FIRST COURSE HANDOUT,
PROBABILITY THEORY (MTH754A), 2018-19 ODD SEMESTER

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1. Pre-requisites

Familiarity with Real Analysis and basic Probability distributions will be assumed. However, the relevant details would be recalled, if required.

2. Course contents and References

- Algebras and sigma algebras; Measurable spaces; Methods of introducing probability measures on measurable space; Random variables
- Lebesgue integral; Fubini's theorem; Expectation
- Conditional probabilities and conditional expectations with respect to sigma algebras; Radon Nikodym theorem
- Various kinds of convergence of sequence of random variables; Convergence of probability measures; Convergence of series; Strong law of large numbers; Law of iterated logarithm; Central limit theorem
- (If time permits) Infinitely divisible and stable distributions; Zero or One laws; Martingales and their basic properties

References:

- Probability & Measure Theory (2nd Edition), Robert B. Ash and Catherine A. Doléans-Dade. Elsevier.
- A Course in Probability Theory (3rd Edition), Kai Lai Chung. Academic Press (Elsevier).
- Probability: Theory and Examples (4th Edition), Rick Durrett. CUP.

Supplimentary texts:

- Probability Essentials (2nd Edition), Jean Jacod and Philip Protter. Springer.
- Probability with Martingales, David Williams, CUP.
- Introduction to Probability and Measure, K. R. Parthasarathy, Hindustan Book Agency.
- Probability and Measure (3rd Edition), Patrick Billingsley. Wiley.

3. Lecture, Tutorial, Lab Schedule & Venue

Lectures: Mondays & Thursdays 9:00 - 10:00 hrs (T212), Tuesdays 12:00 - 13:00 hrs (T212)
No tutorials or lab work are included in this course.

4. Office hours

Mondays 10:00 - 12:30 hrs (make appointments through email)

5. Weightages for different components of evaluation (out of 100)

Component Name	Weightage
Mid-semester Examination	20
End-semester Examination	25
Assignments	30
Quizzes	9
Presentation in class	16

- Assignments ($6 \times 5 = 30$): There will be 6 assignments, 5 marks in each.
- Quizzes ($3 \times 3 = 9$): 3 Surprise Quizzes (MCQ, 3 marks in each) will be held during the classes. The specific dates will not be announced beforehand.
- Presentation in class ($2 \times 8 = 16$): Each student will be assigned two results for presentation in class (Theorem, Proposition, Lemma etc.). Each presentation carries 8 marks.

6. Course Policies: Attendance, Honesty Practices, Withdrawal

- No extra weightage for attendance. However, students should be aware that the Surprise Quizzes carry a certain weightage towards grading.
- Make-up option for exams and/or presentations would be given only if the student produces a medical certificate or a proof of sanctioned leave. There will be no make-up opportunity for the quizzes.
- Discussion/collaborations for solving the assignments is encouraged. However, students are expected to write down the solutions on their own.
- Any dishonest practice during examinations or quizzes will be reported to DOAA and appropriate action would be taken to penalize such action.
- Students are allowed to withdraw from the course as per guidelines set by DOAA.