

# NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

## DEPARTMENT OF MATHEMATICS

MONSOON SEMESTER 2022-23

**MA2001D: MATHEMATICS III**

### COURSE PLAN

**(August 2, 2022 to November 22, 2022)**

| Lecture No | Topics   |
|------------|--|
| 1          | Sample space, events, probability (axioms), conditional probability, independence  |
| 2          | Random variables, distribution function, discrete random variable, p.d.f., expectation   |
| 3          | Expectation of a function of random variable, variance, geometric distribution   |
| 4          | Binomial distribution, Hypergeometric distribution   |
| 5          | Poisson distribution, Poisson approximation of Binomial distribution.  |
| 6          | Continuous random variable, probability density function, mean and variance of a continuous random variable  |
| 7          | Uniform, Gamma and Exponential distributions   |
| 8          | Beta distribution, Weibull distribution  |
| 9          | Normal distribution, mean and variance of normal distribution  |
| 10         | Calculating normal probability using tables  |
| 11         | Markov and Chebyshev inequalities  |
| 12         | Moments and moment generating function (MGF), MGF of standard distributions, approximation of Binomial distribution                                  |
| 13         | Joint distribution, marginal distribution, joint probability mass function, joint density function, marginal density function, independent variables |
| 14         | Transformation of random variables; joint probability distribution of functions of random variables  |
|            | <b>ASSIGNMENTS</b>   |
| 15         | Sum of random variables and properties   |
| 16         | Covariance, correlation coefficient,   |
| 17         | Bivariate normal distribution, conditional distribution, conditional expectation   |
| 18         | Random samples, sample mean, Law of large numbers  |
| 19         | Central limit theorem, sampling distribution of mean (variance known), interval estimation of mean.  |
| 20         | Unbiased estimator, sample variance, Chi squared distribution, Distribution of sample mean and variance), interval estimation of variance            |
| 21         | Student's t distribution, interval estimation of mean when variance unknown and interval estimation of variance                                      |
| 22         | Maximum likelihood estimator, Maximum likelihood estimator of Binomial, Poisson and normal parameters, method of moments                             |
|            | <b>MIDTERM TEST- SEPT 20 ONWARDS</b>   |
| 23         | Testing of hypothesis, Types of errors and power of the test   |
| 24         | Testing of hypothesis regarding population mean (known variance)   |
| 25         | Probability of type II error, one-sided tests  |

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| 26 | Testing of hypothesis regarding normal population mean (unknown variance), comparison of means                        |
| 27 | Test regarding variance of a normal population, F distribution  |
| 28 | F test of the equality of two variances   |
| 29 | Estimation of proportion, Test for equality of proportions  |
| 30 | Chi square test for goodness of fit   |
| 31 | Analysis of $r \times c$ contingency tables, test of association of variables   |
| 32 | Simple linear regression; method of least squares   |
| 33 | Regression analysis: Curve fitting, the method of least squares, regression line                                      |
| 34 | Estimation of curvilinear regression models, Hypothesis concerning regression coefficients                            |
| 35 | Sampling distribution of regression coefficients, curvilinear regression, polynomial regression                       |
| 36 | Sample correlation coefficient of paired data, Correlation and Regression, Regression to the mean, Fisher Z transform |
| 37 | Hypothesis concerning correlation coefficient   |
|    | <b>ASSIGNMENTS</b>  |
| 38 | Analysis of variance -general principles  |
| 39 | Analysis of Variance-One Way Analysis   |
| 40 | Analysis of Variance; Two factor ANOVA.   |
|    | <b>END SEMESTER EXAMINATION: NOVEMBER 28 ONWARDS.</b>   |

**Grading policy:**            **Relative (common for all branches)**

**Assignments:**            **20 marks**

**Midterm Test:**            **30 Marks**

**End semester exam:** **50 Marks**

**Total:**                    **100 Marks**