semester VI | | | |

| The Courses focuses the following needs: | | | | |
|--|-------------------|--------------|--------------|-----------|
| Needs | G - Global | N - National | R - Regional | L - Local |
| SD | Skill Development | | | |
| EM | Employability | | | |
| EN | Entrepreneurship | | | |

Semester-wise Distribution of Marks and Credits:

| Semester | Total Marks | Total Credits |
|--------------|-------------|----------------|
| I | 550 | 19 + 4 |
| II | 650 | 22 + 4 |
| III | 750 | 24 |
| IV | 750 | 25 |
| V | 700 | 25 |
| VI | 600 | 25 |
| Total | 4000 | 140 + 8 |

OFFERED BY

List of Courses Offered by Languages Department

| Semester | Course Code | Course Name | Programme | T/P/ E | Ins. hrs | CIA | ES | Total Marks | Credit |
|----------|---|---|-----------|--------|----------|-----|----|-------------|--------|
| IV | 22GEC01/ 22GEC02/ 22GEC03/ 22GEC04/ 22GEC05 | Spoken Hindi/ Spoken Tamil/ Spoken Telugu / Spoken Malayalam/ Spoken French | B.Sc. MB | T | 3 | 100 | - | 100 | 2 |

List of Courses Offered by Mathematics Department

| Sem | Course Code | Course Name | Programme | T/P/ E | Ins. hrs | CIA | ES | Total Marks | Credit |
|-----|-------------|---|-----------|--------|----------|-----|----|-------------|--------|
| II | 22GEU16A | Biostatistics and Research Methodology | B.Sc. MB | T | 3 | 25 | 25 | 50 | 2 |

| | | | | | | | | | |
|---|----------|--|----------|---|---|----|----|-----|---|
| | 22GEU16B | Biostatistics and Research Methodology Lab | B.Sc. MB | P | 2 | 25 | 25 | 50 | 2 |
| | 22GEU17A | Statistics for Bioscience | B.Sc. MB | T | 3 | 25 | 25 | 50 | 2 |
| | 22GEU17B | Statistics for Bioscience Lab | B.Sc. MB | P | 2 | 25 | 25 | 50 | 2 |
| V | 22GEU22 | Talent Enhancement Course: Basic Mathematics for Competitive Examinations | B.Sc. MB | T | 3 | 50 | 50 | 100 | 3 |
| | 22GEU23 | Logical Reasoning and Aptitude | B.Sc. MB | T | 3 | 50 | 50 | 100 | 3 |

List of Courses Offered by Computer Technology Department

| Sem | Course Code | Course Name | Programme | T/P/ E | Ins. hrs | CIA | ES | Total Marks | Credit |
|-----|-------------|---------------------------|-----------|--------|----------|-----|----|-------------|--------|
| IV | 22GEU54 | Programming in ANSI C | B.Sc. MB | T | 3 | 25 | 25 | 50 | 2 |
| | 22GEU55 | Programming in ANSI C Lab | B.Sc. MB | P | 2 | 25 | 25 | 50 | 2 |
| | 22GEU56 | Perl Programing | B.Sc. MB | T | 3 | 25 | 25 | 50 | 2 |
| | 22GEU57 | Perl Programming Lab | B.Sc. MB | P | 2 | 25 | 25 | 50 | 2 |

List of Courses Offered by Biotechnology Department

| Sem | Course Code | Course Name | Programme | T/P/ E | Ins. hrs | CIA | ES | Total Marks | Credit |
|-----|---------------------|-----------------------------------|-----------|--------|----------|-----|----|-------------|--------|
| I | 22MBU19/ 22BTU19 | Biophysics and Bioinstrumentation | B.Sc. MB | T | 5 | 50 | 50 | 100 | 4 |
| I | 22MBU20/ 22BTU20 | Bioentrepreneurship | B.Sc. MB | T | 5 | 50 | 50 | 100 | 4 |
| V | 22MBU25/ 22BTU25 | Ayush | B.Sc. MB | T | 4 | 50 | 50 | 100 | 3 |
| V | 22MBU26/ 22BTU26 | Bionanotechnology | B.Sc. MB | T | 4 | 50 | 50 | 100 | 3 |

List of Courses Offered by Bioinformatics Department

| Sem | Course Code | Course Name | Programme | T/P/ E | Ins. hrs | CIA | ES | Total Marks | Credit |
|-----|---------------------|----------------|-----------|--------|----------|-----|----|-------------|--------|
| V | 22MBU32/ 22BTU32 | Bioinformatics | B.Sc. MB | T | 3 | 50 | 50 | 100 | 3 |

OFFERED TO

List of Courses Offered to Biotechnology Department

| Sem | Course Code | Course Name | Programme | T/P/E | Ins. hrs | CIA | ES | Total Marks | Credit |
|-----|---------------------|--|-----------|-------|----------|-----|----|-------------|--------|
| III | 22MBU21/ 22BTU21 | Bioethics, Biosafety and IPR | B.Sc. BT | T | 3 | 50 | 50 | 100 | 3 |
| V | 22MBU23/ 22BTU23 | Human Physiology and Anatomy | B.Sc. BT | T | 5 | 50 | 50 | 100 | 4 |
| V | 22MBU30/ 22BTU30 | Molecular Diagnosis | B.Sc. BT | T | 3 | 50 | 50 | 100 | 3 |
| VI | 22MBU33/ 22BTU33 | Biocompost Technology and Bioinoculant | B.Sc. BT | T | 3 | 50 | 50 | 100 | 3 |