# Dr. N.G.P. ARTS AND SCIENCE COLLEGE

**(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)**
Approved by Government of Tamil Nadu & Accredited by NAAC with A++ Grade (3rd Cycle - 3.64 CGPA)
Dr. N.G.P. -Kalapatti Road, Coimbatore – 641048, Tamil Nadu, India
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## Regulations 2025-26 for Undergraduate Programme

## (Outcome Based Education model with Choice Based Credit System)

## B.Sc Microbiology Degree

(For the students admitted during the academic year 2025-26 )

**Programme : Microbiology**

**Eligibility:**

A pass in Higher Secondary Examination with any Academic stream or Vocational stream with Biology/Zoology/Botany /Biotechnology/Microbiology/Life Science as one of the subject and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Science (Microbiology)** Degree Examination of this College after a course study of three academic years.

**Programme Objectives:**

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To inculcate practical knowledge in correlation with the theoretical knowledge.
2. To equip the students to meet the requirements of the current technology in Microbiology.
3. To motivate and train the students in various clinical and industrial sectors.
4. To encourage students to involve in research to explore microorganisms for the betterment of mankind.

**PROGRAM OUTCOMES:**

On the successful completion of the program, the following are the expected outcomes.

| PO Number | PO Statement |
|---|---|
| PO1 | To prepare microbiologists who are competent, creative, and highly valued professionals in academia, industry and private/public sector that is capable of excelling in careers of their choice. |
| PO2 | To impart basic knowledge on the theoretical basis of the tools and techniques and to imbibe and demonstrate the practical skills in microbiology. |
| PO3 | To disseminate knowledge in microbiological discipline and to promote and develop competency in microbiology that have enduring value beyond the classroom. |
| PO4 | To instill a pattern of life-long learning and to translate the potentials of microorganisms to the welfare of biosphere. |
| PO5 | To explore the scope of various branches of microbiology to become an entrepreneur. |

## Credit distribution

### Credit distribution for all UG programmes

| Part | Subjects | No.of Papers | Credit | Semester No. |
|---|---|---|---|---|
| I (12 Credits) | Tamil / Hindi / French/Malayalam | 4 | 4 x 3 = 12 | I & IV |
| II (12 Credits) | English | 4 | 4 x 3 = 12 | I & IV |
| III (108 Credits) | Core (Credits 2,3,4,5 ) | 17 | 70 | I to VI |
| | Inter Departmental Course (IDC) | 4 | 16 | I to IV |
| | Discipline Specific Elective (DSE) | 3 | 3 x 4 =12 | V & VI |
| | Skill Enhancement Course(SEC) | 4 | 8 | III ,IV,V& VI |
| | Industrial Training | 1 | 2 | V |
| IV (8 Credits) | Environmental Studies(AECC) | 1 | 2 | I |
| | Basic Tamil/ Advance Tamil /Human Rights &Women's Rights(AECC) | 1 | 2 | II |
| | Innovation & IPR/Innovation, IPR &Entrepreneurship (AECC) | 1 | 2 | VI |
| | Generic Elective(GE) (AEEC) | 1 | 2 | V |
| V (2 Credits) | NSS/NCC/YRC/RRC/Yoga/Sports/Clubs/ Health and Wellness | - | 2 | I -II |
| TOTAL CREDITS | | | 142 | |

**CURRICULUM**
**B.SC. MICROBIOLOGY**
**A.Y. 2024-25**

| Course Code | Course Category | Course Name | L | T | P | Instruction Hours | | Exam (h) | Max Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | CIA | ESE | Total | |
| **First Semester** | | | | | | | | | | | | |
| **Part – I** | | | | | | | | | | | | |
| 25TLU1TA | Language - I | Tamil-I | 4 | 1 | - | 5 | 60 | 3 | 25 | 75 | 100 | 3 |
| 25TLU1HA | | Hindi-I | | | | | | | | | | |
| 25TLU1MA | | Malayalam-I | | | | | | | | | | |
| 25TLU1FA | | French –I | | | | | | | | | | |
| **Part – II** | | | | | | | | | | | | |
| 25ELU1EA | Language - II | English - I | 4 | 1 | - | 5 | 60 | 3 | 25 | 75 | 100 | 3 |
| **Part –III** | | | | | | | | | | | | |
| 25MBU1CA | Core - I | Fundamentals of Microbiology | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU1CB | Core - II | Cell Biology | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU1CP | Core Practical - I | Fundamentals of Microbiology and Cell Biology | - | - | 5 | 5 | 60 | 6 | 40 | 60 | 100 | 2 |
| 25CLU1IA | IDC - I | Biochemistry | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25CLU1IP | IDC Practical - I | Biochemistry | - | - | 4 | 4 | 48 | 4 | 40 | 60 | 100 | 2 |
| **Part –IV** | | | | | | | | | | | | |
| 25MBU1AA | AECC-I | Environmental Studies | 2 | - | - | 2 | 24 | - | 50 | - | 50 | 2 |
| **Part –V** | | | | | | | | | | | | |
| 25MBU1XA | Extension Activity | NSS/NCC/YRC/ RRC/ Yoga/Sports | - | - | - | - | - | - | 50 | - | 50 | 1 |
| **Total** | | | **19** | **1** | **10** | **30** | **360** | | | | **800** | **22** |

| Course Code | Course Category | Course Name | L | T | P | Instruction Hours | | Exam (h) | Max Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | CIA | ESE | Total | |
| **Second Semester** | | | | | | | | | | | | |
| **Part - I** | | | | | | | | | | | | |
| 25TLU2TA | Language - I | Tamil-II | 4 | 1 | - | 5 | 60 | 3 | 25 | 75 | 100 | 3 |
| 25TLU2HA | | Hindi-II | | | | | | | | | | |
| 25TLU2MA | | Malayalam- II | | | | | | | | | | |
| 25TLU2FA | | French – II | | | | | | | | | | |
| **Part - II** | | | | | | | | | | | | |
| 25ELU2EA | Language - II | English - II | 4 | - | 1 | 5 | 60 | 3 | 25 | 75 | 100 | 3 |
| **Part -III** | | | | | | | | | | | | |
| 25MBU2CA | Core - III | Microbial Physiology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU2CB | Core - IV | Bioinstrumentation | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU2CP | Core Practical - II | Microbial Physiology and Bioinstrumentation | - | - | 5 | 5 | 60 | 9 | 40 | 60 | 100 | 2 |
| 25CEU2IN | IDC - II | Basic Chemistry | 2 | - | 4 | 6 | 72 | 3 | 40 | 60 | 100 | 4 |
| **Part-IV** | | | | | | | | | | | | |
| 25TLU2AA<br>25TLU2AB<br>25CRU2AA | AECC-II | Basic Tamil/ Advanced Tamil/ Human Rights and Women's Rights | 2 | - | - | 2 | 24 | - | 50 | - | 50 | 2 |
| **Part -V** | | | | | | | | | | | | |
| 25MBU2XA | Extension Activity | NSS/NCC/YRC / RRC/Yoga/Sports/ Club/Health and Wellness | - | - | - | | | - | 50 | - | 50 | 1 |
| **Total** | | | **19** | **1** | **10** | **30** | **360** | | | | **700** | **22** |

| Course Code | Course Category | Course Name | L | T | P | Instruction Hours | | Exam (h) | Max Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | CIA | ESE | Total | |
| **Third Semester** | | | | | | | | | | | | |
| **Part – I** | | | | | | | | | | | | |
| 25TLU3TA | Language - I | Tamil-III | 3 | 1 | - | 4 | 48 | 3 | 25 | 75 | 100 | 3 |
| 25TLU3HA | | Hindi-III | | | | | | | | | | |
| 25TLU3MA | | Malayalam- III | | | | | | | | | | |
| 25TLU3FA | | French – III | | | | | | | | | | |
| **Part – II** | | | | | | | | | | | | |
| 25ELU3EA | Language - II | English – III | 3 | 1 | - | 4 | 48 | 3 | 25 | 75 | 100 | 3 |
| **Part – III** | | | | | | | | | | | | |
| 25MBU3CA | Core - V | Microbial Diversity | 4 | 1 | - | 5 | 60 | 3 | 25 | 75 | 100 | 4 |
| 25MBU3CB | Core - VI | Microbial Genetics | 3 | 1 | - | 4 | 48 | 3 | 25 | 75 | 100 | 3 |
| 25MBU3CP | Core Practical - III | Microbial Diversity and Microbial Genetics | - | - | 6 | 6 | 72 | 9 | 40 | 60 | 100 | 3 |
| 25MTU3IF | IDC - III | Principles of Biostatistics | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU3SA | SEC - I | Food and Water Quality Analysis | 2 | 1 | - | 3 | 36 | 3 | 25 | 75 | 100 | 2 |
| **Total** | | | **19** | **4** | **7** | **30** | **360** | | | | **700** | **22** |

| Course Code | Course Category | Course Name | L | T | P | Instruction Hours | | Exam (h) | Max Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | CIA | ESE | Total | |
| **Fourth Semester** | | | | | | | | | | | | |
| **Part – I** | | | | | | | | | | | | |
| 25TLU4TA | Language - I | Tamil-IV | 3 | 1 | - | 4 | 48 | 3 | 25 | 75 | 100 | 3 |
| 25TLU4HA | | Hindi-IV | | | | | | | | | | |
| 25TLU4MA | | Malayalam-IV | | | | | | | | | | |
| 25TLU4FA | | French -IV | | | | | | | | | | |
| **Part – II** | | | | | | | | | | | | |
| 25ELU4EA | Language- II | English – IV | 3 | 1 | - | 4 | 48 | 3 | 25 | 75 | 100 | 3 |
| **Part – III** | | | | | | | | | | | | |
| 25MBU4CA | Core - VII | Immunology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU4CM | Core - VIII | Food Microbiology | 2 | - | 4 | 6 | 72 | 9 | 40 | 60 | 100 | 4 |
| 25MBU4CP | Core Practical - IV | Immunology & Recombinant DNA Technology | - | - | 6 | 6 | 72 | 9 | 40 | 60 | 100 | 3 |
| 25BTU4IC | IDC - IV | Bioinformatics | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU4SA | SEC-II | Recombinant DNA Technology | 2 | 1 | - | 3 | 36 | 3 | 25 | 75 | 100 | 2 |
| **Total** | | | **17** | **2** | **1** | **30** | **360** | | | | **700** | **22** |

| Course Code | Course Category | Course Name | L | T | P | Instruction Hours | | Exam (h) | Max Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | CIA | ESE | Total | |
| **Fifth Semester** | | | | | | | | | | | | |
| **Part – III** | | | | | | | | | | | | |
| 25MBU5CA | Core – IX | Medical Bacteriology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU5CB | Core - X | Virology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU5CC | Core - XI | Mycology and Parasitology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU5CD | Core - XII | Advanced Diagnostic Microbiology | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU5CP | Core Practical - V | Medical Microbiology | - | - | 6 | 6 | 72 | 9 | 40 | 60 | 100 | 3 |
| 25MBU5SA | SEC-III | Microbial Fermentation | 2 | 1 | - | 3 | 36 | 3 | 25 | 75 | 100 | 2 |
| 25MBU5DA | DSE-I | Microbial Products and Process | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU5DB | | Dairy Microbiology | | | | | | | | | | |
| 25MBU5DC | | Communicable Diseases | | | | | | | | | | |
| 25MBU5TA | IT | Industrial Training | - | - | - | - | - | - | 40 | 60 | 100 | 2 |
| **Part – IV** | | | | | | | | | | | | |
| 25MBU5GA | GE (AEEC) | Food Sanitation and Public Health | 2 | - | - | 2 | 24 | 3 | 50 | - | 50 | 2 |
| **Total** | | | **23** | **1** | **6** | **30** | **360** | | | | **850** | **28** |

| Course code | Course category | Course name | L | T | P | Instruction Hours | | Exam (h) | Max. Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Week | Total | | ESE | CIA | Total | |
| **Sixth semester** | | | | | | | | | | | | |
| **Part III** | | | | | | | | | | | | |
| 25MBU6CA | Core-XIII | Environmental Microbiology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU6CB | Core-XIV | Agricultural Microbiology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU6CC | Core-XV | Downstreaming of Microbial Products | 3 | - | - | 3 | 36 | 3 | 25 | 75 | 100 | 3 |
| 25MBU6CP | Core Practical - VI | Environmental, Agricultural and Industrial Microbiology | - | - | 6 | 6 | 72 | 9 | 40 | 60 | 100 | 3 |
| 25MBU6SA | SEC-IV | Pharmaceutical Microbiology | 2 | 1 | - | 3 | 36 | 3 | 25 | 75 | 100 | 2 |
| 25MBU6DA | DSE-II | Phytochemical Drug Discovery | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU6DB | | Entrepreneurial Microbiology | | | | | | | | | | |
| 25MBU6DC | | Medical laboratory Techniques | | | | | | | | | | |
| 25MBU6DD | DSE-III | Microbial Fuel Technology | 4 | - | - | 4 | 48 | 3 | 25 | 75 | 100 | 4 |
| 25MBU6DE | | Perspectives on Microbiology Lab Accreditation | | | | | | | | | | |
| 25MBU6DF | | Epidemiology and Public Health | | | | | | | | | | |
| **Part IV** | | | | | | | | | | | | |
| 25BIU6AA | AECC-III | Innovation and IPR | 2 | - | - | 2 | 24 | - | 50 | - | 50 | 2 |
| **Total** | | | **23** | **1** | **6** | **30** | **360** | | | | **750** | **26** |
| | | | | | | | | | | ***Grand Total** | **4500** | **142** |

## GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective

**Semester - V (GE)**

| S. No. | Course Code | Sem. | Course Name |
|---|---|---|---|
| 1 | 25MBU5GA | V | Food Sanitation and Public Health |

## SELF STUDY COURSES

The following are the courses offered under self study

| S. No. | Course Code | Sem | Course Name |
|---|---|---|---|
| 1 | 25MBUSSA | III | Pedagogy for Biology |
| 2 | 25MBUSSB | III | Bio- Marketing |

| Semester – I<br>LANGUAGE – I: TAMIL - I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25TLU1TA | TAMIL - I | LANGUAGE- I | 48 | 12 | - | 3 |

| | |
|---|---|
| **Preamble** | மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல் |
| | கலை மற்றும் மரபுகளை அறியச் செய்தல் |
| | மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல் |
| **Prerequisite** | தமிழ் மொழி எழுதி, படிக்கும் திறன் |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO. No.** | **Course Outcomes (COs) Statement** | **Bloom's Tax anomy Knowledge Level** |
| CO1 | வாழ்க்கைத்திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல் | K2 |
| CO2 | மதிப்புக்கல்வி (Attitude and Value education) | K3 |
| CO3 | பாடஇணைச்செயல்பாடுகள் (Co-curricular activities) | K3 |
| CO4 | சூழலியல் ஆக்கம் (Ecology) | K4 |
| CO5 | மொழி அறிவு (Tamil knowledge) | K4 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | | ✓ | ✓ | | ✓ |
| CO2 | ✓ | | | ✓ | |
| CO3 | | ✓ | | | ✓ |
| CO4 | | | ✓ | | |
| CO5 | ✓ | | | ✓ | ✓ |

| 25TLU1TA | TAMIL - I |
|---|---|

**Syllabus**

| Unit | Content | Hrs | Resources |
|---|---|---|---|
| 1 | **மறுமலர்ச்சிக் கவிதைகள்**<br>1. இலக்கிய வரலாறு -மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்<br>2. பாரததேசம்- பாரதியார்<br>3. படி - பாரதிதாசன்<br>4. தமிழரின் பெருமை- நாமக்கல் கவிஞர்<br>5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை<br>6. **திரைத்தமிழ்**<br>அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத் தொடங்கும் பாடல் – உடுமலை நாராயண கவி<br>ஆ) 'சும்மா கிடந்த நிலத்தை' எனத் தொடங்கும் பாடல் – பட்டுக்கோட்டை கல்யாண சுந்தரனார்<br>இ) 'சமரசம் உலாவும் இடமே' எனத் தொடங்கும் பாடல் -மருதகாசி<br>ஈ) 'உன்னை அறிந்தால்' எனத் தொடங்கும் பாடல் -கண்ணதாசன் | 13 | தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026<br>https://www.youtube.com/watch?v=Up55uhkk9z!  |
| 2 | **புதுக்கவிதைகள்**<br>1. இலக்கிய வரலாறு - புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்<br>2. கடமையைச் செய் - மீரா<br>3. ஓடு ஓடு சங்கிலி - சிற்பி பாலசுப்பிரமணியம்<br>4. ஒப்பிலாத சமுதாயம் - அப்துல் ரகுமான்<br>5. மரங்கள் - மு.மேத்தா<br>6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்<br>7. ஐந்தாம் வகுப்பு 'அ' பிரிவு - நா. முத்துக்குமார்<br>8. ஹைகூ கவிதைகள் - 10 கவிதைகள் | 13 | தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026<br>https://www.youtube.com/watch?v=dX9ZaNJMaco |
| 3 | **பெண்ணியம்**<br>1. தொலைந்து போனேன் - தாமரை<br>2. நீரில் அலையும் முகம் - அ. வெண்ணிலா<br>3. தற்காத்தல் - பொன்மணி வைரமுத்து<br>4. ஏனிந்த வித்தியாசங்கள் ? - மல்லிகா<br>5. புதையுண்ட வாழ்க்கை - சுகந்தி சுப்ரமணியன் | 10 | தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026<br>https://www.youtube.com/watch?v=DLabokqWEdg |
| 4 | **சிறுகதைகள்**<br>1.இலக்கிய வரலாறு - சிறுகதையின் தோற்றமும் வளர்ச்சியும்<br>2. கனகாம்பரம் - கு.ப.ராஜகோபாலன்<br>3. கடிதம்- புதுமைப்பித்தன்<br>4. பொம்மை - ஜெயகாந்தன்<br>5. காய்ச்சமரம் - கி. ராஜநாராயணன்<br>6. காட்டில் ஒருமான் - அம்பை<br>7.வேட்கை - சூர்யகாந்தன் | 14 | தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026<br>https://www.youtube.com/watch?v=78u7iTN3OU8 |

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|---|---|---|---|
| 5 | **பயிற்சிப் பகுதி**<br>**அ. இலக்கணம்**<br>1. வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கிஎழுதுதல்<br>2. ர,ற-ல,ழ,ள - ண,ந,ன வேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்<br>**ஆ. படைப்பாக்கம்**<br>1. கவிதை- எழுதுதல் (15 வரிகள் முதல் 30 வரிகள் வரை)<br>2.சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்) | 10 | தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026<br>https://www.youtube.com/watch?v=B3wfM0QL6N8<br>https://www.youtube.com/watch?v=FchTlqAtwBU<br>https://www.youtube.com/watch?v=gCP3gC-JQU4<br>https://www.youtube.com/watch?v=p9QOHD12Yeo |
| | Total | 60 | |

| | | |
|---|---|---|
| **Text book** | 1. | தமிழ் மொழிப்பாடம் – 2025-2026 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என். ஜி. பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர் – 641048. |
| **Reference Books** | 1. | பேராசிரியர் புலவர் சோம. இளவரசு, தமிழ் இலக்கிய வரலாறு, எட்டாம் பதிப்பு – 2024, மணிவாசகர் பதிப்பகம், சென்னை – 600 108. |
| | 2. | பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு – 2023, இலக்கணம், இலக்கியவரலாறு, மொழித்திறன் – பூவேந்தன் பதிப்பகம், சென்னை – 600 004. |

| | |
|---|---|
| **Journal and Magazines** | இலக்கிய இதழ்கள் |
| **E-Resources and Website** | https://www.tamilvu.org |

| | |
|---|---|
| **Learning Method** | Lecture/ Tutorial / Student Seminar/GD/Assignment |

| | |
|---|---|
| **Focus of the Course** | Skill Development / Employability |

| Semester – I<br>LANGUAGE –I: HINDI – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25TLU1HA | HINDI – I | LANGUAGE- I | 48 | 12 | - | 3 |

| | |
|---|---|
| **Preamble** | The writing ability and develop reading skill |
| | The various concepts and techniques for criticizing literature |
| | The techniques for expansion of ideas and translation process |
| **Prerequisite** | To understand the language Hindi for communication |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO.No.** | **Course Outcomes (COs) Statement** | **Bloom's Tax anomy Knowledge Level** |
| CO1 | Learn the fundamentals of novels and stories | K2 |
| CO2 | Understand the principles of translation work | K3 |
| CO3 | Expose the knowledge writing critical views on fiction | K3 |
| CO4 | Build creative ability | K3 |
| CO5 | Apply the power of creative reading | K4 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | | ✓ | ✓ | | ✓ |
| CO2 | ✓ | | | ✓ | |
| CO3 | | ✓ | | | ✓ |
| CO4 | | | ✓ | | |
| CO5 | ✓ | | | ✓ | ✓ |

| 25TLU1HA | HINDI – I |
|---|---|

**Syllabus**

| Unit | Content | Hrs | Resources |
|---|---|---|---|
| 1 | गद्य – नूतन गद्य संग्रह (जयप्रकाश) पाठ1- रजिया पाठ, 2- मक्रील पाठ 3- बहता पानी निर्मला<br>पाठ4- राष्ट्रपिता महात्मा गाँधी | 13 | Text Book |
| 2 | कहानी कुंज- डॉ वी.पी. 'अमिताभ'(पाठ 1-4) | 13 | Text Book |
| 3 | व्याकरण : शब्दविचार ( संज्ञा, सर्वनाम,विशेषण) | 12 | Text Book |
| 4 | अनुच्छेद लेखन | 12 | Text Book |
| 5 | अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में) (पाठ1 to 10) | 10 | Text Book |
| | Total | 60 | |

| | | |
|---|---|---|
| **Text books** | 1. | प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड' अशोक नगर इलाहाबाद-211001 |
| | 2. | प्रकाशक: गोविन्द प्रकाशन सदर बाजार, मथुरा उत्तरप्रदेश-281001 |
| | 3. | पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024 |
| | 4. | पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024 |
| | 5. | प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 |
| **Reference Books** | | - |

| | |
|---|---|
| **Journal and Magazines** | - |
| **E-Resources and Website** | - |

| | |
|---|---|
| **Learning Method** | Lecture/ Tutorial / Student Seminar/GD/Assignment |

| | |
|---|---|
| **Focus of the Course** | Skill Development / Employability |

| Semester – I<br>MALAYALAM- I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25TLU1MA | MALAYALAM- I | LANGUAGE- I | 48 | 12 | - | 3 |

| | |
|---|---|
| **Preamble** | The writing ability and develop reading skill |
| | The various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process |
| | The competency in translating simple Malayalam sentences into English and vice versa |
| **Prerequisite** | To understand the language Malayalam for communication |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO. No.** | **Course Outcomes (COs) Statement** | **Bloom's Tax anomy Knowledge Level** |
| CO1 | Learn the fundamentals of novels and stories | K2 |
| CO2 | Understand the principles of translation work | K3 |
| CO3 | Expose the knowledge writing critical views on fiction | K3 |
| CO4 | Apply creative ability | K3 |
| CO5 | Build the power of creative reading | K4 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | | ✓ | ✓ | | ✓ |
| CO2 | ✓ | | | ✓ | |
| CO3 | | ✓ | | | ✓ |
| CO4 | | | ✓ | | |
| CO5 | ✓ | | | ✓ | ✓ |

| 25TLU1MA | MALAYALAM- I |
|---|---|

**Syllabus**

| Unit | Content | Hrs | Resources |
|---|---|---|---|
| 1 | **Novel**<br>PathummayudeAdu | 14 | Text book |
| 2 | **Novel**<br>PathummayudeAdu | 10 | Text book |
| 3 | **Short Story**<br>Nalinakanthi | 14 | Text book |
| 4 | **Short Story**<br>Nalinakanthi | 10 | Text book |
| 5 | **Practical Application**<br>Expansion of ideas, General Essay and Translation | 12 | Text book |
| | Total | 60 | |

| | | |
|---|---|---|
| **Text books** | 1. | Vaikkam Muhammed Basheer, "PathummayudeAdu" (NOVEL), DC Books & Kottayam |
| | 2. | T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam. |
| **Reference Books** | 1. | MalayalaNovel Sahithyam. |
| | 2. | MalayalaCherukathaInnale Innu. |

| | |
|---|---|
| **Journal and Magazines** | - |
| **E-Resources and Website** | - |

| | |
|---|---|
| **Learning Method** | Lecture/ Tutorial / Student Seminar/GD/Assignment |

| | |
|---|---|
| **Focus of the Course** | Skill Development / Employability |

| Semester – I<br>FRENCH - I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25TLU1FA | FRENCH - I | LANGUAGE- I | 48 | 12 | - | 3 |

| | |
|---|---|
| **Preamble** | The competence in general communication skills with oral, written and comprehension & expression |
| | The culture, life style and the civilization aspects of the French people as well as of France |
| | The students to acquire competency in translating simple French sentences into English and vice versa |
| **Prerequisite** | To understand the language French for communication |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO. No.** | **Course Outcomes (COs) Statement** | **Bloom's Tax anomy Knowledge Level** |
| CO1 | Learn the Basic verbs, numbers and accents | K2 |
| CO2 | Apply the adjectives and the classroom environment in France | K3 |
| CO3 | Select the Plural, Articles and the Hobbies | K3 |
| CO4 | Measure the Cultural Activity in France | K3 |
| CO5 | Evaluate the sentiments, life style of the French people and the usage of the conditional tense | K4 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | | ✓ | ✓ | | ✓ |
| CO2 | ✓ | | | ✓ | |
| CO3 | | ✓ | | | ✓ |
| CO4 | | | ✓ | | |
| CO5 | ✓ | | | ✓ | ✓ |

| 25TLU1FA | FRENCH - I |
|---|---|

**Syllabus**

| Unit | Content | | | Hrs | Resources |
|---|---|---|---|---|---|
| 1 | **Objectifs de Communication** | **Tâche** | **Activités de réception et de production orale** | 14 | Text book Salut I Page 10 |
| | • Saluer<br>• Enter en contact<br>• avec quelqu'un.<br>• Se presenter.<br>• S'excuser | En cours de cuisine, premiers contacts avec les members d'un groupe | • Comprendre des personnes qui se saluent.<br>• Ēchanger pour entrer en contact, se présenter, saluer, s'excuser.<br>• Communiquer avec *tu* ou *vous*.<br>• Comprendre les consignes de classe<br>• Ēpeler son nom et son prénom.<br>Computer jusqu'à 10. | | |
| 2 | • Demander de se presenter.<br>• Présenter quelqu'un<br>.<br>• | Dans la classe de français, se presenter et remplir une fiche pour le professeur. | • Comprendre les informations essentielles dans un échange en milieu professionnel.<br>Ēchanger pour se presenteret présenterquelqu'un. | 12 | Text book Enchanté I Page 20 |
| 3 | • Exprimer ses gouts. | Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation | • Dans une soirée de recontresrapid comprendre des personnes qui échangent sur elles et sur leurs goût<br>• Comprendre une personne qui parler des goûts de quelqu'un d'autre | 14 | Text book J'adore I Page 30 |
| 4 | Demander à quelqu'un de faire quelque chose.<br>Demander poliment.<br>Parler d'actions passes.<br>Tu veux bien? | Organiser un programme d'activités pour accueillir une personne importante | Comprendre une personne demande un service à quelqu'un.<br>Demander à quelqu'un de faire quelque chose.<br>• Imaginer et raconter au passé à partir de situations dessinées. | 10 | Text book Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42 Tu veux bien page 46 |
| 5 | **Practical Application**<br>Make in Own Sentences | | | 10 | - |
| | Total | | | 60 | |

| | | |
|---|---|---|
| **Text book** | 1. | Regine Merieux, Yves Loiseau. 2012. LATITUDES – 1: Méthode de français (Page No: 9-55) Les Editions Dider, Paris, ImprimeenRoumanie par Canale en Janvier |
| **Reference Book** | 1. | - |

| | |
|---|---|
| **Journal and Magazines** | - |
| **E-Resources and Website** | - |

| | |
|---|---|
| **Learning Method** | Lecture/ Tutorial / Student Seminar/GD/Assignment |

| | |
|---|---|
| **Focus of the Course** | Skill Development / Employability |

| Semester – I<br>LANGUAGE II: ENGLISH – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25ELU1EA | ENGLISH - I | LANGUAGE- II | 48 | - | 12 | 3 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• the effect of dialogue, imagery and varied genres<br>• any spontaneous spoken discourse and respond to them with proper sentence structure<br>• the transactional concept of English language. |
| **Prerequisite** | Basic comprehension of Language Skills |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO Number** | **Course Outcomes (COs) Statement** | **Bloom's Taxonomy Knowledge Level** |
| **CO1** | Identify the various aspects in poetry. | K2 |
| **CO2** | Infer linguistic and non-linguistic features of the context for understanding and interpreting. | K3 |
| **CO3** | Construct sentences and convey messages effectively in real life situations. | K3 |
| **CO4** | Apply different reading strategies with varying speed. | K3 |
| **CO5** | Prepare modules with their own ideas and present them coherently in a grammatically correct form. | K3 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | ✓ | ✓ | ✓ | | |
| **CO2** | | ✓ | ✓ | | |
| **CO3** | ✓ | | ✓ | ✓ | ✓ |
| **CO4** | | ✓ | | ✓ | |
| **CO5** | ✓ | | ✓ | | ✓ |

## 25ELU1EA | LANGUAGE II: ENGLISH – I

**Syllabus**

| Unit | Content | Hrs | Resources |
|---|---|---|---|
| I | **Genre Studies**<br>**Mathew Arnold: Dover Beach**- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques– Annotations<br>**Niyi Osundare: Our Earth Will Not Die**- Author's Biography- title indications-outline- paraphrasing the poem- context of poem- form- poetic devices-enjambment- techniques– Annotations<br>**Charles Lamb: Christ's Hospital Five and Thirty Years Ago**- Author's biography- Narrative structure- Exploration of the text- passage analysis- insight of ideas- cohesion and context- style- language techniques- Annotation<br>**James Hanson: A Famed Life - Ten Minute Comedy for Two Women** - Author's Biography- Plot Summary- Detailed summary and Analysis- Themes- Important Quotations- Characters- Description - analysis- Terms- Symbols- Critical analysis<br>**Sheila Nayampalli Baruna: Alone** - Author's Biography- narrative structure- passage analysis- insight of ideas- cohesion and context- style- language techniques. | 12 | Text Book |
| II | **Listening Skills**<br>Listening vs. hearing- Types of listening, Tips to enhance Listening Skills, Non-verbal and Verbal signs of active listening- Comprehensive Listening- Listening to pre-recorded audios on speeches, interviews and conversations-Listening Activities- Listening and responding to complaints (formal situation), Listening to problems and offering solutions (informal) | 13 | britishcouncil.org<br>cambridgeenglish.org |
| III | **Speaking Skills**<br>Formal occasions- Introducing oneself, Introducing others, Enquiries and Seeking permission, neural speaking -Making short presentations- Informal occasions- Requests, Offering help, Congratulating, Farewell party, graduation speech- Giving instructions to do a task and to use a device, Giving and asking directions | 11 | britishcouncil.org<br>cambridgeenglish.org |
| IV | **Reading Skills**<br>Study Skills: Skimming and Scanning- Reading different kinds of texts- Types of reading-Developing a good reading speed, reading aloud, Referencing skill- Word Power (Denotation and Connotation) - Reading comprehension, Data interpretation – Charts, Graphs, Advertisements - Cognitive Skills- Inference Making – Interpretation | 12 | britishcouncil.org<br>cambridgeenglish.org |
| V | **Writing Skills**<br>Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book /Movie Review - Infographics Writing | 12 | britishcouncil.org<br>cambridgeenglish.org |
| | **Total** | **60** | |

Note: Case studies related to the above topics to be discussed (Examined Internal only)

| | | |
|---|---|---|
| **Text book** | 1. | https://www.poetryfoundation.org/poems/43588/doverbeach |
| | 2. | https://portal.abuad.edu.ng/lecturer/documents/1586771577our_earth_will_not_die.doc |
| | 3. | http://l-adam-mekler.com/chucktwo.pdf |
| | 4. | https://offthewallplays.com/wpontent/uploads/2017/04/1_pdfsam_A-famed-life-full-with-title-page.pdf |
| | 5. | Nation, I. S. P and Jonathan Newton. 2009. *Teaching ESL/EFL Listening and Speaking*. Routledge, New York, United States of America. |
| | 6. | Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. *Sparkle.* (1st Edn.) McGraw - Hill Education, Chennai, India. |
| **Reference Books** | 1. | Rudzka, Brygida -Ostyn, 2003. Word Power: *Phrasal Verbs and Compounds: A Cognitive Approach,* Mouton de Gruyter, New York, United States of America. |
| | 2. | Swales, John M. & Feak, Christine B. 2012. *Academic Writing for Graduate Students: Essential Tasks and Skills*, University of Michigan Press, Michigan, United States of America. |
| | 3. | Sen, Leena. 2007. *Communication Skills*, Second Edition, Prentice Hall India Learning Private Limited, New Delhi, India. |
| | 4. | O. Greene, John. 2021. *Essentials of Communication Skill and Skill Enhancement: A Primer for Students and Professionals*, Routledge publishers, United Kingdom. |

| | |
|---|---|
| **Journal and Magazines** | https://academic.oup.com/journals |
| **E-Resources and Website** | https://learnenglish.britishcouncil.org/<br>https://www.cambridgeenglish.org/learning-english/activities-for-learners/ |

| | |
|---|---|
| **Learning Method** | Chalk and Talk/Assignment/Seminar/ Group Discussion/Case Study |

| | |
|---|---|
| **Focus of the Course** | Skill Development/ Employability |

## Semester – I

## CORE: Fundamentals of Microbiology

| Semester | Course Code | Course Name | Category | L | T | p | Credits |
|---|---|---|---|---|---|---|---|
| I | 25MBU1CA | FUNDAMENTALS OF MICROBIOLOGY | CORE | 36 | - | - | 3 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• the history of Microbiology<br>• the handling of microscope and aseptic techniques<br>• the cultivation of microbes |
| **Prerequisite** | Knowledge on types and characteristics of microorganisms |

**Course Outcomes (Cos)**

| CO Number | Course Outcomes (Cos) Statement | Bloom's Taxonomy Knowledge Level |
|---|---|---|
| CO1 | Describes the history and scope of microbiology | K2 |
| CO2 | Comprehend routes of handling of microscopes and bacteriological study | K2 |
| CO3 | Recognize the methods of sterilization | K3 |
| CO4 | Identify the various types of culture media and its preservation | K3 |
| CO5 | Emphasize on the general characteristics of algae, fungi and protozoa | K2 |

**Mapping with Programme Outcomes**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CO1 | ✓ | | | | |
| CO2 | ✓ | ✓ | ✓ | | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | |
| CO5 | ✓ | | | | |

## 25MBU1CA - FUNDAMENTALS OF MICROBIOLOGY
**Syllabus**

| Unit | Content | Hours | E-Contents / Resources |
|---|---|---|---|
| I | History and Scope of Microbiology – Spontaneous generation theory and its disproval – Contribution of Leuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, John Tyndall, Salmon A .Waksman, Martinus W.Beijerinck, Elie Metchnikoff, Fannie Eilshmius Hesse, Paul Ehrlich. Scope of Microbiology. | 8 | Text book<br>Reference Book<br>Journals |
| II | Microscopy – Principles and application – Bright field, Dark field, Phase contrast, confocal, Fluorescence, SEM & TEM. Stains - Staining reactions – Types of staining – Simple, Differential (Gram's, Spore, AFB), Capsule and fungal staining. | 7 | Text book<br>Reference Book |
| III | Sterilization and Disinfection- Principles- Methods of Sterilization – Physical methods: Dry Heat, Moist heat, Filtration and Radiation. Chemical methods - Formaldehyde, Alcohol, Phenol and Gaseous sterilizing agents. Sterility Testing. | 7 | Text book<br>Reference Book |
| IV | Culture Media - Types of Media – Enriched, Selective, Differential and Special Purpose Media, Transport media (Stuart's medium), Media for Anaerobes(Robertson cooked meat medium) – Pure culture techniques - Maintenance and Preservation of microbial cultures. | 7 | Text book<br>Reference Book |
| V | Morphology, General Characteristics, and economic importance of Fungi (Aspergillus, Penicillium), Algae (Anabena, Spirogyra), Protozoa – (Euglena and Nostoc). | 7 | Text book<br>Reference Book<br>Journals |
| | **Total** | **36** | |

| | | |
|---|---|---|
| Text Book | 1. | *Joanne Wiley, Linda Sherwood, Christopher J Woolverton*, 2016, **Prescott's Microbiology,** *10th Edition, McGraw Hill Company & New York, United States* |
| Reference Books | 1. | *Salle AJ,* 2014, **Fundamental Principles of Bacteriology**, *7th edition, Tata Mcgraw-Hill Publishing Company & New York, United States.* |
| | 2. | *Michael Madigan, John Martinko, Kelly Bender, Daniel Buckley and David Stahl*, 2015, **Brock Biology of Microorganisms**, *14th edition, Pearsons Education Ltd & London, United Kingdom.* |
| | 3. | *Atlas RM, 1997,* **Principles of Microbiology**, *2nd edition, Tata Mcgraw-Hill Publishing Company & New York, United States.* |
| | 4. | *Jeffrey C Pommerville,* 2013, **Alcamo's Fundamentals of Microbiology**, 10th Edition, *BlackwellPublications & New Jersey, United States.*Dr.NGPASC COIMBATORE \| INDIA |

| | |
|---|---|
| Journal and Magazines | https://www.nature.com<br><br>https://www.the-scientist.com › tag › microbiology |
| E-Resource and Websites | https://usiu-ke.libguides.com/c.php?g=943666&p=6802092<br><br>https://microbe.net/resources/microbiology-web-resources/ |

| | |
|---|---|
| Learning Methods | Chalk and Talk/ Seminar/ Assignment |

| | |
|---|---|
| Focus of the Course | Skill Development/Employability |

**Semester – I**

**CORE: CELL BIOLOGY**

| Semester | Course Code | Course Name | Category | L | T | p | Credits |
|---|---|---|---|---|---|---|---|
| 1 | 25MBU1CB | CELL BIOLOGY | Core | 36 | - | - | 3 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• The complexity and harmony of cell structure and functions of prokaryotic and eukaryotic life forms<br>• The cellular changes occur during different phases of life cycle<br>• To understand the different modes of cellular differentiation and division |
| **Prerequisite** | Knowledge on bioinstrumentation |

**Course Outcomes (Cos)**

| CO Number | Course Outcomes (Cos) Statement | Bloom's Taxonomy Knowledge Level |
|---|---|---|
| CO1 | Understand the structure and functioning of the internal organelles of an prokaryotic cell | K2 |
| CO2 | Decipher the structure and functioning of the internal organelles of an eukaryotic cell | K2 |
| CO3 | Cognize the interactions in an eukaryotic and prokaryotic system and the changes that occurs inside the cell upon receiving a chemical / hormonal signal | K2 |
| CO4 | Understand the mode of transport of extracellular proteins from the cytoplasm to the exterior | K2 |
| CO5 | Decipher the reproduction methods or cell division strategies in a prokaryotic and eukaryotic system | K3 |

**Mapping with Programme Outcomes**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ |

## 25MBU1CB - CELL BIOLOGY

### Syllabus

| Unit | Content | Hours | E-Contents / Resources |
|---|---|---|---|
| I | Definition - Shape, arrangement and Size - Cell Organization - Structure and function - Cell wall Gram positive and Gram negative – Cell membrane - Nuclear material - plasmids - ribosomes - inclusion bodies– Flagella – Pili – Capsule - Slime - Endospore formation | 8 | Text book<br>Reference Book |
| II | Eukaryotic Cell Organization - Structure and Function of – Cell wall - Cell membrane – Nucleus (organization of genetic material) – Mitochondria – Endoplasmic reticulum – Ribosomes - Golgi Apparatus - Lysosomes - Extra cellular matrix - Chloroplast & Cytoskeleton - actin filaments, intermediate filaments, microtubules - flagella - cilia | 7 | Text book<br>Reference Book |
| III | Cell-cell interactions in eukaryotes - adhesion junctions, tight junctions, gap junctions, and plasmodesmata - Quorum sensing (in prokaryotes) Cell Signaling - Signalling molecules and their receptors Function of cell surface receptors, Cyclic AMP pathway | 7 | Text book<br>Reference Book |
| IV | Extracellular protein transport - targeting and insertion of proteins in the ER, export of proteins to Golgi apparatus, Protein sorting and export from Golgi apparatus to Lysosomes | 7 | Text book<br>Reference Book |
| V | Prokaryotes - Binary fission in Bacteria – Eukaryotic Cell cycle and Cell division - Mitosis: Mitotic Spindle - Centromere - Centrioles (Prophase - Metaphase - Anaphase- Telophase). Meiosis: Stages and Synapsis (Crossing Over). | 7 | Text book<br>Reference Book<br>E- content |
| | **Total** | **36** | |

| | | |
|---|---|---|
| Text Book | 1. | Karp G, 2010, Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons. Inc. |
| Reference Books | 1. | Joanne Wiley, Linda Sherwood, Christopher J Woolverton, 2017, Prescott'sMicrobiology, 10th edition, McGraw Hill Company, New Delhi, India |
| | 2. | Hardin J, Bertoni G and Kleinsmith LJ, 2010, Becker's World of the Cell, 8th edition, Pearson, New Delhi, India |
| | 3. | De Robertis, EDP and De Robertis EMF. 2006, Cell and Molecular Biology, 8th edition. Lipincott Williams and Wilkins, Philadelphia |
| | 4. | Cooper, G.M. and Hausman, R.E. 2009, The Cell: A Molecular Approach, 5th Edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA. |

| | |
|---|---|
| Journal and Magazines | Journal of Cell Biology (JCB) \| Rockefeller University Press (rupress.org) |
| E-Resource and Websites | Bolsover2004CellBiology.pdf (bio-nica.info) |

| | |
|---|---|
| Learning Methods | Chalk and Talk/ Seminar/ Assignment |

| | |
|---|---|
| Focus of the Course | Skill Development/ Employability |

| Semester – I<br>CORE PRACTICAL I: FUNDAMENTALS OF MICROBIOLOGY AND CELL BIOLOGY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Semester** | **Course Code** | **Course Name** | **Category** | **L** | **T** | **P** | **Credits** |
| I | 25MBU1CP | FUNDAMENTALS OF MICROBIOLOGY AND CELL BIOLOGY | CORE | - | - | 60 | 2 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• Culture techniques<br>• Isolation and enumeration techniques<br>• Staining techniques. |
| **Prerequisite** | Basic practical skill on Microbiology |

| **Course Outcomes (Cos)** | | |
|---|---|---|
| **CO Number** | **Course Outcomes (COs) Statement** | **Bloom's Taxonomy Knowledge Level** |
| CO1 | Comprehend the principles behind the preparation of Nutrient Broth and Nutrient Agar in various forms. | K2 |
| CO2 | Apply the decimal dilution technique for accurate microbial quantification. | K3 |
| CO3 | Apply simple and differential staining techniques (Gram's, acid-fast, capsule, and spore staining) for bacterial identification. | K3 |
| CO4 | Demonstrate slide culture technique to study the morphology of fungi under laboratory conditions. | K3 |
| CO5 | Understand the structure and functions of cell organelles through microscopic observation of plant and animal cells. | K2 |

| **Mapping with Program Outcomes:** | | | | | |
|---|---|---|---|---|---|
| **Cos / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | ✓ | ✓ | ✓ | ✓ | |
| CO2 | ✓ | | | ✓ | |
| CO3 | ✓ | ✓ | ✓ | | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | | ✓ | ✓ | ✓ |

| 25MBU1CP | FUNDAMENTALS OF MICROBIOLOGY AND CELL BIOLOGY |
|---|---|

| S.No | List of Programs |
|---|---|
| 1 | Preparation of cleaning solutions - Chromic acid |
| 2 | Media preparation – Nutrient Broth, Nutrient Agar (Plate, Deep, Slant and semisolid media) |
| 3 | Preparation of differential medium and selective medium |
| 4 | Decimal Dilution Technique. |
| 5 | Pure culture techniques - Streak plate, Pour plate and Spread plate method. |
| 6 | Isolation and Enumeration of bacteria, fungi and actinomycetes from soil |
| 7 | Bacterial staining Techniques - Simple Staining & Differential staining - Gram's Staining, Acid Fast, Capsule and Spore staining |
| 8 | Fungal staining – Lacto phenol Cotton Blue Mount |
| 9 | Slide culture Technique (DBT Star Scheme) |
| 10 | Fungal Cell Observation by Stereo Microscope (DBT Star Scheme) |
| 11 | Screening of PHB production (DBT Star Scheme) |
| 12 | Microscopic studies of cell organelles - Plant and Animal cells |
| 13 | Observation of permanent slide for stages of mitosis and meiosis, Algae, Fungi and Protozoa |

| References | | |
|---|---|---|
| | 1. | James.C.Cappuccino. 2017. **Microbiology A laboratory manual**. 11 edition, Pearson education publishers.. |
| | 2. | Aneja. K.R. 2012. **Experiments in Microbiology, plant pathology and biotechnology**, 4 Edition. New age publishers. |
| | 3. | Kannan, N. 2003. **Hand book of Laboratory culture media.** 1 edition, Panima publishing house. |

| Learning Method | Demonstration/ Hands on Experiments |
|---|---|

| Focus of the Course | Skill Development/ Employability |
|---|---|

## Semester - I

IDC : BIOCHEMISTRY

| Semester | Course Code | Course Name | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| I | 25CLU1IA | BIOCHEMISTRY | IDC | 36 | - | - | 3 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• The structure and properties of carbohydrates and lipids.<br>• The structure and properties of amino acids, proteins and nucleic acids. The essentials of minerals and vitamins and role of hormones. |
| **Prerequisite** | Knowledge on biological sciences |

**Course Outcomes (COs)**

| CO Number | Course Outcomes (COs) Statement | Bloom's Taxonomy Knowledge Level |
|---|---|---|
| CO1 | Outline carbohydrate structure, classification and function. | K3 |
| CO2 | Know the structure and properties of lipids. | K1 |
| CO3 | Understand the structural and functional aspects of amino acids and proteins. | K3 |
| CO4 | Describe the structure, types and properties of nucleic acids. | K2 |
| CO5 | Understand the types and significance of vitamins, minerals and hormones. | K3 |

**Mapping with Program Outcomes:**

| COs / POs | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CO1 | ✓ | ✓ | | ✓ | ✓ |
| CO2 | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ |

## 25CLU1IA - Biochemistry

### Syllabus

| Unit | Content | Hours | E-Contents / Resources |
|---|---|---|---|
| I | Carbohydrates – classification, structure, properties and chemical reactions of monosaccharide – Glucose, Fructose, Galactose, Mannose, Arabinose. Disaccharides – Maltose, Lactose and Sucrose. Polysaccharides – Homo polysaccharides – Starch, Glycogen and Cellulose and Hetero polysaccharides – Hyaluronic acid, Heparin, Chondroitin sulphate and Bacterial cell wall polysaccharides. | 08 | Text Book |
| II | Lipids -Definition, classification of lipids, physiochemical properties. Storage lipids – types. Structural lipids – phospholipids, glycolipids and sphingolipids. Structure and biological role of cholesterol. | 06 | Reference Book |
| III | Aminoacids - Classification of amino acids, general properties, non protein amino acids. Peptide bond – structure and conformation, Proteins - classification and physiochemical properties. Organization of protein Structure– Primary, secondary tertiary, quaternary structure and Protein denaturation. | 07 | Text Book |
| IV | Nucleic acids - Structures of Purines, Pyrimidines, Nucleoside and Nucleotides. Properties of nucleic acids. DNA - Double helical structure, Isoforms of DNA Denaturation and Renaturation. RNA – Types structure and function. Enzymes - Concepts of enzymes, classification, characteristic features, coenzymes, cofactors clinical and industrial applications. | 08 | NPTEL |
| V | Micronutrients - Minerals in biological system and their importance – Iron, calcium, phosphorous, iodine, copper, zinc. Vitamins – Definition, classification -Fat soluble Vitamins - A, D, E and K. Water Soluble vitamins –Vitamin B Complex, Vitamin C- sources, functions and deficiencies. Hormones involved in regulatory metabolism-Insulin, Glucagon and Thyroid hormones. | 07 | You Tube Videos |
| | **Total** | **36** | |

| | | |
|---|---|---|
| **Text Book** | **1.** | Satyanarayana U and Chakrapani U, 2013, "Biochemistry", 4rth Edition, , Elsevier, India. |
| **Reference Books** | **1.** | [Deb AC, 2001, "Fundamentals of Biochemistry", 7th Edition New central Agency, Calcutta.] |
| | **2.** | [Cooper, G M and Hausman R E, 2013, The cell: A Molecular Approach, 6th Edition, Sinauer Associates, Inc.Publishers, Sunderland, Massachusetts.] |
| | **3.** | [DM. Vasudevan, Sreekumari S., Kannan Vaidyanathan , 2019. Textbook Of Biochemistry For Medical Students, 9th Edition, Jaypee Brothers Medical Publishers, India]. |
| | **4.** | Jain J L, Jain S and Jain N, 2012, "Biochemistry", 1st Edition, S. Chand and Company Pvt Ltd, New Delhi.. |

| | |
|---|---|
| **Journal and Magazines** | https://ocw.mit.edu/courses/5-07sc-biological-chemistry-i-fall-2013/pages/module-i/ |
| **E-Resources and Website** | https://www.khanacademy.org/search?page_search_query=biochemistry |

| | |
|---|---|
| **Learning Method** | Chalk and Talk/Assignment/Seminar |

| | |
|---|---|
| **Focus of the Course** | Skill Development/Employability |

| 25CLU1IP | IDC PRACTICAL - I BIOCHEMISTRY | **SEMESTER I** |
|---|---|---|

**Total Credits:** 2
**Total Instructions Hours:** 48 h

| S.No | Contents |
|---|---|
| 1 | Qualitative analysis of Monosaccharides – Pentose - Arabinose |
| 2 | Qualitative analysis of Hexoses - Glucose, Fructose |
| 3 | Qualitative analysis of Disaccharides - Sucrose, Maltose and Lactose |
| 4 | Qualitative analysis of Polysaccharide - Starch |
| 5 | Qualitative analysis of Histidine |
| 6 | Qualitative analysis of Tyrosine |
| 7 | Qualitative analysis of Tryptophan |
| 8 | Qualitative analysis of Arginine |
| 9 | Estimation of Acid Number |
| 10 | Estimation of Iodine Number |
| 11 | Quantification of Protein by Lowry's method |
| 12 | Quantification of Carbohydrate by DNSA method |

**References**


1. Sadasivam S and Manikam A, 1996, "Biochemical methods ", 2nd Edition, New Age International publishers, New Delhi
2. Plummer D T, 2004, " An Introduction to practical Biochemistry", 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd, New Delhi
3. Jayaraman J, 2015, "Laboratory manual in Biochemistry" 5th Edition, New Age International (P) Ltd.
4. Pattabiraman T N and SitaramaAcharya U, 2015, "Laboratory Manual in Biochemistry", 4th Edition. , All India Traveller Book Seller

## Semester – I

## AECC I: ENVIRONMENTAL STUDIES

| Semester | Course Code | Course Name | Category | L | T | p | Credits |
|---|---|---|---|---|---|---|---|
| I | 25MBU1AA | ENVIRONMENTAL STUDIES | AECC | 24 | - | - | 2 |

| | |
|---|---|
| **Preamble** | This course has been designed for students to learn and understand<br>• Multi-disciplinary aspects of Environmental studies<br>• Importance to conserve the biodiversity<br>• Causes of Pollution and its control |
| **Prerequisite** | Aware the basics of environmental components |

**Course Outcomes (Cos)**

| CO Number | Course Outcomes (Cos) Statement | Bloom's Taxonomy Knowledge Level |
|---|---|---|
| CO1 | To understand the importance of natural resources in order to conserve for the future | K1 |
| CO2 | To impart knowledge on Natural resources and its conservation | K2 |
| CO3 | To impart knowledge on Biodiversity and its conservation | K3 |
| CO4 | To create awareness on effects, causes and control of air, water, soil and noise pollution etc., | K3 |
| CO5 | To build awareness about sustainable development and Environmental protection | K1 |

**Mapping with Programme Outcomes**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | | |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ |

## 25MBU1AA - ENVIRONMENTAL STUDIES
### Syllabus

| Unit | Content | Hours | E-Contents / Resources |
|---|---|---|---|
| I | Introduction to Environmental studies& Ecosystems: components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance - Energy flow in an ecosystem: food chain, food web and ecological succession. | 5 | Text book and Website |
| II | Natural Resources: Renewable and Non-renewable Resources: Land Resources and land use - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs. | 5 | Text book and Website |
| III | Biodiversity and Conservation: Global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. | 4 | Text book and Website |
| IV | Environmental Pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution. Nuclear hazards and human health risks. Environment Laws: Environment Protection Act; Prevention & Control of Pollution Act – Air & Water. Wildlife Protection Act; Forest Conservation Act; Indigenous knowledge used for sustainable forest use. | 5 | Text book and Website |
| V | Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Role of Information Technology in Environment and human health. Role of the Colleges, Teachers and Students in village adoption towards clean, green and make in villages in various aspects. | 5 | Text book and Website |
| | **Total** | **24** | |

| | | |
|---|---|---|
| Text Book | 1. | *Carson, R.* 2002. **Silent Spring.** *Houghton Mifflin Harcourt* |
| | 2. | *Gadgil, M., & Guha, R.*1993. **This Fissured Land: An Ecological History of India**. *Univ. of California Press.* |
| Reference Books | 1. | *Gleeson, B. and Low, N. (eds.)* 1999. **Global Ethics and Environment, London, Routledge**. |
| | 2. | *Gleick, P.H.* 1993. **Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security.** *Stockholm Env. Institute, Oxford Univ. Press.* |
| | 3. | *Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll.* 2006, **Principles of Conservation Biology**. *Sunderland: Sinauer Associates.* |
| | 4. | *Grumbine, R. Edward, and Pandit, M.K.* 2013. **Threats from India's Himalaya dams. Science,** *339: 36-37.* |

| | |
|---|---|
| Journal and Magazines | https://www.hzu.edu.in/bed/E%20V%20S.pdf |
| E-Resource and Websites | https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf |

| | |
|---|---|
| Learning Methods | Chalk and Talk/ Seminar/ Assignment |

| | |
|---|---|
| Focus of the Course | Skill Development/Employability/Social Awareness and Environment |