



**ST ALOYSIUS COLLEGE (AUTONOMOUS)**

**MANGALURU**

**Re-accredited by NAAC “A” Grade**

**Course structure and syllabus of**

**OF**

**M.Sc. Biochemistry**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**(2021 -22 BATCH ONWARDS)**



Re-accredited by NAAC with 'A' Grade with CGPA 3.62/4   
 Recognised by UGC as "College with Potential for Excellence"   
 Conferred "College with "STAR STATUS" by DBT, Government of India.   
 Centre for Research Capacity Building under UGC-STRIDE

Date: 12-08-2021

## NOTIFICATION

Sub: Syllabus of M.Sc. Biochemistry under Choice Based Credit System.

Ref: 1. Decision of the Academic Council meeting held on 19-06-2021 vide

Agenda No: 9 (2021-22)

2. Office Notification dated 12-08-2021

Pursuant to the above, the Syllabus of M.Sc. Biochemistry under Choice Based Credit System which was approved by the Academic Council at its meeting held on 19-06-2021 is hereby notified for implementation with effect from the academic year 2021-22.

  
PRINCIPAL



  
REGISTRAR

To:

1. The Chairman/Dean/HOD.
2. The Registrar Office
3. Library
4. PG Office

M.Sc. Biochemistry							
I Semester (2+1 Hard core and 2+1 soft core paper)							
Code	Papers	Instruction hours/ Week	Duration of Exam (hours)	Marks		Total	Credits
				IA	End Semester		
PH.511.1	Biomolecules	5	3	30	70	100	5
PH.512.1	Biochemical Techniques	4	3	30	70	100	4
PH.513.1P	Bioquantitation	8	4	30	70	100	4
PS.514.1	Organic and Physical Biochemistry	3	3	30	70	100	3
PS.515.1	Physiology and Nutrition	3	3	30	70	100	3
PS.516.1	General microbiology						
PS.517.1P	Analytical Techniques	8	4	30	70	100	3
PS.518.1P	Experimental microbiology						
	<b>Total</b>					<b>600</b>	<b>22</b>
II Semester (2+1 Hard core and 2+1 Softcore papers and 1 open elective paper)							
PH.511.2	Enzymology	5	3	30	70	100	5
PH.512.2	Metabolism	4	3	30	70	100	4
PH.513.2P	Practical Enzymology	8	4	30	70	100	4
PS.514.2	Research Methodology and ethics	3	3	30	70	100	3
PS.515.2	Biotechnology	3	3	30	70	100	3
PS.516.2	Neurobiochemistry						
PS.517.2P	Practical Biotechnology	8	4	30	70	100	3
PS.518.2P	Experimental Neurobiochemistry						
<b>PO.519.2</b>	<b>Biochemistry of Diseases</b>	3	3	30	70	100	3
	<b>+Total</b>					<b>700</b>	<b>25</b>

M.Sc. Biochemistry							
III Semester (2+2 Hard core and 1 Soft core papers and open elective 1 paper)							
Code	Papers	Instruction hours/ Week	Duration of Exam (hours)	Marks		Total	Credits
				IA	End Semester		
PH.511.3	Molecular Biology	5	3	30	70	100	5
PH.512.3	Nitrogen Metabolism & Plant Biochemistry	4	3	30	70	100	4
PH.513.3P	Metabolism & clinical Biochemistry	8	3	30	70	100	4
PH.514.3P	Cell & Molecular Biology	8	3	30	70	100	4
PS.515.3	Cellular Biochemistry	3	3	30	70	100	3
PS.516.3	Clinical Biochemistry						
PO.517.3	Evolution and Ecology	3	3	30	70	100	3
	<b>Total</b>					<b>600</b>	<b>23</b>
IV Semester (2+1 Hard core and 2+1 Soft core papers)							
PH.511.4	Immunology	4	3	30	70	100	4
PH.512.4	Genetics	4	3	30	70	100	4
PH.513.4P	Project	10	3	30	70	100	5
PS.514.4	Genetic Engineering & Bioinformatics	3	3	30	70	100	3
PS.515.4	Clinical Toxicology	3	3	30	70	100	3
PS.516.4	Food Biochemistry						
PS.517.4P	Methods in Genetic Engineering & Bioinformatics	8	3	30	70	100	3
PS.518.4P	Experiments in food science						
						<b>600</b>	<b>22</b>
	<b>Grand Total</b>					<b>2500</b>	<b>92</b>

## PO.517.3 EVOLUTION AND ECOLOGY

**Total No. of Lectures: 42 hours**

**Total marks: 70**

**No. of Lectures/week: 3**

**Credits: 3**

### **Course Objective:**

*The objective of the course is to familiarize the students with the study of evolution, the processes that determine how the genetic composition of populations changes over time; the interactions between organism and their environment, among individuals within a population, and among species.*

*The first unit elaborates on the definition and theories of evolution. The second unit deals with population ecology, species and inter-species interactions. The third unit deals with the ecosystem and pollution.*

**Course Learning Outcomes:** Upon completion of this course, students will be able to

- CO 1: Discuss the scientific theory of evolution and explain the points of the Modern Synthesis of evolutionary theory.
- CO 2: Demonstrate broad-based knowledge of the fundamentals of Ecology, and Evolution and the relationships among these disciplines
- CO 3: Describe the principal interactions between different species and how they affect the respective species.
- CO 4: Discuss the biogeochemical cycles, pollution, natural resource conservation and management

### **Unit I: Evolution**

**14 L**

Definition; Theories of Evolution – Lamarckism, Darwinism, Neo-darwinism, Modern synthesis; Evidence for evolution; Phenomena influencing evolution – Adaptation, Natural selection (genetic variation, fitness, competition), Sexual selection, Fecundity selection, Genetic drift, Gene flow, Adaptive radiation; Species concept – Definition, Parameters for the delimitation of species, Speciation: Allopatric and parapatric, Biogeography and evolutionary ecology; Evolution and development; Misconceptions and misinformation of evolution.

### **Unit II: Ecology**

**14 L**

Population ecology: meta-population dynamics; growth rates – density independent growth, density dependent growth; niche concept; key stone species.

Species interactions: inter-species interactions – mutualism, commensalism, competition, predation; trophic interactions; functional ecology; eco-physiology; behavioural ecology

Community ecology: Community assembly, organization and evolution; biodiversity – species richness, evenness and diversity indices; endemism; species-area relationships

### **Unit III: Ecosystems**

**14 L**

Ecosystems: structure and function; Aquatic ecosystem – freshwater, estuaries, marine communities; Terrestrial ecosystems. Biogeochemical cycles – gaseous, sedimentary, water, micronutrient;

Pollution: environmental pollutants – biomagnification, Pollution control; global warming and climate change.

Natural resource ecology: Natural resource conservation and management, Wild life management.

### **References:**

1. Braude, S., & Low, B. S. (Eds.). (2010). An introduction to methods & models in ecology, evolution, & conservation biology. Princeton University Press.
2. Knustad, D., & Simmons, M. (2006). Principle of genetics (4th ed.). John Wiley and Sons publications.
3. Kumar, H. (2001). Text book of Cytology genetics and evolution. Kalyani Publisher, Ludhiana.
4. Life on earth: An encyclopedia of biodiversity, ecology, and evolution. (2003). Choice Reviews Online, 40(11), 40-6160-40-6160. <https://doi.org/10.5860/CHOICE.40-6160>
5. Mayhew, P. J. (2006). Discovering evolutionary ecology: Bringing together ecology and evolution. Oxford University Press.
6. Purohit, S. (2004). Ecology & Environmental biology. Agrobios (India).
7. Purohit, S., Shammi, Q., & Agarwal, A. (2004). A text book of environmental sciences. Student Edition.
8. Verma, P., & Agarwal, V. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. SChand Pvt. Ltd., New Delhi.
9. Wright, R., & Nebel, B. (2002). Environmental Science. Prentice-Hall, India Pvt. Ltd.
10. Williams, G. (1992). Natural Selection: Domains, Levels, and Challenges (Oxford Series in Ecology and Evolution). Oxford University Press.

## PO.519.2. Biochemistry of Diseases

(Open Elective-I)

**Total No. of Lectures: 42 hours** **Total marks: 70**

**No. of Lectures/week: 3** **Credits 3**

### Course objective:

*The objective of this paper is to enable the students to understand basic health, common diseases, general check-ups & medical diagnostic tests.*

*The first unit gives information about anatomy of the human body, healthy diet, and general check-ups. The second unit deals with some common infectious disease, tests to diagnose them & antidote therapy. The third unit elaborates on systemic pharmacology and drugs used for various diseases.*

**Course Learning Outcomes:** Upon completion of this course, students will be able to

CO 1: Demonstrate an understanding of the mechanisms of diseases- cause, transmission, detection, treatment and prevention.

CO 2: Understand general health check-ups, diagnosis and samples for disease analysis.

CO 3: Relate to any existing or emerging infection as well as will learn about drug resistance and its mechanisms.

CO 4: Acquire know-how to health research and develop new tools for their management.

### Unit I 12L

**Introduction** - Location of organs. Introduction on Concepts of macro and micro nutrients, healthy diet, Atkins diet, essential nutrients and their classification. Energy value of food- Food as source of energy.

General health, syndrome and common diseases – communicable and non- communicable diseases. General check up: Blood group, Hb, height and weight, waist to hip ratio, electro cardio gram. Samples for analysis: Blood, urine, pleural fluid, synovial fluid, cerebrospinal fluid and tissues and histology.

**Professional hazards:** High risk groups (farmers, heavy duty machine workers, Corporate workers, athletes).

## Unit II

10L

**Infectious diseases:** Cause, Symptoms and treatment/prevention- Bacterial infections (Tuberculosis, Salmonella, Cholera), Viral infections (Hepatitis A,B,C), H1N1, chikungunya, Dengue ), STDs( Chlamydia, Syphilis, Gonorrhoea, HIV). Pregnancy and infections.

**Antidotal therapy:** types of antidotes: universal, simple & multiple antidotes: definition & examples. Antidotal procedures: decrease absorption of toxicants by emetics and chelating agents.

**Adverse effect of Drugs:-** Paracetamol, Aspirin ,Solvent toxicity-Methanol and Chemotherapeutic drugs.

**Pharmacodynamics-** types of action, Pharmacodynamic /pharmacokinetic (PK/PD) correlation.

## Unit III

20 L

**Mechanism of drug action and adverse reaction of following drugs:**

**Analgesic drugs:** Codeine, Morphine

**Drugs of abuse:** Alcohol, LSD, nicotine.

**Antipyretic drug:** Paracetamol

**Respiratory Drugs:** salbutamol, montelukast

**Anti-emetics:** metaclopramide,

**Drugs in peptic ulcer:** cimetidine.

**Diuretics:** chlorothiazide

**Cardiovascular drugs-**in heart failure: digoxin,

**Vasodilators:** Nitroglycerine.

**Anti-inflammatory drugs-** NSAIDS: aspirin,

**Antidiabetics:** metformin, glimepiride & Insulin.

**Steroids:** estradiol, methyltestosterone, dexamethasone.

**Antimicrobial agents-** Penicillin, isoniazid, amphotericin B, acyclovir, chloroquine.

**Anti-cancer agents:** Cyclophosphamide, mercaptopurine, vinblastine, vincristine

### References:

1. Tripathi, K. D. (2013). Essentials of medical pharmacology. JP Medical Ltd.
2. Hodgson, E. (Ed.). (2004). A textbook of modern toxicology. John Wiley & Sons.
3. Omkar. (2014). Concepts of toxicology. Vishal Publishers.
4. Thomas, L. (6<sup>th</sup> Ed), (2008). Foyes principles of medicinal chemistry. Wolter Klu