DEPARTMENT OF MATHEMATICS
FACULTY OF ENGINERING AND TECHNOLOGY
SRM UNIVERSITY

MA 0539 – NUMERICAL AND STATISTICAL METHODS (FOR BIO INFORMATICS)

SEMESTER I **ACADEMIC YEAR: 2012-2013**

LECTURE SCHEME / PLAN

The objective is to develop analytical capability and to impart knowledge in Statistical methods and Queuing theory and their applications in Engineering and Technology, the knowledge of Statistical methods and its applications so as to enable them to apply them for solving real world problems.

The list of instructions (provided below) may be followed by a faculty relating to his/her own schedule includes warm-up period, controlled/free practice, and the respective feedback of the classes who handle. The lesson plan has been formulated based on high quality learning outcomes and the expected outcomes are as follows

Each subject must have a minimum of 50 hours, which in turn, 45 hours for lecture and rest of the hours for tutorials. The faculty has to pay more attention in insisting the students to have $\leq$ 95 % class attendance.

UNIT1: NUMERICAL CALCULATIONS			
Lect. No	**Lesson schedule**	**Learning outcomes**	**Cumulative day(s)**
L 0.0	Warm-up session/Motivation About the previous semester and their performance .	Students will be motivated	1
L 1.1	▪ Numerical calculation: introduction and fundamental concepts of numerical methods for linear equation and matrices by Crammer's rule ▪ Numerical problems	To provide Theoretical knowledge for solving simple problems	2, 3
L 1.2	▪ Numerical solution to the system of linear equations by Gaussian elimination method ▪ Numerical problems	One applies the knowledge in solving Problems.	4, 5
L 1.3	▪ Solution by Crout's method and Similarity transformation ▪ Numerical problems	One understand the difference between this method and previous method	6, 7

L 1.4	▪ To find Eigen Values and Eigen vectors for Symmetric matrices (repeated and non repeated Eigen values). ▪ To find Eigen Values and Eigen vectors for Non-symmetric matrices (repeated and non repeated Eigen values). ▪ Properties of Eigen values and Eigen vectors. ▪ Problems based on the properties.	Eigen values and vectors are used to solve homogeneous linear differential equations with constant co-efficient and in optimization problems.	8, 9, 10
L 1.5	Introduction:solving ordinary differential equations numerically. Solution by Runge-kutta method of fourth order**,** Milne's predictor corrector method, Adam Bash forth predictor corrector method. Integral equations:Soln by Laplace Transform technique.	Test and evaluate that this method is the one best methods to get numerical solution to ODE. Predicts the solution of a given problem and confirm it with its corrector value if it deviates applies the corrector again	11, 12, 13
CYCLE TEST – I			**DATE: 09.10.2012**
UNIT 2 : BIO STATISTICS			
L 2.1	▪ Introduction to Biostatistics Probability concepts, simple problems. ▪ Students will be introduced to the techniques of developing discrete & continuous probability distributions and its applications Basic theorem	Students will be introduced to the techniques of developing discrete & continuous probability distributions and its applications and One applies the knowledge in solving Problems. .	14, 15, 16
L 2.2	Conditional probability, Baye's theorem		17
L 2.3	One dimensional random variables Discrete and continuous probability functions		18, 19
L 2.4	Bivariate Distributions Numerical problems		20
L 2.5	Multivariate data- Introduction to Probabilities, Interval Estimation Numerical problems	Comprehensive knowledge of solving problems	21,22

UNIT 3 : TESTING OF HYPOTHESIS			
L 3.1	Introduction : One and Two sided confidence intervals- types of error	Students get an idea of One and Two sided confidence intervals- types of error	23
L 3.2	Student's t test Numerical problems	Learners will understand the problems of Students t test for single mean, difference of means	24,25
L 3.3	F- test Numerical problems	Able to compare this test with the previous test.	26, 27
L 3.4	Chi-square test Numerical problems	Gets an idea of this test for the kind of problems it is applicable	28, 29
L 3.5	2X2 tables, rXc tables Numerical problems	Students able to solve problems themselves	30, 31
L 3.6	paired samples -Independent samples Numerical problems	Students able to solve problems	32,33
L 3.7	equal variances- unequal variances. Numerical problems	Students able to solve problems themselves	34
L 3.8	The two way scatter plot- Pearson's correlation coefficient. Numerical problems	Able to understand the relationship between two independent variables	35
L 3.9	Spearman's rank correlation coefficient. Numerical problems	Comprehensive knowledge of solving problems when the given data is ranked, if not ranking the data first and solve	36
L 3.10	Regression concepts-the population regression line- the method of least squares. Numerical problems	One acquires enhanced knowledge of regression that is the average relationship between two independent variables	37,38
UNIT 4: ANALYSIS OF VARIANCE			
L 4.1	Introduction: One-way analysis of variance. Numerical problems	Provides the deeper understanding of solving one way classification problems	38, 39
L 4.2	Two Way ANOVA Numerical problems	Able to compare One way classification and Two way classification and advantages	40, 41, 42

L 4.3	Multiple Correlation	Under stands that this technique for a comparison of more than two independent variables	43
L 4.4	PCA, Factor analysis, Discriminant functional analysis,	Able to classify different factorizing techniques	44, 45
TERM PAPER:			**DATE: 10.11.2012**
UNIT 5 : DESIGN OF EXPERIMENTS			
L 5.1	Introduction to the Concepts & Methods of Design Experiments Numerical problems	Students should be able to Understand the terminology& nomenclature appropriate to designs	46, 47
L 5.2	Completely Randomized Designs Numerical problems	Accuracy is more than the previous method	48, 49, 50
L 5.3	Randomized Block Designs Numerical problems	Able to compare with the previous design	51, 52
L 5.4	Latin Square Design Numerical problems	Test and evaluate that this method with the afore said methods.	53, 54
L 5.5	Comparison of CRD, RBD, LSD	Identifies the applications and Various design and concepts of experiments	55
L 5.6	Factorial & Fractional designs, Taguchi's concepts & Methods and second- order designs.		56, 57, 58
MODEL EXAM		**19.11.2012**	**(Duration: 3 Hours)**
LAST WORKING DAY : 30.11.2012			

REFERENCES

- Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, Reprint 2003.
- Gupta S.C. and Kapoor V.K., "Fundamentals of Applied Statistics", Sultan Chand & Sons, New Delhi, 2003.
- P. Kandasamy et al, Numerical Methods, S.Chand & Sons, 2006.

WEB RESOURCES:

http://faculty.txwes.edu/mskerr/files/2420/Ch6_2420.htm
http://abyss.uoregon.edu/~js/glossary/correlation.html
http://stud.pam.szczecin.pl/edu/eng/Chapter-5.pdf
http://stattrek.com/sampling/sampling-distribution.aspx
http://en.wikipedia.org/wiki/Analysis_of_variance
http://en.wikipedia.org/wiki/Queueing_theory
http://home.iitk.ac.in/~skb/ee679/ee679.html

Internal marks Total: 50

Internal marks split up: Cycle Test 1: 25 Marks   Model Exam: 25 Marks
Term Paper: 10 Marks   Surprise Test: 5 marks
Attendance: 5 marks

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