PONDICHERRY UNIVERSITY
(A CENTRAL UNIVERSITY)

B.Sc. Biochemistry
(CBCS)

REGULATIONS & SYLLABUS
2017-2018 ONWARDS
ADMISSION PROCESS
Selection of students to B. Sc. Biochemistry Programs is based on merit (12th mark) and follows the Government reservation policy.

CURRICULUM GOALS/OBJECTIVES
The curriculum of this Department incorporates classical to recent concepts within different areas of each subject offered, and updates syllabus with periodic revision exercises, ensured by the Board of Studies and ratified through the School Board. The curriculum is made with a view to impart fundamental knowledge in the field of Biochemistry. The theory and practical sessions augment their ability to understand the implications of the scientific and technical approaches involved in this domain of knowledge, enabling to mold them into prospective skillful scientific workforce for the future.

EVALUATION
The student assessment followed in this department is as per the regulations notified by the Office of the Controller of Exams, Pondicherry University.
All subjects in the UG program carry an Internal assessment component. Students are expected to secure 25% in the internal evaluation and 75% in end Semester external evaluation modes. Each teacher is expected to organize continuous assessment modes for each course assigned to him/her. The internal assessment is categorized into 15 marks for internal assessment tests/Term papers/Quizzes and 5 marks for Seminars/Assignment/Presentation/Write ups/Viva, and 5 marks for attendance. A failed student who fulfils the required attendance 75% shall have a minimum 40% in internal assessment for being permitted to register for the end semester exam. Students who have failed due to insufficient attendance (below 75%) and / or less than 40% in internal assessment marks should repeat the course as when it is offered.
**GRADING**

Letter grades shall be used to assess the performance of students in each course by converting final marks (out of 100) into grades. In case of fractions the marks shall be rounded off to next integer. The following shall be used to convert marks into awarding grades:

<table>
<thead>
<tr>
<th>Range of Marks</th>
<th>Letter Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>96-100</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>86-95</td>
<td>A+</td>
<td>09</td>
</tr>
<tr>
<td>76-85</td>
<td>A</td>
<td>08</td>
</tr>
<tr>
<td>66-75</td>
<td>B+</td>
<td>07</td>
</tr>
<tr>
<td>56-65</td>
<td>B</td>
<td>06</td>
</tr>
<tr>
<td>46-55</td>
<td>C</td>
<td>05</td>
</tr>
<tr>
<td>40-45</td>
<td>P</td>
<td>04</td>
</tr>
<tr>
<td>Below 40</td>
<td>F</td>
<td>00</td>
</tr>
<tr>
<td>Lack of attendance</td>
<td>FA</td>
<td>00</td>
</tr>
</tbody>
</table>

The SGPA shall also be calculated by taking all courses taken by the student in the semester and CGPA shall also be calculated by taking all the courses taken by the student in all the semesters.

<table>
<thead>
<tr>
<th>CGPA</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00 – 10.00</td>
<td>First Class with Distinction (should not have failed in any course)</td>
</tr>
<tr>
<td>7.00 – 8.99</td>
<td>First Class</td>
</tr>
<tr>
<td>5.50 – 6.99</td>
<td>Second Class</td>
</tr>
<tr>
<td>4.00 – 5.49</td>
<td>Pass</td>
</tr>
</tbody>
</table>

The Grade card shall be issued to the students containing grades obtained by the student in the previous semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).
COMPUTATION OF SGPA AND CGPA

Following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) shall be followed:

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

SGPA (Si) = \( \frac{\sum (Ci \times Gi)}{\sum Ci} \)

where \( Ci \) is the number of credits of the \( i \)th course and \( Gi \) is the grade point scored by the student in the \( i \)th course.

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = \( \frac{\sum (Ci \times Si)}{\sum Ci} \)

where \( Si \) is the SGPA of the \( i^{th} \) semester and \( Ci \) is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

ILLUSTRATION OF COMPUTATION OF SGPA AND CGPA AND FORMAT FOR TRANSCRIPTS

Computation of SGPA and CGPA

Illustration 1 for calculation of SGPA
The illustration is for a student who has taken six courses of given credits in a semester and performance is given in grade letter which carry certain grade point.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Grade letter</th>
<th>Grade point</th>
<th>Credit Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Credit x Grade</td>
</tr>
<tr>
<td>Course 1</td>
<td>3</td>
<td>A</td>
<td>08</td>
<td>3 x 08 = 24</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>B+</td>
<td>07</td>
<td>4 x 07 = 28</td>
</tr>
<tr>
<td>Course 3</td>
<td>3</td>
<td>B</td>
<td>06</td>
<td>3 x 06 = 18</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>O</td>
<td>10</td>
<td>3 x 10 = 30</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>C</td>
<td>05</td>
<td>3 x 05 = 15</td>
</tr>
<tr>
<td>Course 6</td>
<td>4</td>
<td>B</td>
<td>06</td>
<td>4 x 06 = 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>139</td>
</tr>
</tbody>
</table>

SGPA = 139/20 = 6.95

**Illustration 2 for calculation of SGPA**

A student registered for 6 (six) courses in a semester. At the end of the semester the student got A grade in a 4 credit course, A grade in 2 credit course B+ in a 3 credit course another B+ in a 3 credit course, B in a 3 credit course and F grade in a 3 credit course. Calculation of SGPA of this student is:

SGPA = \[(8\times4+8\times2+7\times3+7\times3+6\times3+0\times3)/(4+2+3+3+3+3)\] = \[(32+16+21+21+18+0)/18\] = 108/18 = 6.00 out of 10.00.

SGPA of the student is 6.00.

**Illustration for calculation of CGPA (Example)**
The illustration is for calculation of CGPA of a student who studied six semesters in a UG program.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
<th>SGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>20</td>
<td>6.95</td>
</tr>
<tr>
<td>Semester 2</td>
<td>22</td>
<td>7.80</td>
</tr>
<tr>
<td>Semester 3</td>
<td>18</td>
<td>5.65</td>
</tr>
<tr>
<td>Semester 4</td>
<td>21</td>
<td>6.04</td>
</tr>
<tr>
<td>Semester 5</td>
<td>19</td>
<td>7.21</td>
</tr>
<tr>
<td>Semester 6</td>
<td>20</td>
<td>7.85</td>
</tr>
</tbody>
</table>

Total = 120

CGPA =

\[ \frac{(20 \times 6.95 + 22 \times 7.80 + 18 \times 5.65 + 21 \times 6.04 + 19 \times 7.21 + 20 \times 7.85)}{120} = \frac{139.00 + 171.60 + 101.70 + 126.84 + 136.99 + 157.00}{120} = \frac{833.13}{120} = 6.94275 \]

Rounded off to 6.94

CGPA = 6.94. The student has passed in the program and is placed in 2nd Class.
## B.Sc. Biochemistry

**CBCS - Course Structure**  
2017–2018 onwards

<table>
<thead>
<tr>
<th>Course (Theory) / (Practical)</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIL-1</td>
<td>LTAM 111</td>
<td>Language-I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGLISH-1</td>
<td>ENGL 112</td>
<td>English-I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>DSC-1A(T)</td>
<td>BBCT 111</td>
<td>Biological Science-I</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>DSC-2A(T)</td>
<td>BBCT 112</td>
<td>Cell Biology</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>DSE-I(T)</td>
<td>CHET 113</td>
<td>Chemistry-I</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>AECC-I</td>
<td>PADM 113</td>
<td>Public Administration</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>DSC-1A(P)</td>
<td>BBCP 111</td>
<td>Lab in Biological Science-I</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>DSC-2A(P)</td>
<td>BBCP 112</td>
<td>Lab in Cell Biology</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>DSE-I(P)</td>
<td>CHEP 113</td>
<td>Lab in Chemistry-I</td>
<td>1</td>
<td>4</td>
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<tr>
<td><strong>SECOND SEMESTER</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIL-2</td>
<td>LTAM 121</td>
<td>Language-II</td>
<td>3</td>
<td></td>
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<tr>
<td>ENGLISH-2</td>
<td>ENGL 122</td>
<td>English-II</td>
<td>3</td>
<td></td>
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<tr>
<td>DSC-1B(T)</td>
<td>BBCT 121</td>
<td>Biological Science-II</td>
<td>4</td>
<td>5</td>
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<tr>
<td>DSC-2B(T)</td>
<td>BBCT 122</td>
<td>Biomolecules</td>
<td>4</td>
<td>6</td>
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<tr>
<td>DSE-2(T)</td>
<td>CHET 123</td>
<td>Chemistry-II</td>
<td>4</td>
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<td>AECC –II</td>
<td>ENV5 123</td>
<td>Environmental Studies</td>
<td>2</td>
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<tr>
<td>DSC-1B(P)</td>
<td>BBCP 121</td>
<td>Lab in Biological Science-II</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>DSC-2B(P)</td>
<td>BBCP 122</td>
<td>Lab in Biomolecules</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>DSE-2(P)</td>
<td>CHEP 123</td>
<td>Lab in Chemistry-II</td>
<td>1</td>
<td>8</td>
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<tr>
<td><strong>THIRD SEMESTER</strong></td>
<td></td>
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</tr>
<tr>
<td>MIL-3</td>
<td>LTAM 231</td>
<td>Language-III</td>
<td>3</td>
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<td>ENGLISH-3</td>
<td>ENGL 232</td>
<td>English-III</td>
<td>3</td>
<td></td>
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<tr>
<td>DSC-1C(T)</td>
<td>BBCT 231</td>
<td>Intermediary Metabolism-I</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>DSC-2C(T)</td>
<td>BBCT 232</td>
<td>Human physiology &amp; Nutrition</td>
<td>4</td>
<td>10</td>
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<tr>
<td>SEC-I(T)</td>
<td>BMBT 233</td>
<td>Basic Microbiology</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>DSC-1C(P)</td>
<td>BBCP 231</td>
<td>Lab in Intermediary Metabolism-I</td>
<td>2</td>
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<td>DSC-2C(P)</td>
<td>BBCP 232</td>
<td>Lab in Human physiology &amp; Nutrition</td>
<td>2</td>
<td>12</td>
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<tr>
<td>SEC-I(P)</td>
<td>BMBP 233</td>
<td>Lab in Basic Microbiology</td>
<td>1</td>
<td>12</td>
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</tbody>
</table>
# B.Sc. Biochemistry

## Course Structure

2017 – 2018 Onwards

### FOURTH SEMESTER

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject code</th>
<th>Subject</th>
<th>credits</th>
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<tr>
<td>MIL-4</td>
<td>LTAM 241</td>
<td>Language-IV</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGLISH-4</td>
<td>ENGL 242</td>
<td>English-IV</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>DSC-1D(T)</td>
<td>BBCT 241</td>
<td>Intermediary Metabolism-II</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>DSC-2D(T)</td>
<td>BBCT 242</td>
<td>Analytical Biochemistry</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>SEC-2(T)</td>
<td>CABT 243</td>
<td>Computer application in Biology</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>DSC-1D(P)</td>
<td>BBCP 241</td>
<td>Lab in Intermediary Metabolism-II</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>DSC-2D(P)</td>
<td>BBCP 242</td>
<td>Lab in Analytical Biochemistry</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>SEC-2(P)</td>
<td>CABP 243</td>
<td>Lab in Computer application in Biology</td>
<td>1</td>
<td>16</td>
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</table>

### FIFTH SEMESTER

<table>
<thead>
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<th>credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSC-1E(T)</td>
<td>BBCT 351</td>
<td>Clinical Biochemistry</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>DSE-3(T)</td>
<td>MOLT 352</td>
<td>Molecular Biology</td>
<td>4</td>
<td>18</td>
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<tr>
<td>DSE-4</td>
<td>ENDO 353</td>
<td>Endocrinology</td>
<td>4</td>
<td>19</td>
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<tr>
<td>SEC-3</td>
<td>BCHP 354</td>
<td>Biochemical Pharmacology</td>
<td>3</td>
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<td>GE-1</td>
<td>EBIO 355</td>
<td>Environmental Biology</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>DSC-1E(P)</td>
<td>BBCP 351</td>
<td>Lab in Clinical Biochemistry</td>
<td>2</td>
<td>22</td>
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<tr>
<td>DSE-3(P)</td>
<td>MOLP 352</td>
<td>Lab in Molecular Biology</td>
<td>1</td>
<td>22</td>
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### SIXTH SEMESTER

<table>
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<th>Subject</th>
<th>credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSC-1F(T)</td>
<td>BBCT 361</td>
<td>Basic Immunology</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>DSE-5(T)</td>
<td>BBTT 362</td>
<td>Basic Biotechnology</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>DSE-6</td>
<td>GENT 363</td>
<td>Genetics</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>SEC-4</td>
<td>BIOS 364</td>
<td>Biostatistics</td>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>GE-2</td>
<td>BIOI 365</td>
<td>Bioinformatics</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>DSC-1F(P)</td>
<td>BBCP 361</td>
<td>Lab in Basic Immunology</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>DSE-5(P)</td>
<td>BBTP 362</td>
<td>Lab in Basic Biotechnology</td>
<td>1</td>
<td>28</td>
</tr>
</tbody>
</table>
Ability Enhancement (AECC) and Skill Enhancement Course (SEC) Courses offered by the Department of Biochemistry for other UG programmes

2017–2018 onwards

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECC-I</td>
<td>BCNT 114</td>
<td>Basic concepts in Nutrition</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>SEC 1</td>
<td>LSDT 233</td>
<td>Life style Disorders</td>
<td>2</td>
<td>30</td>
</tr>
</tbody>
</table>
FIRST SEMESTER

BIOLOGICAL SCIENCE-I

Subject code - BBCT 111 (DSC - 6 credits)

UNIT I

Introduction to Plant and Animal Sciences: General classification of plants and animals - concepts of species – overview of kingdom – Animalia and Plantae - General characteristics of each group up to class level with an example.

UNIT II

Structure and functions of plant tissues: Parenchyma, collenchyma, sclerenchyma, secretory ducts and laticiferous tubules, different types of xylem and phloem.

UNIT III

Nutrition & Transport in Plants: Grouping of organisms according to their energy and carbon sources; Importance of photosynthesis and photosynthetic pigments. Mineral nutrients - Macronutrients: nitrogen, phosphorus & potassium; Micronutrients: magnesium, manganese, iron, zinc, sulphur. Plant-water relations: Movement of water through flowering plant; Transpiration and stomatal mechanism; Ascent of water in xylem and organic solutes in phloem.

UNIT IV

Structure and function of animal tissues: Connective tissue: fibrous and cellular basis of connective tissue; Muscle tissue: smooth, striated and cardiac muscle; Nervous tissue: structure and types of neurons.

UNIT V

Nutrition & Transport in Animals: Different types of heterotrophic nutrition; Feeding mechanisms in a range of animals; Digestion and absorption of carbohydrates, protein and fats in various regions of the alimentary canal in human; General characteristics of a blood vessels and vascular system in human; Composition of blood and clotting mechanism.

Text Book:


Suggested Reading:

UNIT I  
**Introduction to Cell Biology:** Historical aspects - cell theory, protoplasm theory and organizational theory; Broad classification of cell types: prokaryotic cell and eukaryotic cells and their characteristics; Compartments and division of labours; Ultra structure of cell: virus, microbial, plant and animal cells.

UNIT II  
**Cell wall and Cell membrane:** Structure and functions - Bacterial cell wall and plant cell wall; Plasma membrane: membrane models, composition; Types of junction; Transport mechanisms: Uniport, antiport, facilitated active mechanisms, ion channels, exocytosis, endocytosis, pinocytosis and phagocytosis; Cytoskeleton structure: microtubules, microfilaments; Basic aspects of intercellular communication; autocrine, paracrine, endocrine & neuronal.

UNIT III  
**Cell organelles:** Structure and functions – Endoplasmic reticulum: rough endoplasmic reticulum and smooth endoplasmic reticulum; Golgi apparatus, Lysosomes, Microbodies: peroxisomes and glyoxisomes, Mitochondria: organization of respiratory chain, Chloroplasts – photophosphorylation, Vacuoles, Ribosomes, Centriole and Basal bodies.

UNIT IV  
**The Nucleus:** Structure of nucleus, nuclear pore complex, internal organization of nucleus – chromosome and higher order chromatin structure, functional domain within the nucleus, nuclear matrix, the nucleolus; Cell cycle – cell division (mitosis and meiosis), checkpoints in cell cycle.

UNIT V  

**Text Book:**

**Suggested Reading:**
CLEMISTRY-I
Subject code - CHET 113
(DSE - 5 credits)

1. Intermolecular forces - Vanderwall and London forces. Liquid state theory and properties of liquids, liquid-crystal formation and applications. Solid state- forces in solids- covalent, ionic, metallic, and Vanderwall’s, Lattice energy.

(8 hrs)


(10 hrs)


(10 hrs)

4. Aromatic compounds-electrophilic substitution in benzene, mechanism of nitration, halogenation, Alkylation and Acylation. Preparation, properties and uses of Naphthalene, Furan, Thiophene, Pyrrole, Pyridine, Chloroform and Carbon Tetrachloride.

(7 hrs)


Text books:
LIST OF PRACTICALS

FIRST SEMESTER

**Biological Science –I: Subject code – BCP 111**

1. Study of morphological characteristics of plants.
2. Examination of cross sections of stem, root, leaf of dicots and monocots.
3. Effect of CO\textsubscript{2} concentration on photosynthesis in Hydrilla.
4. Transpiration index: measurement of transpiration by cobalt chloride method in dry and moist conditions.
5. Observation of stomata in dicot leaf.
6. Study of histological slides of various animal tissues:
   - Epithelial Tissue - Columnar Epithelium, Squamous Epithelium;
   - Connective Tissue - adipose tissue, Cartilage tissue;
   - Muscle, cardiac muscle, skeletal muscle, smooth muscle;
   - Blood Vessels - arteries, veins.

**Cell biology: Subject code – BCP 112**

1. Study of parts of Light & compound microscope.
2. Micrometry.
3. Examination of prokaryotic and eukaryotic cell.
5. Study of different stages of Mitosis in Onion root tip squash preparation.

**Chemistry-I: Subject code - CHEP 113**

1. Estimation of sodium hydroxide using sodium carbonate standard.
2. Estimation of hydrochloric acid using oxalic acid standard.
5. Estimation of oxalic acid using ferrous sulphate standard.
6. Preparation of the following inorganic compounds: ferrous ammonium sulphate, manganous sulphate, sodium thiosulphate.
SECOND SEMESTER

BIOLOGICAL SCIENCE-II

Subject code – BBCT 121 (DSC - 6 credits)

UNIT I (7 hrs)
Homeostasis: Control systems in biology, Temperature regulation - ectothermic and endothermic animals, Osmoregulation - nitrogen and urea excretion, water conservation, Control of blood pH.

UNIT II (8 hrs)
Reproduction in plants: Asexual and sexual reproduction in plants, Pollination and fertilization, artificial propagation of plants; Reproduction in animals: male and female reproductive system with reference to humans.

UNIT III (10 hrs)
Basic concepts of developmental biology: Cell fate and commitment, Maintenance of differentiation, patterns formation, morphogenesis, Outline of cleavage, blastulation, and gastrulation, Fate of ecto, endo and mesoderm.

UNIT IV (12hrs)
Coordination & Control in animals & plants: Parts of the Nervous System - central, peripheral & autonomic; Reflex action – importance of reflexes; Sympathetic & Parasympathetic NS; CSF.
Plant movements: Tropisms, Taxes, kinesis.

UNIT V (8 hrs)

Text books:

Suggested Reading:
1. Scott Freeman. Biological Science, 2ne ed, Patience Hall, 2004
BIOMOLECULES

Subject code – BBCT 122 (DSC - 6 credits)

UNIT I (10 hrs)
**Carbohydrates**: Chemistry, Classification, Monosaccharide: glucose, fructose, mannose, galactose; Stereoisomer, Epimers, Benedict’s reaction, osazone, glycosides, amino sugars, deoxysugar; Disaccharides: sucrose, lactose, maltose; Polysaccharides: starch, glycogen; Mucopolysaccharides and glycoprotein.

UNIT II (8 hrs)
**Proteins and Amino acids**: Classification of proteins, properties, specialized proteins: hemoglobin, collagen, elastin, and keratin. Classification of amino acids and properties; Peptide bond; Structure of protein: primary, secondary, tertiary and quaternary structures, Ramachandran plot; Properties: isoelectric pH, zwitterions, and precipitation reactions.

UNIT III (10 hrs)
**Lipids**: Classification, Fatty acids: saturated, unsaturated and essential fatty acid; Physical and chemical properties: rancidity, saponification number, iodine number, acid number & Reicheat-meissel number; Triacylglycerol, Phospholipids and Cholesterol.

UNIT IV (10 hrs)
**Nucleic acids**: Chemistry of purine & pyrimidine, nucleosides, nucleotides; Structure and properties of DNA; Types of DNA & RNA - structure and functions of mRNA, tRNA, rRNA.

UNIT V (7 hrs)
**Vitamins & Minerals**: Introduction, chemistry, properties and functions of fat and water soluble vitamins; Introduction: major, minor and trace elements.

Text Book:


(10 hrs)


(10 hrs)


(8 hrs)


(10 hrs)


Text books:

LIST OF PRACTICALS
SECOND SEMESTER

Biological Science-II: Subject code - BBCP 121

1. Preservation of embryo.
2. Transverse sectioning, staining and temporary mounting of root.
3. Transverse sectioning, staining and temporary mounting of leaf.
4. Transverse sectioning, staining and temporary mounting of stem.
5. RBC fragility test.

Biomolecules: Subject code - BBCP 122

1. Preparation of molar and normal solutions.
2. Qualitative analysis of protein.
3. Qualitative analysis of amino acids - glycine, tyrosine, arginine, glutamic acid.
4. Qualitative analysis of carbohydrates- glucose, fructose, sucrose, lactose, starch.
5. Qualitative analysis of lipids.
6. Qualitative analysis of nucleic acid (Bial’s test).

Chemistry–II: Subject code - CHEP 123

1. Detection of elements –nitrogen, sulphur and halogens.
2. Preliminary test and detection of carbohydrate, urea, benzamide and aromatic amines.
4. Reaction of aldehyde (aromatic), ketone (aliphatic and aromatic), carbohydrate, carboxylic acid (mono-and dicarboxylic–), phenol, aromatic primary amine, amide and diamide.
5. Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests or derivatives.
THIRD SEMESTER

INTERMEDIARY METABOLISM-I

Subject code - BBCT 231  (DSC - 6 credits)

UNIT I  
(10 hrs)
Enzymes: Characteristics of enzymes, nomenclature and classification, active site, & units of enzyme activity; Coenzymes – Structure and function, metallo-enzymes and metal activated enzymes; Isoenzymes, abzymes, ribozymes. Proteolytic enzymes: endopeptidase and exopeptidase; Multienzyme complex: Pyruvate dehydrogenase and fatty acid synthase.

UNIT II  
(9 hrs)
Enzyme kinetics: Factors affecting enzyme activity, Derivation of Michaelis Menton equation, Line weaver Burk Plot; Mechanism of enzyme action, Lock and key Model, Induced fit theory; Enzyme specificity, Allosteric enzymes, Inhibition: Reversible, Irreversible, allosteric and feedback.

UNIT III  
(10 hrs)
Heme Metabolism: Chemistry of porphyrins, Biosynthesis and degradation of heme, Bile pigments formation.

UNIT IV  
(8 hrs)
Nucleic acid Metabolism: Nucleosides and nucleotides, Synthesis of purine and pyrimidine: de nova and salvage pathway; Degradation of purine and pyrimidine.

UNIT V  
(8 hrs)
Biological role of minerals: Na, K, Cl, I, Fe, Cu, Mg, Ca, P.

TEXT BOOKS:


HUMAN PHYSIOLOGY AND NUTRITION
Subject code – BBCT 232 (DSC - 6 credits)

UNIT I
(8 hrs)
Respiratory system: Structure and functions of lung, Mechanism of pulmonary ventilation - exchange of gases between lung and blood and between blood and cells - transport of gases in tissues.

UNIT II
(10hrs)
Cardiovascular system: Structure and functions of heart, conductive system of heart, origin and conduction of heart beat; Cardiac cycle, electrocardiogram (ECG).

UNIT III
(10hrs)
Muscle physiology: Ultra-structure and chemical composition of skeletal muscle, sliding filament theory, physico-chemical changes during muscle contraction.
Nerve Physiology: Concept of nerve and nerve cells, Transmission of nerve impulse, Action potential, neurotransmitters; Synaptic conduction: neuromuscular synapse, adrenergic and cholinergic neurotransmission.

UNIT IV
(7hrs)
Excretory system: Structure and functions of kidney and Nephron; Composition and formation of urine; Fluid and electrolyte balance, Acid-base dynamics.

UNIT V
(10hrs)
Nutrition and Energy supply: Calorific value of foods; Respiratory Quotient, BMR and SDA, factors affecting BMR, Significance of BMR and SDA; Nutritional importance of carbohydrates, proteins, lipids, minerals and vitamins; Fiber in the diet.

TEXT BOOKS
2) Human Physiology- Ross and Wilson, Churchill Livinstone Medical Division of Pearson Professional Ltd. 1998.
3) Nutrition –Swaminathan Volume I and II
BASIC MICROBIOLOGY
Subject code – BMBT 233 (SEC - 3 credits)

UNIT I (10 hrs)
Introduction: Definition, Scope and History of Microbiology; Differences between the prokaryotic and eukaryotic microorganisms; Basic understanding of classification of Bacteria, Viruses, Algae, Fungi and Protozoa.

UNIT II (5 hrs)
Distribution of Microorganisms:
   a) In soil – distribution of bacteria, molds, yeast and protozoa.
   b) In Water – Quality of drinking water, Bacteriological examination of water, Total bacterial count for E. coli; Purification of water: filtration, sedimentation and addition of chemicals.

UNIT III (5 hrs)
   a) Microorganism in air, air borne diseases.

UNIT IV (5 hrs)
Microbial growth, growth rate, doubling time, exponential growth phases, factors affecting growth – nutrient factors (C, O, N, P, S trace elements) and non-nutrients (temperature, hydrostatic pressure, pH, osmotic strength) for the microorganism.

UNIT V (5 hrs)
   a) Principles and methods of Sterilization and disinfection.
   b) Antibiotics.

TEXT BOOKS
LIST OF PRACTICALS

THIRD SEMESTER

Intermediary Metabolism-I: Subject code – BCP 231

1. Preparation of starch from potatoes.
2. Preparation of casein from milk.
3. Preparation of ovalbumin from egg.
4. Preparation of lactalbumin from milk.
5. Estimation of amylase by iodometric method.
7. Effect of pH on enzyme activity.

Human Physiology & Nutrition: Subject code – BCP232

1. Determination of blood pressure.
2. Determination of hemoglobin.
3. RBC count.
4. WBC count.
5. Analysis of food.

Basic Microbiology: Subject code – BMBP 233

1. Sterilization techniques.
2. Identification of Bacterial cells.
3. Identification of Fungal cells.
4. Pure culture technique- Streak, Pour Plate and Serial dilution.
5. Methylene blue reductase test (MBRT).
7. Gram Staining.
INTERMEDIARY METABOLISM-II

Subject code – BBCT 241 (DSC - 6 credits)

UNIT I  
Carbohydrate metabolism: Glycolysis and energetics, Oxidation of pyruvate to acetyl coA, TCA cycle and energetics, HMP shunt, Uronicacid pathway, Gluconeogenesis, Glycogenesis, Glycogenolysis, Cori cycle, Glucose–alanine cycle, Utilization of lactose and fructose.

UNIT II  
Lipid Metabolism: Fatty acid biosynthesis and catabolism; Biosynthesis of Triacylglycerol and phospholipids; Cholesterol-metabolism, synthesis, transport, degradation and exertion; Fatty acid oxidation - Beta oxidation; Ketone bodies: formation, utilization and excretion; Transport forms of lipid; VLDL, LDL, HDL and Chylomicrons.

UNIT III  
Amino acid metabolism: Amino acid pool, glycogenic and ketogenic amino acids; Biosynthesis and catabolism of tyrosine and lysine; Transamination, deamination and decarboxylation; Metabolism of ammonia, Urea cycle.

UNIT IV  

UNIT V  
Integration of Metabolism: Overview of integration of major metabolic pathways of energy metabolism; Major organs involved in metabolism; Metabolism in starvation.

TEXT BOOKS:


2. Essentials of Biochemistry- U. Sathyanarayanan, Books and Allied (P) Ltd. 8/1, Chintamani Das lane, Kolkata, 2004.

3. ENZYMES: Biochemistry, Biotechnology, Clinical Chemistry, 2/E by Trevor Palmer (Author), Philip Bonner (Author).
UNIT I  
**Centrifugation Techniques**: Theory - Clinical, High speed and Ultracentrifuge - analytical and preparative; Centrifuge rotors: vertical, fixed angle, swinging bucket; Subcellular fractionation by differential centrifugation.

UNIT II  
**Chromatographic Techniques**: Partition- Adsorption-Ion Exchange- Molecular sieve and Affinity chromatography; Principles of Gas Liquid chromatography and High Performance Liquid Chromatography.

UNIT III  
**Electrophoretic Techniques**: Principle and applications of Paper, Starch, Agarose, Polyacrylamide, Cellulose Acetate and Immunoelectrophoresis; Southern, Northern, Western Blots; Concepts and application of PCR.

UNIT IV  
**Colorimetry and Spectrometry**: Beer Lambert’s law, Transmittance, Absorbance, Optical density; Types of Spectroscopy: UV & Visible - Principle, instrumentation & application.

UNIT V  
**Radioactive techniques**: Types of radiation- Units if radioactivity- Radioisotopes, Half-life- - Radioactivity measurement; GM and Scintillation Counters; Radioactive hazards - Uses and safety measures; Pulse labeling technique, Autoradiography.

**TEXT BOOKS:**

i) Biophysical chemistry- Principles and techniques- Upadhyay, Upadyay and Nath Himalaya publication house Mumbai.

COMPUTER APPLICATIONS IN BIOLOGY
Subject code – CABT 243 (SEC - 3 credits)

UNIT I (6 hrs)
**Fundamentals of Computers:** Block diagram of computer (input and output devices), Generations, Advantages and limitations of Computers; Basics of operating system: DOS, Windows NT & XP, UNIX and Application Software.

UNIT II (6 hrs)
**Communication Technology:** Networking- LAN, WAN & MAN - Internet & Intranet - Data transfer, storage & retrieval via network- Email, DNS, WEB servers and browsers.

UNIT III (6 hrs)
**Fundamentals of database:** Database models (Hierarchical, Network, Relational, Object-Oriented Models), RDBMS, Database System applications and Security.

UNIT IV (6 hrs)
**Introduction to M.S. office package:** word- creating a new document - templates and wizards- scientific data representation and basic calculations with EXCEL- Creating Tables and databases using Access - interactive presentations using Power Point.

UNIT V (6 hrs)
**Basics of Biological databases:** Types of data held in biological databases - Literature Databases and searches – Pub med Central – Medline – OMIM – SCOPUS – Science direct - Elsevier.

**TEXT BOOKS:**

1. Fundamentals of Computers- Pradeep K. Sinha, PritiSinha
2. Principles of database systems- Jeffery O. Ullman
LIST OF PRACTICALS

FOURTH SEMESTER

Intermediary Metabolism-II: Subject code – BCP 241

1. Preparation of acetate buffer.
2. Determination of acid number.
4. Thin layer chromatography- Separation of amino acids.
5. Agarose gel electrophoresis.

Analytical Biochemistry: Subject code – BCP 242

1. Preparation of cleaning agents.
2. Calibration of pipette and standard flask.
3. Calibration of pH meter.
4. Verification of Beer’s Law.
5. Estimation of unknown concentration using colorimeter.

Computer applications in biology: Subject code – CABP 243

1. Creating a word document with Mail merge option.
2. Representing Biological data in graphs and charts using EXCEL.
3. Database and front- end development with ACCESS.
4. Searching scientific articles using keyword search.
5. Searches with OMIM database using medical terms.
FIFTH SEMESTER
CLINICAL BIOCHEMISTRY

Subject code – BBCT 351 (DSC - 6 credits)

UNIT I (8 hrs)
Approaches to clinical biochemistry: Concepts of accuracy, precision, sensitivity and reproducibility; Quality control, fixation of normal range. Collection and processing of blood and urine samples, Anticoagulants, Preservative for blood and urine, Transport of biological samples.

UNIT II (9 hrs)

UNIT III (9 hrs)
Diseases in protein metabolism: Introduction - Clinical significance and variation of plasma and serum protein; Clinical features of phenylketonuria, alkaptonuria, albinism and tyrosinosis; Disorders in urea cycle.
Clinical significance of non-protein nitrogen: urea, uric acid and creatinine - Normal and abnormal levels; clinical importance of clearance determination

UNIT IV (9 hrs)
Disorders in lipid metabolism: Introduction, hyper triacylglyceridemia, hypo and hyperlipoproteinemia; Atherosclerosis - clinical features and complications; Lipid storage disease, fatty liver.
Disorders in nucleic acid metabolism: Gout-types, aetiology and clinical features.

UNIT V (9 hrs)
Liver function tests: Detoxification and excretory functions, protein changes in liver disease; Differential diagnosis of Jaundice: Hemolytic hepatic and obstructive Jaundice, Un-conjugated and conjugated bilirubin, bile pigment levels in blood and urine.
Gastric function test: Fractional test meal analysis and its interpretation; GI hormones: gastrin, secretin, CCK and gastric inhibitory peptide.

TEXT BOOKS:
4. Textbook of Biochemistry for Medical Students by Vasudevan DM.
MOLECULAR BIOLOGY

Subject code – MOLT 352  (DSE - 5 credits)

UNIT I (9 hrs)
History: Identification of DNA as genetic material, Experiments of Griffith, Avery, McLeod and McCarty, Hershey and Chase, Lederberg and Tatum; Chemical nature and types of DNA and RNA; Chromosomal organization in prokaryotes and Eukaryotes; Gene and gene concept: cistron, muton, and recon.

UNIT II (9 hrs)
Replication in Prokaryotes: Semi conservative replication - Enzymes and proteins involved in replication - Replication of plasmids and mitochondrial DNA.

UNIT III (9 hrs)
Transcription in prokaryotes: RNA polymerases, promoters, enhancers, silencers, transcription factors; Structure of mRNA in prokaryotes and eukaryotes, Post transcriptional processing in eukaryotes; Genetic code, characteristics of genetic code, wobble hypothesis, central dogma, reverse transcription.

UNIT IV (9 hrs)
Translation in prokaryotes: Mechanism of translation - amino acid activation, initiation, elongation, and termination; Posttranslational processing, modification in eukaryotes; Inhibition of protein synthesis by antibiotics.

UNIT (9 hrs)
Gene expression: Regulation of gene expression in prokaryotes - positive Vs negative control: lac, trp operon; Transposons, Gene regulation in eukaryotes, Enzyme induction and repression, Positive control of gene expression by steroid hormones.

TEXT BOOKS:

1. Molecular Biology- David Friefelder, Narosa publication- house pvt. Ltd. 22 Dayaganj, Prakash Deep, Medical Association Road, New Delhi.
3. A Textbook of Biochemistry: Molecular and Clinical Aspects. 2nd ed. SciTech Publ., Chennai. 2007 by Dr. S. Nagini
UNIT I  (9 hrs)
**Introduction to Endocrinology:** Historical perspective, comparative endocrinology, concept of homeostasis - feedback systems, hormones and homeostasis, endocrine glands and their hormones, general classes of chemical messengers, basic mechanism of hormones action.

UNIT II  (7 hrs)
**Hypothalamus:** Hormones, control of hypothalamic - hypophysial hormone secretion.
**Pituitary gland:** anatomy, hormones and their biological actions and disorders.

UNIT III  (10 hrs)
**Thyroid gland:** Structure and functions, thyroid hormones, biosynthesis and biological actions, hypo and hyperthyroidism.
**Parathyroid gland:** Structure and functions - Parathyroid hormone: Calcitonin, and Calcitriol - biological actions; Regulation of Calcium and Phosphorus metabolism; Hypo and hyper parathyroidism.

UNIT IV  (9 hrs)
**Pancreas:** Endocrine parts of pancreas; Hormones: glucagon, insulin and somatostatin - synthesis, regulation, secretion, biological actions and disorders.
**Adrenal gland:** Adrenal cortex – glucocorticoids, mineralocorticoids; Adrenal medulla – epinephrine, norepinephrine.

UNIT-V  (10 hrs)
**Testis:** Structure, cell types, spermatogenesis, steroidogenensis, endocrine control of testicular function, biological actions of androgens and its disorders.
**Ovaries:** Structure, cell types, ovarian cycle, ovarian steroid hormones, physiological roles of ovarian steroid hormones and disorders.

TEXT BOOKS:

2. Human physiology- Guyton and Hall, Prism books (p) LTD, Bangalore.
UNIT I 
Importance of Biochemistry and pharmacy: Metabolites and anti-metabolites; Drugs - Classification of drugs, routes of drug administration, absorption and distribution of drugs, factors influencing drug absorption.

UNIT II 
Drugs: Receptor interaction, involvement of binding forces in drug receptor interaction, drug action not mediated by receptors; Drug metabolism, role of cytochrome P<sub>450</sub>.

UNIT III 
Adverse responses and side effects of drugs: Allergy, drug intolerance, drug addiction, drug abuses and their biological effects.

UNIT IV 
Drugs and pharmaceuticals from marine organisms: Marine lipids, marine flavourants and flavonoids.

UNIT V 
Natural products: Alkaloids - coinine, nicotine, quinine, atropine; Terpenoids - terpenoil, menthol, ditentene; Flavonoids – anthoxynene; Aloevera - Sources, preparation and uses; Jetropa - Sources, preparation and uses.

TEXT BOOKS:

ENVIROMENTAL BIOLOGY

Subject code – EBIO 355 (GEC - 3 credits)

UNIT I (6 hrs)
Environment: Definition - atmosphere, hydrosphere, and lithosphere; Abiotic and biotic factors: Abiotic factors - essential elements and limiting factors, Biotic factors - interspecific and intraspecific interactions.

UNIT II (6 hrs)
Ecosystem: Structure and functions of ecosystem - Ecological pyramids - Food chain and Food web- Energy flow in the ecosystem; Aquatic and terrestrial ecosystem; Biological succession - Types, general process of succession, Influence on succession, community evolution.

UNIT III (6 hrs)
Ecosystem Diversity: Forest, grassland, wetlands, coastal, marine, mangrove and desert ecosystem - Factors influencing ecosystem diversity and conservation measures.

UNIT-IV (6 hrs)
Natural Resources: Concepts and classification of natural resources- renewable and non-renewable resources- resource management- Recycling.

UNIT-V (6 hrs)
Environmental Pollution: Concept and classification - Air, water, soil, radiation and noise pollution- Toxins- their effects on ecosystem and their control - Pollution control and environmental protection.

TEXT BOOKS:

LIST OF PRACTICALS

FIFTH SEMESTER

Clinical Biochemistry: Subject code – BCP 351

1. Blood glucose analysis.
2. Blood urea analysis.
3. Serum creatinine estimation.
4. Serum uric acid estimation.
5. Serum cholesterol estimation.
7. Estimation of total protein.
9. Urine analysis.

Molecular Biology: Subject code – MOLP 352

1. Isolation of microbial DNA.
2. Isolation of animal DNA.
3. Isolation of plant DNA.
4. Isolation of plasmid DNA.
5. Agarose gel electrophoresis.
6. SDS PAGE (demonstration).
7. Estimation of RNA by Orcinol method.
SIXTH SEMESTER

BASIC IMMUNOLOGY

Subject code – BBCT 361  (DSC - 6 credits)

UNIT I  (10 hrs)
Overview and historical perspective of Immunology: Immunity. Types: innate and acquired - active, passive, natural and artificial immunity. Overview of immune system, Cells of the immune system and functions, Organs of the immune systems and functions - primary and secondary lymphoid organs.

UNIT II  (10 hrs)
Antigens: Nature and types of antigens, specificity, epitope, haptens, adjuvants, immunogenicity, factors affecting immunogenicity.
Antibodies: Immunoglobulins-Structure, Classes and functions; Antigens-antibody reactions - Agglutination, precipitation, complement fixation, neutralization; Immunofluorescence.

UNIT III  (8 hrs)
Humoral and cell-mediated immunity: Th, Tc, Ts and B lymphocyte function; Primary and secondary immune responses, Memory cells; Polyclonal and monoclonal antibody generation and its applications.

UNIT IV  (8 hrs)
Immunodiagnostic technique: Single radial Immunodiffusion, Double Immunodiffusion, Immunelectrophoresis, Rocket electrophoresis, Haemaggulitination, bacterial agglutination, ELISA, RIA.

UNIT V  (9 hrs)
Hypersensitivity reactions: Type I, II, III and IV, Allergy and inflammation; Fundamentals of autoimmune disorders, Immunodeficiency and Immune suppression disease. Transplantation Immunology: graft acceptance and rejection.

TEXT BOOKS:

2. Essentials of Immunology- I. Roitt, Blackwell Science, 2005
BASIC BIOTECHNOLOGY

Subject code – BBTT 362 (DSE - 5 credits)

UNIT I (9 hrs)
**Introduction to genetic engineering:** Basic steps of gene cloning, Enzymes used in genetic engineering, Restriction enzymes - types, target sites, nomenclature, DNA polymerase, ribonuclease, ligases, alkaline phosphatases, reverse transcriptase.

UNIT II (9 hrs)
**Cloning vectors:** Plasmid vectors, bacteriophage, phagemid, cosmids, yeast vectors and plant vectors; Gene transfer techniques - microinjection, electroporation and gene gun bombardment.

UNIT III (9 hrs)
**Genomic and DNA libraries:** Selection and screening of recombinants; Isolation and purification of cellular and plasmid DNA, methods for labeling nucleic acids and probes, somatic cell hybrids, in situ hybridization.
Amplification of DNA by PCR: Technique and applications, analysis of DNA, RNA and proteins by blotting techniques.

UNIT IV (9 hrs)
**Plant genetic engineering:** Transgenic plants - Agrobacterium mediated gene transfer and protoplast fusion - somaclonal variation - Applications of transgenic plants.

UNIT V (9 hrs)
**Animal genetic engineering:** Transgenic animals: Production of recombinant insulin, and vaccines. RAPD, RFLP and its applications, DNA fingerprinting, foot printing, gene therapy.

TEXT BOOKS:

GENETICS
Subject code – GENT 363 (DSE - 4 credits)

UNIT I (10 hrs)
Introduction: A brief overview of the modern history of genetics; Mendelism and the chromosomal theory - Mendel’s experiments, segregation, dominance, independent assortment; Epistasis; Multiple alleles; one gene-one enzyme hypothesis. Inheritance - Sex linked inheritance and extra chromosomal inheritance.

UNIT II (9 hrs)
Cytogenetics: Normal human karyotype, sex chromosomes and sex determination patterns, dosage compensation. Sex linkage-X Linkage in Drosophila, sex limited and sex influenced traits, Genetic mapping.

UNIT III (8 hrs)
Linkage: Types of linkage and theories of linkage, coupling and repulsion, factors affecting linkage, Non disjunction: types in man, syndromes.

UNIT IV (9 hrs)
Changes in chromosome number and structure: Monoploidy, euploidy, and polyploidy; Mutations - Point mutation: transversion, transition, deletion, missense, nonsense and frame shift; Chromosomal aberrations, crossing over, and significance of mutation.

UNIT V (9 hrs)
Population genetics: Gene pool, allele frequency, genotype frequency, and Hardy-Weinberg equation; Variation, Mutation, Mechanisms of speciation, factors producing changes in populations.

TEXT BOOKS:

1. Genetics- Verma and Agarwal, S. Chand and company Ltd, Ram Nagar, New Delhi.
UNIT I (6 hrs)
Nature and scope of statistical methods and their limitations: Collection of sample - Classification, Types and methods of data collection- tabulation of data and representation of data - diagrammatic representation (histogram, frequency, polygon and Ogives).

UNIT II (6 hrs)
Measures of central tendency: Mean, Median, Mode, Hormonic mean, geometric mean - merits and demerits.

UNIT III (6 hrs)
a) Measurements of dispersion: Range, Variance, Standard deviation, Quartile deviation, Lorenz curve, Coefficient of variation.
b) Skewness: classification of skewness, Karl Pearson’s coefficient of skewness; Kurtosis.

UNIT IV (6 hrs)
Correlation: Types and method of correlation, coefficient of correlation, scatter diagram, Regression, Regression analysis.

UNIT V (6 hrs)
Test of significance (student t-test), F-test, Chi-square, ANOVA (one-way)

TEXT BOOKS:

UNIT I

Introduction to Bioinformatics: Scope and applications - biological sequence structure - deficit - genome projects – status - sequence analysis - homology and analogy.

UNIT II

Biological Databases: Nucleotide sequence databases – Gene bank, EMBL, DDBJ; Protein sequence databases - Swissprot, PIR, TrEMBL; Protein Structure databases - PDB, CATH, SCOP- Information retrieval - Different search criteria.

UNIT III

Molecular Sequence analysis: Introduction - sequence manipulation - sequence analysis software (DNASIS, Gene scan) - Sequence comparison (Pairwise, Multiple Sequence). Evolutionary analysis-clustering methods - phylogenetic analysis

UNIT IV

Biological Structure databases: (NDB, PDB) - Structure File format - Structure obtainment- Visualization with RasMol, Swiss PDB viewer.

UNIT V

Introduction of presently available biological software programs: BLAST, FASTA, CLUSTALW, MEGA.

TEXT BOOKS:

LIST OF PRACTICALS

SIXTH SEMESTER

**Basic Immunology: Subject code – BBCP 361**

2. Identification of Immune cells of blood smears.
4. Double Immunodiffusion.
5. Immuno-electrophoresis.

**Basic Biotechnology: Subject code – BBTP 362**

1. Isolation of DNA from mammalian tissue.
2. Restriction digestion analysis.
3. Ligation.
4. Immobilization of cells.
5. Antifungal activity.
6. Antimicrobial activity.
7. Estimation of DNA by diphenolamine method.
BASIC CONCEPTS IN NUTRITION
Course - AECC I
Subject code - BCIN 114

Credits-2

UNIT I
**Introductions to Nutrition:** Basic concepts of nutrition and health; Role of food in the maintenance of good health; Definition of Health, Nutrition and Malnutrition.

UNIT II
**Requirement:** Minimum Nutritional Requirement and RDA - Formulation of RDA and Dietary Guidelines

**Energy in Human Nutrition:** Idea of energy and its unit, Energy balance, Assessment of energy requirements - Deficiency and Excess, Determination of energy in food, BMR and its regulation, SDA.

UNIT III
**Concepts of Calorie:** Nutrients in food and food supplying them; Carbohydrates, Protein, Fat, Vitamins and Minerals - Source, functions and requirements and deficiency.

UNIT IV
**Basic food groups and study of different foods:** Food pyramids - Nutritional allowances - Nutrition during preschool, school, adolescence, adulthood and old age.

UNIT V
**Energy requirements:** Energy requirement during rest, different physical activities. Diet related health disorders - Alcohol, drugs, food poisoning, allergy, anorexia, bulimia, etc.

**Text books and References**
LIFESTYLE DISORDERS
Course – SEC-I

Subject code – LSDO 233
Credits-2

UNIT I
Introduction: Definition of health, lifestyle disorders, types and contributory factors of lifestyle disorders, impact of lifestyle factors on physical & mental health of the people.

UNIT II
Lifestyle disorders: Eating, physical, mental and occupational lifestyle disorders; Causes - food, physical & mental habits and its consequences, Symptoms and Prevention of lifestyle disorders in children, adult and old age diseases.

UNIT III
Lifestyle disorders in India: Cardiovascular disease – hypertension, heart attack and stroke; Asthma, chronic liver disease, chronic obstructive pulmonary diseases (COPD), nephritis diabetes and osteoporosis; Cancer, Alzheimer’s disease and Obesity.

UNIT IV
Growth monitoring and promotion: Growth & factors affecting growth and development; Importance of Nutrition for ensuring adequate development, management of diet related to lifestyle disorders.

UNIT V
Strategies and approaches in lifestyle disorders: Prevention of disease by means of diet and lifestyle changes; Lifestyle choices and personal wellness.

Text books and References