

CIRCULAR:

The Directors/Heads of the recognized Science Institutions concerned and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by the Faculty of Science at its meeting held on 3rd August, 2009 has been accepted by the Academic Council at its meeting held on 17th September, 2009 vide item No.4.10 and subsequently approved by the Management Council at its meeting held on 25th September, 2009 vide item No.21 and that, in accordance therewith, the Certificate Course in Bioinformatics (Add-on-Course) has been introduced from the academic year 2009-2010.

Further that in exercise of the powers conferred upon the Management Council under Section 54(1) and 55(1) of the Maharashtra Universities Act, 1994, it has made **Ordinances 5886 and 5887 and Regulations 8170, 8171, 8172, 8173, 8174, 8175 and 8176** including syllabus for the Certificate Course in Bioinformatics (Add-on-Course) is as per Appendix and that the same has been brought into force with effect from the academic year 2009-2010.

MUMBAI-400 032
1st December, 2009

PRIN. K. VENKATARAMANI
REGISTRAR

To,

The Directors/Heads of the recognized Science Institutions concerned and the Principals of the affiliated colleges in Science.

A.C./4.10/17.09.2009

M.C./21/25.09.2009

No. UG/445-A of 2009, MUMBAI-400 032 1st December, 2009

Copy forwarded with compliments for information to :

- 1) The Dean, Faculty of Science.
- 2) The Controller of Examinations.
- 3) The Co-ordinator, University Computerization Center.


(D. H. KATE)
DEPUTY REGISTRAR

UNIVERSITY OF MUMBAI



ORDINANCES, REGULATIONS AND SYLLABUS FOR THE CERTIFICATE COURSE IN BIOINFORMATICS (Add-on course)

(To be introduced with effect from the academic
year 2009-2010)

CAREER ORIENTED ADD ON CERTIFICATE COURSE IN BIOINFORMATICS
CERTIFICATE COURSE IN BIOINFORMATICS
XII (Science) Pass

- Minimum 1 Year
- **13** Credits (Total 300 Hours)

Rs.3,000/-

30 – 40 Students Per Batch

6 Credits (90 Hours)

3 Credits (90 Hours)

4 Credits (120 Hours)

Examination

Total Marks

250

Theory

Paper I : 50 Marks

Paper II : 50 Marks

Practical

Practical I (Experiments, Journal And Viva) : 50 Marks

Practical II (Experiments, Journal And Viva) : 50 Marks

Project

Report : 40 Marks

Presentation: 10 Marks

Each student will have a project of 8 credits (120 hours) during the course per year. The student will prepare a report on the same. The report duly signed by the candidate and the supervisor under whom the work was carried out, will be submitted for evaluation by the examiner during the examination, during which the candidate will also make a presentation on the same.

Passing Criteria 40% Marks in Theory and Practicals

Students can be given Grades -

A Grade Above 75%

B Grade 60 – 74%

C Grade 40 – 59%

Eligibility, No. of Seats, Distribution of Credits to theory, practical, projects, passing and grading criteria are according to the guidelines given by UGC in the XIth plan.

Infrastructure Requirement

- Classrooms and laboratory space for conducting lectures and practical
- A computer lab with needed softwares, internet facility and uninterrupted power supply to conduct on line bioinformatics practical. No. of computers should be proportional to the students (1 : 2).

Staff Requirement

1. A coordinator who will be responsible for the smooth conduct of the course. Co-ordinator of the course may be paid an Honorarium of Rs.5000/- per year out of the seed money.
2. A lab assistant cum computer technician who is a computer literate.
3. Lectures and practical can be conducted by the core faculty or visiting faculty having expertise in concerned field. Guest Faculty / Internal Faculty may be remunerated @Rs.250/- per lecture of 1 hr. duration.

Unitized Question Paper Pattern

Theory Question Paper Pattern

Question 1	From Unit 1	10 Marks
Question 2	From Unit 1	10 Marks
Question 3	From Unit 2	10 Marks
Question 4	From Unit 2	10 Marks
Question 5	From Unit 1 And Unit 2	10 Marks
	Total	50 Marks

Practical Question Paper Pattern

Question 1	One Major Expt.	15 Marks
Question 2	One Major Expt.	15 Marks
Or		
Question 2 A	Minor Expt.	8 Marks
Question 2 B	Minor Expt.	7 Marks
Question 3	Journals	10 Marks
Question 4	Viva	10 Marks
	Total	50 Marks

CAREER ORIENTED ADD ON CERTIFICATE COURSE IN BIOINFORMATICS SYLLABUS

PAPER I

Unit I - Introduction to Bioinformatics: 20 Lectures

- Scope of Bioinformatics
- Areas of Bioinformatics
- Biological Databases:
 - Biological database organizations. Public data bases: NCBI, EBI
 - DNA data bases and Protein databases. Flat file structure, Tools within PDB, Data visualization in proteins, Rasmol.
- Primary, secondary and composite databases.
- Literature databases: PUBMED, OMIM
- Data Retrieval system: ENTREZ, SRS
- Database Mining Tools: FASTA, SWISSPROT, BLAST
- Introduction to Genomics
- Introduction to Proteomics: Tools and techniques in proteomics.

Unit II - Computer Basics: 25 Lectures

- Need and utility of computers in bioinformatics
- Types of computers and their constructions
- Computer hardware, software and their role
- Introduction to Windows, Windows explorer
- Brief introduction to programs and programming language
- Some useful computer application program:
 - MS Office, UNIX and their use in data presentation (WORD, EXCEL, POWER POINT)
 - Internet concepts and technologies
 - Concept of information network
 - Client server concept
- Emails, browsing, WWW, URL's.

Unit I - Biological Fundamentals-

25 Lectures

- Macromolecules as information carriers
 - Proteins
 1. Molecular interaction inter-action in protein structures
 2. The peptide bond, Electrostatic interaction, Hydrogen bonding, 3. Van der waals interaction, covalent bonds
 4. Protein functions: Enzymes, Regulatory proteins, Storage, transportation, signaling
 - Nucleic acids
 1. DNA and RNA
 2. Structure, Function and Types
 - Transcription and Translation

Unit II – Instrumentation -

20 Lectures

- Analytical instruments:
 - Principle, working and application of pH Meter, Colorimeter, Spectrophotometer
- Chromatographic Techniques:
 - Paper chromatography, Adsorption chromatography, TLC, Gas chromatography
- Electrophoresis
 - Agarose Gel Electrophoresis, PAGE
- DNA Sequencing
- PCR

PRACTICAL I

Computer Science/ Bioinformatics

1. Fundamentals of computing:
Hardware and software installed in computer systems.
2. Introduction to operating systems WINDOWS, UNIX / LINUX
3. Using MS Office or equivalent packages with an emphasis on Word-processing, Excel spreadsheets and Power point presentations
4. Accessing internet: Network goals, applications of network, network structure and architecture.
5. Surfing World Wide Web and collecting desired information.
6. Introduction to Visual basic macro facility for automation of repetitive tasks.
7. Creating and using Email account.
8. DNA and Protein sequence analysis
9. Pair-wise sequence alignment – local alignment
10. Global alignment
11. Multiple sequence alignment and phylogenetic analysis (ClustalW)
12. BLAST, FASTA,
13. Entrez and SRS

PRACTICAL II

- Demonstration of working and calibration of common laboratory instruments:
 - Colorimeter, Centrifuge, pH Meter.
- Verification of Beer's Law and Lambert's Law.
- Separation of amino acids by Paper Chromatography
- Separation of fats by Thin layer chromatography
- Adsorption Chromatography using chalk.
- Separation of nucleic acids by agarose gel electrophoresis.
- Separation of proteins by PAGE.
- Qualitative estimation of proteins.
- Quantitative estimation of proteins
- Qualitative estimation of Nucleic acids.
- Quantitative estimation of Nucleic acids.

REFERENCE BOOKS

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Prentice Hall India 2003 Edition
2. Linux in a Nutshell, Fourth Edition – Ellen Siever-Oreilly (2002)
3. Computer Fundamentals III edition – Pradeep sinha & Priti sinha BPB
publication(1999)
4. Fundamental Concepts of Bioinformatics by Dan E. Krane, Michael
L. Raymer; Benjamin Cummings Released: 12 September, 2002
5. Bioinformatics: A Practical Guide to the Analysis of Genes and
Proteins, Third Edition; by Andreas D. Baxevanis, B. F. Francis
Ouellette Wiley-Interscience; Released: 15 October, 2004

6. Bioinformatics: CVS Murthy, Himalaya publishing house.
7. Fundamentals of Biochemistry; A. C. Deb; New Central Book Agency (P) Ltd. (2002)
8. Introductory Practical Biochemistry; S. K Sawhney, Randhir Singh; Narosa Publishing House Pvt. Ltd. (2005).
9. Biochemistry; J. M. Berg, J. L. Tymoczko, L. Stryer; W. H. Freeman And company, New York (2003)
10. Biochemistry; Mathews, Van Holde, Ahern; Pearson Education (Singapore, Indian Branch, New Delhi (2005).
11. Biochemistry; G. Zubay; W m. C. Brown Publisher (1993)
12. Biochemistry; P.C. Champe, R.A. Harvey; Lippincott Williams & Wilking, Philadelphia.
13. Principles of Biochemistry; D. L. Nelson, M. M. Cox; W. H.. Freeman & Co. New York (2005).
14. Biochemistry by U Satyanarayan. Book and Allied (Pvt) Ltd , Kokatta
15. Principles of Biochemistry by Lehniger Nelson & cox. W. H. Freeman and Company New York.

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