DEPARTMENT OF MATHEMATICS

CENTRAL UNIVERSWITY OF KEREALA

PERIYE, KASARAGOD

Minutes of the Second Board of studies meeting held on Thursday, 7th February, 2019 in the Department of Mathematics in Room No. 28 at 2.30 p.m.

The following members were present:

1. *Prof. Gadadhar Misra,*

   Department of Mathematics,
   Indian Institute of Science, Bangalore – 560 012.

2. *Prof. A.K. Nandakumaran,*

   Department of Mathematics,
   Indian Institute of Science, Bangalore – 560 012.

3. *Prof. A. R. Rajan, Emeritus Professor,*

   Department of Mathematics, University of Kerala,
   Thiruvananthapuram, Kerala – 695 581.

4. *Mr. V. Kumar, Assistant Professor,*

   Department of Computer Science, CU Kerala.

5. *Dr. V. Vilfred, Associate Professor & Head,*

   Department of Mathematics, CU Kerala.

6. *Dr. K. A. Germina, Associate Professor,*

   Department of Mathematics, CU Kerala.

7. *Dr.* Ali Akbar K, Assistant Professor,

   Department of Mathematics, CU Kerala.

The Meeting started at 2.30 p.m. The Chairperson Dr. V. Vilfred welcomed the members and submitted the modified Course Structure and Syllabus approved by the Faculty Council, Department of Mathematics, CU Kerala. Then, he briefed how and what modifications were done in the communicated Course Structure and Syllabus.

With the permission of the experts in the Board of Studies, the convenor invited Dr. Shaini P, Dr. S. Gnanavel and Dr. Manikandan Rangaswamy to join the BoS Meeting. The committee commended on each and every paper and also on the course structure. The whole structure and Syllabus was thoroughly discussed. The revised version of the same was prepared and submitted for the approval. The Members of the Board of Studies approved the revised Course Structure and Syllabus. (A copy of the approved Course structure and Syllabus is attached herewith.) The committee decided to implement the revised course structure and syllabus from the academic year 2019 - 20 onwards.

The members also commented on the Method of Evaluation of M.Sc. Mathematics Programme and requested to include the same in the minutes. The experts strongly recommended that the mode of evaluation of examinations should be strictly internal.

The members of the BoS seriously noted the current strength of intake at CU Kerala to M.Sc. Maths programme that is increased to fourty seats and strongly recommend that for quality teaching the number of teaching faculty in the Department of Mathematics should be increased sufficiently since present strength of seven faculty is quiet insufficient.

The meeting was fruitful and Dr. K.A. Germina thanked the experts for their valuable suggestions and guidance.

The meeting came to a close at 5.00 p.m.

1. Prof. Gadadhar Misra,
   Department of Mathematics,
   I.I.Sc., Bangalore – 560 012.

2. Prof. A.K. Nandakumaran,
   Department of Mathematics,
   I.I.Sc., Bangalore – 560 012.

3. Prof. A. R. Rajan, Emeritus Professor,
   Department of Mathematics,
   University of Kerala, Trivandrum, Kerala – 695 581.

4. Mr. V. Kumar, Assistant Professor,
   Department of Computer Science, CU Kerala.

5. Dr. V. Vilfred, Associate Professor & Head,
   Department of Mathematics, CU Kerala. 07.02.2019

6. Dr. K. A. Germina, Associate Professor,
   Department of Mathematics, CU Kerala. 7/2/2019

7. Dr. Ali Akbar K, Assistant Professor,
   Department of Mathematics, CU Kerala. 7/02/2019

Course Objective	To develop the modeling and mathematical skills to analytically determine computer systems and analytically determine computer systems and communication network performance. Students should be able to read and understand the current performance analysis and queueing theory literature upon completion of the course. Understand strengths and weaknesses of Queueing Models
Course Outcome(s)	Construct models in discrete and continuous time based on Markov Chains, describe and explain the theory of Markov Chains, describe and motivate Little's formula and its applications, describe and analyze basic Markov queuing models and situations to which they may be applied apply Markov models for selected applications.

Syllabus:

Probability and random variable, discrete and continuous, univariate and multivariate distributions, moments, law of large numbers and central limit theorem (without proof). Poisson process, birth and death process, infinite and finite queueing models M/M/1, M/M/C, M/G/1, M/M/1/N, M/E/1, E/M/1, M/G/1/N, GI/M/1, and more complex non-Markovian queueing models - GI/G/1 queues, Multiserver Queues: M/M/c, M/G/c, GI/M/c modles, Erlang's loss system, Queues with finite populations: M/M/1/N/K, M/G/1/N/K etc. models and Engset formula, Concept bulk queues: M[X]/M/1, M/M[Y]/1, M/M(a, b)/1, M[X]/G/1,

GI[X]/M/1, M/G(a, b)/1, GI/M(a, b)/1 etc. queueing models. Priority queueing models, Vacation queueing models, Network of queues, finite processor sharing models, central server model of multiprogramming, performance evaluation of systems using queueing models. Concepts of bottleneck and system saturation point. Introduction to discrete time queues and its applications.

Text books:

1. Gross D. and Harris C. M., Fundamentals of Queueing Theory, Wiley, 2012.

References:

1. Kleinrock L., Queueing Systems Volume 1 : Theory, Wiley, 2013 .
2. Kleinrock L., Computer Applications, Volume 2, Queueing Systems, Wiley, 2013.

Code:MAT5020: Stochastic Models and Applications Prerequisites: Basic Probability	L	T	P	Credit
	3	2	0	4

Course Category	Elective
Course Type	Theory
Course Objective	Upon completion of this course, students will: · understand the need for system models that capture random behavior to assess the risk of undesirable outcomes. · be able to model a number of important industrial and service systems and analyze those models to improve system performance. · be able to construct algorithmic solution strategies to explore system models that have been developed.
Course Outcome(s)	Students would acquire a rigorous understanding of basic concepts in probability theory. They would learn some important concepts concerning multiple random variables such as Bayes rule for random variables, conditional expectation and its uses etc. They would also learn stochastic processes, including Markov Chains and Poisson Processes. The course would provide the background needed to study topics such as Machine Learning, Adaptive Signal Processing, Estimation Theory etc

Syllabus:
Probability spaces, conditional probability, independence, random variables, distribution functions, multiple random variables and joint distributions, functions of random variables, moments, characteristic functions and moment generating functions, conditional expectation, sequence of random variables and convergence concepts, laws of large numbers, central limit theorem, stochastic processes, Markov chains, Poisson process.

Text books:
1. Ross S. M, Introduction to Probability Models, 10th Edition, Academic Press, 2012.

References:
1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, 1971.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, 1972.

Code:MAT5021: Topological Dynamics	L	T	P	Credit