Course Code	**EM 525**
Course Title	**Bayesian Statistics**
No. of Credits	**3**
Pre-requisites	**EM212, EM213**
Compulsory/Optional	**Optional**

Aim(s): To introduce basic concepts of Bayesian analysis, including how to conduct posterior and predictive inference; learn how to use common Bayesian models in applications; learn common ways of prior elicitation; utilize R for Bayesian computation, visualization and analysis of real-world data.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- Demonstrate a solid understanding of the basic Bayesian approach to inference, based on expressing all uncertainty in terms of conditional probability distributions.
- Interpret Bayesian models in applied problems, including hierarchical model specification and computational techniques.

Time Allocation (Hours): Lectures 36 Tutorials Practical Assignments18

Course content/Course description:

- **Course overview: Introduction** to Bayesian Statistics.
- **Bayesian inference from Binomial and Multinomial data:** Concepts and methods of Bayesian inference, Bayesian hypothesis testing and model comparison, inference from binomial and multinomial data.
- **Single-parameter Models:** Normal distribution, Poisson distribution, exponential distribution and hypothesis testing.
- **Multiple-parameters Models:** Normal and multinomial distribution.
- **Overview of approximations of posterior distributions**; Markov chains, Monte Carlo and Markov Chain Monte Carlo (MCMC).
- **Categorical Data;** Hierarchical models, linear models, variable selection for linear models, hierarchical linear nonlinear models mixed models, generalized linear models and mixture models.

Recommended Texts :

- J. Gill, Bayesian Methods,A Social and Behavioral Sciences Approach, 2nd edition,(2008),Chapman & Hall.
- J.B. Carlin Gelman, H.S. Stern and D.B. Rubin Bayesian Data Analysis, 2nd edition, (2004),Chapman & Hall.
- J. K. Doing Kruschke, Bayesian Data Analysis, 2ndedition, (2015),A Tutorial with R, JAGSand Stan,Academic Press.

Assessment	Percentage Mark
In-course	
Tutorials/Assignments	30
Mid Semester Examination	20
End-semester	50