

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),
CUDDALORE-1**



PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY

M.Phil Syllabus

2016-2017

**PG AND RESEARCH DEPARTMENT OF
BIOCHEMISTRY**

CURRICULUM TEMPLATE

c. M.Phil Biochemistry

SEMESTER – I

| S.No | Part | | Hours/ Week | Credit | Course Code | Course Title | Maximum Marks | | |
|-----------------------|------|---------------|----------------|-----------|----------------|---------------------------------|---------------|------------|------------|
| | | | | | | | CIA | ESE | TOTAL |
| 1 | III | Core Paper I | 9 | 5 | MBC101 | Research Methodology | 25 | 75 | 100 |
| 2 | III | Core Paper II | 9 | 5 | MBC102 | Biochemical Aspects of Diseases | 25 | 75 | 100 |
| Semester Total | | | 18 | 10 | | | 50 | 150 | 200 |

SEMESTER – II

| S.No | Part | | Hours/ Week | Credit | Course Code | Course Title | Maximum Marks | | |
|-----------------------|------|----------------|----------------|-----------|----------------|----------------------|---------------|------------|------------|
| | | | | | | | CIA | ESE | TOTAL |
| 3 | III | Elective paper | 9 | 5 | | Guide Elective Paper | 25 | 75 | 100 |
| 4 | III | Core practical | - | 21 | JBC201 | Project Dissertation | 20 | 80 | 100 |
| Semester Total | | | 9 | 26 | | | 45 | 155 | 200 |

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| M.Phil., | RESEARCH METHODOLOGY | MBC101 |
| SEMESTER-I | | HRS/WK-9 |
| CORE-1 | | CREDIT-5 |

Objectives :

- To provide knowledge and skills to understand the role of statistics in research.
- To develop skill in scientific writing and recent techniques.
- To launch the students into core areas of Bioinformatics like sequence alignment ,phylogenetic trees, genomics, proteomics
- To gain appropriate knowledge about sample collection, hypothesis testing analysis, tabulation of statistical data apart from measures of central tendency and averages
- To gain knowledge about the principle and application of various biochemical techniques.

UNIT I - Scientific Research

[35 hours]

Research .definition, importance & need for research ethics, selection of topic, hypothesis. Research schedules, Sample collection techniques,. Data collection, review of literature & its use in designing a research work. Mode of collection of literature. Year books, books & monographs, journals, conference proceedings, abstracting & indexing journals, notes & index cards, internet, magazines, CD- ROMS. Preparation of manuscript- plan of the report, designing of methodology, interpretation of data & thesis layout. Scientific writing .characteristic of scientific writing, essential features of an abstract, presentation of data, writing of results & discussions. Computer application in scientific research. World Wide Web. Finding scientific articles . Pub med .Public biological databases. Power point features, slide preparation.

UNIT II - Bioinformatics

[25 hours]

The scope of bioinformatics. The internet. The world wide web. File formats. Biological data bases-sequence and structure-NCBI, PDB. Data retrieval – the Entez system. Searching sequence databases – sequence similarity searches, substitution matrices. Database search- FASTA and BLAST. Protein multiple sequence alignments-CLUSTAL. Protein docking.

UNIT III - Biostatistics

[25 hours]

Collection and classification of data – diagrammatic and graphic representation of data – measurement of central tendency – standard deviation – standard error- normal distribution – test of significance based on large samples – small samples – student t test – F test- correlation and regression – Chi square test for independents of attributes – ANOVA. Use of SPSS . Multiple Duncan’s test.

UNIT - IV - Biotechniques**[25 hours]**

Blotting techniques, CD-spectra, Capillary electrophoresis, working and applications. ELISA. Spectroscopy-general principle and applications-Mass spectroscopy, XRD- DNA sequencing-sangers and pyrosequencer, 2D electrophoresis, MALDI-TOF, COMMET assay, PCR, peptide mass finger printing.

UNIT V - Bioethics and Patenting**[25 hours]**

Bioethics involved in animal studies, Patents-process and product, copyright, TRIPs, IPR, plant breeder's right, conditions for patenting; patenting of live forms.

REFERENCE BOOKS:

1. R.A.Day. How to write a scientific paper. Cambridge university press.
2. Cooray P.G. Guide to scientific and technical writing.
3. Carter V Good and Douglas E seats Methods of Research.
4. Alley, Michael. The craft of scientific writing Englewood Cliffs. N.N. Prentic 1987.
5. M.C. Sharma, Desk Top Publishing on PC, BPB Publications, 1887.
6. Lesk, A.M. Introduction to Bioinformatics Oxford 2002.
7. Krane et al fundamental concepts of bioinformatics Benjamin Cummings.
8. Sundar Rao, Jesudian Richard – An introduction to Biostatistics.
9. S.P. Gupta – Fundamentals of statistics, Sultan Chand.
10. Ethics and the use of alternatives to animals in research and education. Shiranee Pereira. CPCSEA.
11. CPCSEA guidelines for laboratory animal (CPCSEA) – No.13 Scaward road, Valmiki Nager Chennai – 41.
12. Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi, 2000.
13. Dickson. Molecular and cell biology of human gene therapeutics. Series Chapman and Hall 1995.
14. Research and Development Funding Schemes of Central Government Departments and Agencies. Ministry of Science and Technology, Departement of Science and Technology, New Mehrauli Road, New Delhi – 110106.
15. Biostatistical analysis-Zar 5th Edition Publisher: Prentice Hall 16. Molecular cloning-sambrook, Manities Vol-I, II, and III.
16. Current protocols in molecular biology, Ausubel Publisher: Current Protocols

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|------------------------|----------------------------------------|-----------------|
| M.Phil | Biochemical Aspects of Diseases | MBC102 |
| SEMESTER -I | | HRS/WK-9 |
| CORE-1 | | CREDIT-5 |

Objectives:

- To gain knowledge of biochemical and clinical complications of Diabetes mellitus and cancer.
- To understand the formation of free radicals and its toxicity.
- To understand the state of marker enzymes in various biochemical diseases.
- To understand the biochemical role and bioavailability of different antioxidants.
- To gain knowledge on mechanism of carcinogenesis toxicity and different aspects of heavy metal toxicity.

UNIT I

[25 hours]

Maintenance of blood sugar- Diabetes mellitus - classification - stages - complications and monitoring. Carcinogenesis- molecular basis of cancer- oncogenes- mechanism- Antioncogenes-p53 pathway and its role

UNIT II

[25 hours]

Formation of free radicals, autoxidation initiated by oxygen radicals, Influence of free radicals in metal toxicity. Free radical hepatotoxins- CCl₄ model .free radicals and cancer .Oxidative process in tissue injury. Detection of free radicals and radical ions.Role of free radicals in diseases.

UNIT III

[25 hours]

Marker enzymes in hepatobiliary disease, myocardial infarction, atherosclerosis, renal dysfunction. Cancer markers for oral, prostate, colorectal breast and GI tract cancer, oncofetal cancer markers.

UNIT IV

[25 hours]

Enzymic antioxidants- Chemistry, mechanism, antioxidant effect of SOD, catalase, Glulathione Peroxidase. Non Enzymic antioxidants- source, chemistry, toxicity, biochemical functions, bioavailability, bioassays, Antioxidant effects of Vit A, Vit C, Vit E, glutathione and selenium.

UNIT V

[35 hours]

Toxic mechanism- Carcinogenesis, teratogenesis & immunotoxicity,LD50, ED50, TI Heavy metal toxicity - effects of physiochemical and biological factors. Bioassays for heavy metal toxicity, pathological and histopathological examinations for heavy metal toxicity.

REFERENCE BOOKS:

1. Biochemistry oxygen toxicity, Annual review of Biochemistry Enrique cadinar, Vol 58,1989.pp 78-110
2. Free radicals in biology by William a.Pryor,Academic press 1980.,pp 96- 150.
3. Heavy metal toxicity testing in environmental samples,Reviews of environmental contamination and toxicology in Chul, Kong Gabriel Bitton, Benkoopan,vol 142.1995.pp 130-136.
4. Methods of plan analysis, Phytochemical analysis by J.B.Harborne, Chapman & Hall Ltd.1973 pp 1-26.
5. Pharmocology of medicinal plants and natural products by S.A.Dhanukar, R.A.Kulkarani,W.N.Rege, Indian Journal of Pharmacology,2000 S81-S118.
6. Selenium dependent enzymes-glutathione peroxidase. Annual review of Biochemistry by Thresser, stadman ,Vol 49.1980 pp 103-108.
7. Superoxide radicals & SOD by Irwin Fridowich Annual review of Biochemistry, Vol 64.1995 pp 97-106
8. Vitamins –Annual research review by Horrobin ,Eden Press Pub.,Vol.3. 1980.pp 59-82,91-105,218-291.
9. Clinical chemistry-Allan etal Clinical biochemistry by William J.Marshall
- 11.Biochemistry of diseases by Robert M.Cohn