Measure Theoretic Probability 1
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Lecture No. 01
Introduction to the Course Measure Theoretic Probability 1

Hello everyone. I am Suprio Bhar, faculty in the Department of Mathematics and Statistics, Indian Institute of Technology Kanpur, India. Welcome to the course Measure Theoretic Probability 1. Now, I am going to mention some of the important facts about the course, and these important facts are already written up in terms of certain slides, and I am going to share those slides and discuss the points one by one. So, I will move on to the slides now.

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Welcome to the Course Measure Theoretic Probability 1. The course duration is 8 weeks and we, shall learn about the Mathematical foundations of Probability Theory. We need the language/tools from Measure
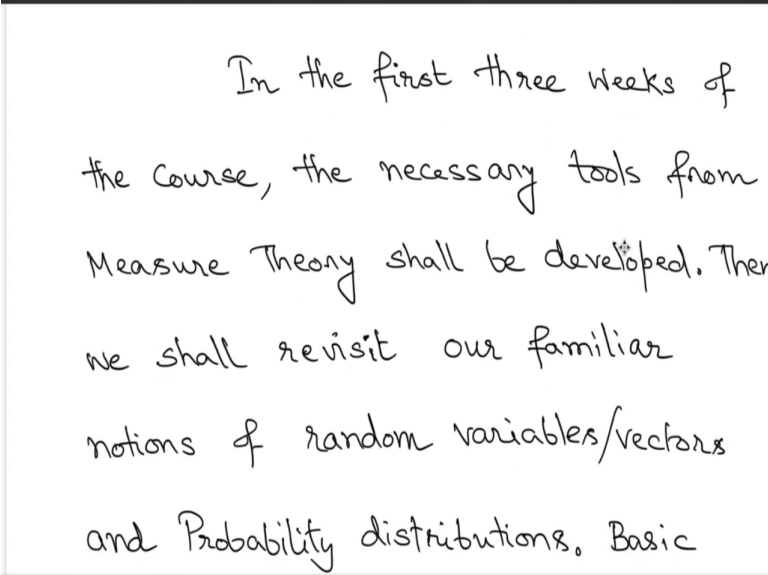

learn about the Mathematical foundations of Probability Theory. We need the language/tools from Measure Theory and hence follows the title of this Course.

In the first three weeks of the course, the necessary tools from

This course duration is eight weeks, and we will learn about the mathematical foundations of probability theory. And for these mathematical foundations, we need the language and tools from the measure theory, and hence we have the title of the course major theoretic probability 1.
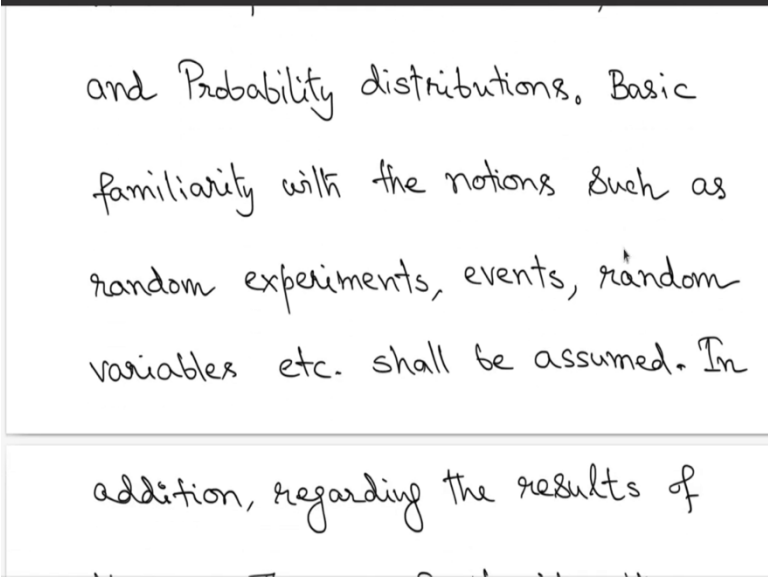
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In the first three weeks of the course, the necessary tools from Measure Theory shall be developed. Then we shall revisit our familiar notions of random variables/vectors and Probability distributions. Basic

In the first three weeks, we are going to see the necessary tools from the measure theory, and this shall be developed for the need of the course. And then, we shall revisit our familiar notions regarding probability, which are random variables and vectors or probability distributions.

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and Probability distributions. Basic familiarity with the notions such as random experiments, events, random variables etc. shall be assumed. In

addition, regarding the results of

Basic familiarity with such notions involving random experiments, events, random variables, etc., shall be assumed.

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addition, regarding the results of

Measure Theory, familiarity with

Real Analysis is also an important

pre-requisite.

The lecture notes have been

In addition, regarding the results of the measure theory that we will introduce, familiarity with real analysis is also an important prerequisite.

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The lecture notes have been

prepared using the following references.

(i) "Probability and Measure Theory"

(Second Edition) by Robert B. Ash

with Contributions from

Catherine A. Doléans-Dade.

The lecture notes have been prepared using slides that you see right now, and they are prepared using the following references.

(i)   Book by Robert B. Ash titled probability and measure theory with contributions from Catherine A Doleans-Dade.

Catherine A. Doléans-Dade.

(ii) "A Course in Probability Theory"

(Third Edition) by Kai Lai Chung.

(iii) "Probability: Theory and Examples"

(Fourth Edition) by Rick Durret.

(iv) "Probability and Measure" (Third

(ii)   Book by Kai Lai Chong titled A Course in Probability Theory.

(iii)   Book by Rick Durret and the title is probability theory and examples, and

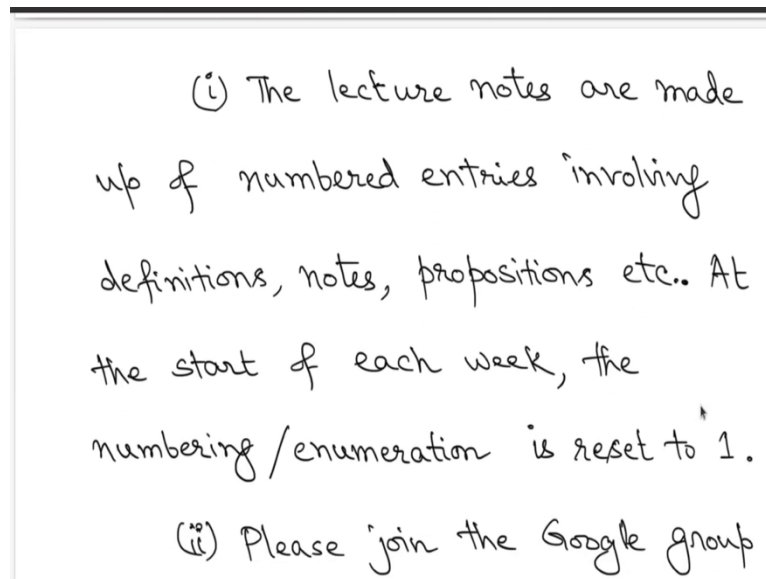(iv)   Book by Patrick Billingsley, the title is probability and measure.

Edition) by Patrick Billingsley.

Please note the following points.

These may help you in your

understanding of the lecture materials

(i) The lecture notes are made

up & numbered entries involving

So, let us now highlight the important points about this course. This may help you in an understanding of the lecture materials. So, keep this in mind, please.

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> (i) The lecture notes are made up of numbered entries involving definitions, notes, propositions etc.. At the start of each week, the numbering / enumeration is reset to 1.
>
> (ii) Please join the Google group

The first point is the lecture notes are made up of certain numbered entries involving definitions, notes, propositions, etcetera. For example, you will see definition 1, definition 2, and then some remarks or certain things will be put in notes. So, those will also note one note, two, and so on.

And at the start of each week, the numbering and the enumeration will be reset to 1. So, that means in week one you will see numbering starting with 1 for each of the definitions notes and other things. At to the end of the first week, you will see then some numbering let us say up to 20 or 30 or whatever and then at the beginning of week two the lectures that you will find the numbering again will start from 1 so you will again see definition 1, proposition 1 and so on.

So, please keep track of this so the lecture notes will be broken down in terms of the individual weeks. So, that is an important point, and this will be used for later references. So, I might require some results from week 2 when I am discussing certain topics from, let us say week 4 or 5 in that case, I will say that look up such and such notes such and such proposition from week two references. So, please take care of that.

u/o of numbered entries involving definitions, notes, propositions etc.. At the start of each week, the numbering/enumeration is reset to 1.

(ii) Please join the Google group of the discussion forum and actively

The next important point is that you should join the google group of the discussion forum and actively participate. This will help you understand the topics, and some live sessions may be organized later on, and such information from time to time will be informed to you via announcements. But, again, for a weekly understanding of the materials, please go to the google group and do the discussions.

(iv) Exercises are included in the lecture notes. However, they need not be submitted. Please feel free to discuss the exercises in the discussion forum.

(v) Weekly assignments will be available to check your progress.

Some exercises are included in the lecture notes, so if you see certain concepts, certain results, and immediately afterward, you might find 1 or 2 exercises. Please try them out; however, they need not be submitted. Please feel free to discuss these exercises in the discussion forum.

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You will also see weekly assignments, which will be used for grading, and this will help us understand your progress. If you require additional practice problems, please go to the reference books that I have mentioned and try out the problems from there.

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And the important point is that all communications in this course will be either through the announcements or the discussion forums discussion forum via the google groups. There shall be no response to emails sent to the personal email account. So, if you send me some emails to my personal email account, please do not expect a reply. Always refer to the discussion forum for all your queries.

So, this is because if you have a query, somebody else might also have the same query, so if you post the question in the discussion forum, it will also help others. Please use the discussions forum.

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> Sent to personal email account.
>
> The starting point in this Course is the notion of a random experiment. Recall that such experiments can be repeated under identically conditions and and that all possible outcomes are

So, let us make a point about the starting point in this course, so it is the notion of random experiments, so recall that such experiments you can repeat under identical conditions and you also before performing the experiments you already know what the all possible outcomes are.
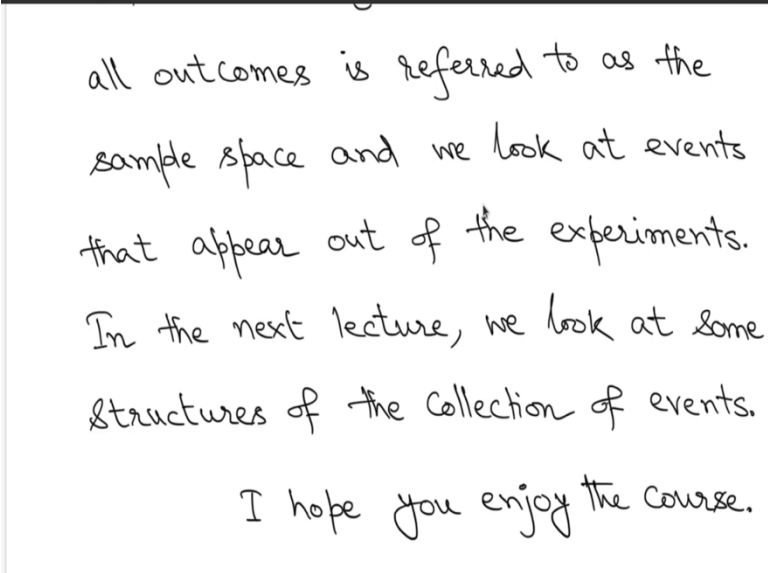
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> and that all possible outcomes are known in advance. However, we do not know the specific outcome of a trial, before conducting the trial. The set of all outcomes is referred to as the sample space and we look at events

However, if before you perform a specific trial of the experiment, you do not know the specific outcome, you know all the possible things that can happen. Still, you do not know exactly what

is going to happen. So, that is exactly what a random experiment is, and the set of all outcomes is usually referred to as the sample space. And we are going to look at certain events or that will appear in connection with these experiments, and these events are, of course, certain special subsets of sample spaces.

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all outcomes is referred to as the sample space and we look at events that appear out of the experiments. In the next lecture, we look at some structures of the collection of events.

I hope you enjoy the course.

So, in the next lecture, we are going to start with this, and we are going to look at certain important structures that appear when you look at the collection of all events in relation to a specific random experiment. We are going to start with that point. I do hope that you enjoy this course.