INSTRUCTION DIVISION

FIRST SEMESTER 2016-2017
Course Handout (Part II)

02/08/2016

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course

Course No. **: BIO G510**
Course Title **: APPLICATION OF STATISTICS AND COMPUTERS IN BIOLOGY**
Instructor-in-Charge **: SHIBASISH CHOWDHURY**
Instructor : Priti Jain, Ashish Runthala

1. **Course Description:**

Methods of collection and presentation of statistical data; Calculation and Interpretation of various measures like mean, median, mode, standard deviation, Kurtosis, correlation coefficient, probability distributions; sampling and estimation of parameters; tests of hypothesis; data analysis, ANOVA, analysis of research problems.

Biological data mining; basic algorithms and tools to analyze sequences and structures; Phylogenetic tree generation and hand-on session on each topic.

2. **Scope and Objective of the course:**

This course is designed to impart training in computational techniques and use of computational tools in the analysis of research problems, experimental design, and statistical analysis of data.

3. **Text Book (T):**

T1: S. Bolton, "Pharmaceutical Statistics: Practical and clinical application", 3rd Edn., Marcel Dekker, New York, 1997.

T2: Wayne, W. Daniel, Biostatistics : A foundation for analysis in the health science, 7th Ed., John Wiley, 1999.

T3: Lesk, Arthur M, Introduction to Bioinformatics, 4th Edn., Oxford University Press, 2013.

Reference Books (R):

R1: Marcello Pagano and Kumberlee Gourerau, Principles of Biostatistics, 2nd Ed., Duxbury – Thomson Learning, 2000.

4. **Course Plan:** Lectures are sub-divided into two parts: I- Biostatistics and II- Computer application

I- Biostatistics

S.No	Learning Objectives	Topics	Chap Ref T1	Chap. Ref. T2
1-2	Overview of various statistical techniques for data collection and analysis	Introduction to Biostatistics Descriptive Statistics	1, 2	1,2
3-9	Sampling design	Some Basic Probability Concepts Probability Distributions Some Important Sampling Distribution	3,4,5	3,4,6
10-13	Understanding statistical inference	Estimation Hypothesis Testing	6,7	5
14-16	Understanding the basic premises in analysis based on regression and correlation	Simple Linear Regression and Correlation	9	7
17-20	Application of non-parametric testing procedures	The Chi-Square Distribution and the Analysis of Frequencies Nonparametric and Distribution-Free Statistics	12,13	15
21-25	Application of parametric testing procedures	Analysis of Variance	8	8

II- Computer Applications

Lecture No.	Learning Objectives	Topic to be covered	Reference
1-3	Unix OS, Filesystem and Basic commands	Unix OS – overview and selected commands	Class notes
4-6	Basics of Biological Databases and data mining	Archives and information retrieval; Sequence and structural database, Hand on sessions	Class notes and Web resources, Chap-3 (T3), Chap-4 (T3)
7-12	Sequence analysis and Phylogeny relationships	Sequence analysis algorithms, basic sequence analysis tools, Algorithms to infer the evolutionary relationship between the DNA and protein sequences	Class notes, Web resources, Chap-5 (T3)
13-15	Structural Bioinformatics	Protein stability, folding, structure prediction and Modeling	Class notes, Web resources, Chap-6 (T3)

5. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Remarks
Mid Term	90 min	25	<TEST_1>	CB
Practice based Laboratory Component/Quizzes/ Assignments	--	40		---
Comprehensive Exam	180 min	35	<TEST_C>	CB+OB

6. **Mid-semester evaluation:** Will be announced after the mid term test.

7. **Attendance**: Regularity in attendance will be one of the criteria in deciding the borderline cases at the time of final grading.

8. **Grading Procedure:**
   1. It is not necessary that all the grades would be awarded.
   2. In borderline cases subjective judgment will be exercised for pull-up. Basic guiding factors will be regularity, consistency in performance (above average) or/and steady improvement throughout the semester.

9. **Make-up:** Make-up will be given only for genuine reasons. It is expected that students shall avoid misuse of this feature.

10. **Chamber consultation hours:** To be announced in the class.

11. **Notices:** Notices pertaining to this course will be displayed **on the Notice Board of Department of Pharmacy and Biological Sciences.**

Instructor-in-Charge
BIO G510