FIRST COURSE HANDOUT,
BASIC PROBABILITY AND DISTRIBUTION THEORY (MTH431A),
2019-20 ODD SEMESTER

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1. Pre-requisites

This is a compulsory course for the first year Masters' (Statistics) students. Some familiarity with Real Analysis will be assumed.

2. Course contents and References

- Limits of sequences of sets, σ-field of events.
- Probability measure, probability space. Random variables, induced probability space, probability distribution.
- Distribution function of univariate random variables, decomposition theorem.
- Discrete and absolutely continuous random variables (distributions).
- Expectation, moments and moment generating function. Inequalities.
- Multi-dimensional random variables (random vectors): Joint, marginal, and conditional distribution functions. Independence. Moments and moment generating function. Conditional mean and conditional variance.
- Multinomial and multivariate normal distributions.
- Distribution of functions of random variables including order statistics.
- Properties of random vectors which are equal in distribution. Exchangeable random variables and their properties.

References:

- An Introduction to Probability and Statistics (3rd Edition), V. K. Rohatgi and A. K. Md. E. Saleh, John Wiley & Sons.
- An Introduction to Probability Theory and its Applications, Vol. 1 & 2, William Feller, John Wiley & Sons,
- A Course in Probability Theory (3rd Edition), Kai Lai Chung. Academic Press (Elsevier).

Supplimentary texts:

- A First Course in Probability (5th Edition), Sheldon Ross, Prentice-Hall.
- Probability & Measure Theory (2nd Edition), Robert B. Ash and Catherine A. Doléans-Dade. Elsevier.

3. Lecture, Tutorial, Lab Schedule & Venue

Lectures: Tuesdays, Wednesdays & Thursdays 8:00 - 8:50 hrs (C5)
Tutorials: Fridays 15:00 - 15:50 hrs (C5)

4. Office hours

Wednesdays 10:00 - 11:00 hrs (make appointments through email)

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

Component Name	Weightage
Mid-semester Examination	30
End-semester Examination	40
Quizzes	30

- Quizzes ($3 \times 10 = 30$): 3 Quizzes (MCQ/MSQ type, 10 marks in each) will be held during the 5th, 9th and 13th week. Exact date/time will be announced in due time.
- Homework/Exercises: Exercises will be mentioned during lectures and students are expected to solve them on their own. There is no need to submit the solutions. However, students are strongly encouraged to discuss amongst themselves and solve problems from the books mentioned above. Some of these problems may be discussed during the tutorial sessions.

6. Course Policies: Attendance, Honesty Practices, Withdrawal

- No extra weightage for attendance.
- Make-up option for exams 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.
- 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.