	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Master of Science**	Year of Regulation	**2018-19**
Department	**Mathematics**	Semester	**III**

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA 539	Statistical Inference	None	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	To introduce the fundamental concepts of statistical inference. To apply these concepts in obtaining and comparing various estimators for parameters of some distributions.	Course Outcomes	**CO1** Able to derive sampling distributions of some statistic from standard distributions. **CO2** Able to obtain and compare various point estimators for parameters of some distributions using principle of data reduction. **CO3** Able to evaluate hypothesis about a population parameter by hypothesis testing procedure. **CO4** Able to obtain confidence intervals for parameters of some distributions.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1															
2	CO2															
3	CO3															
4	CO4															

SYLLABUS

No.	Content	Hours	COs
I	**Parametric Models** Problems of inference, random sample and its likelihood, statistic and its sampling distributions. Examples from standard discrete and continuous models such as Bernoulli, Binomial, Poisson, Negative Binomial, Normal, Exponential, Gamma, Weibull, Pareto etc.	**10**	**CO1**
II	**Point Estimation** Concept of sufficiency, minimal sufficiency, Neyman factorization criterion, unbiasedness, Fisher information, exponential families. Maximum likelihood estimator (MLE), method of moment estimator (MME), consistency results of the MLE's and the MME's. Asymptotic relative efficiency, consistent and asymptotic normal (CAN) estimators, uniformly minimum variance unbiased estimator (UMVUE), Rao-Blackwell theorem, Cramer-Rao lower bound, completeness, Lehmann-Scheffé Theorem, different applications. Ancillary statistics, Basu's Theorem. Bayes estimators, Limit of Bayes estimators, Minimax estimators and their relations.	**14**	**CO1** **CO2**
III	**Testing of Hypothesis** Statistical hypotheses-simple and composite, statistical tests, critical regions, Type-I and Type-II errors, size and power of a test, Neyman-Pearson lemma and Likelihood ratio test.	**7**	**CO3**
IV	**Interval Estimation** Confidence intervals, construction of confidence intervals, shortest expected length confidence interval, most accurate one-sided confidence interval.	**5**	**CO4**
Total Hours		**36**	

Essential Readings
1. G. Casella and R. L. Berger, “Statistical Inference”, Duxbury Press, 2nd edition, 2002.
2. V. K. Rohatgi and A.K. Saleh, “An Introduction to Probability and Statistics”, Wiley India Pvt. Ltd., 2nd edition, 2014.
Supplementary Readings
1. M. H. DeGroot, “Probability and Statistics”, Addison-Wesley, 4th edition, 2012
2. E. L. Lehmann and G. Casella, “Theory of Point Estimation”, Springer, 2nd edition, 1998