Fundamentals of Acoustics
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Lecture - 01
Course Overview

Hello, welcome to this 30 hour MOOC course. The name of this course is Fundamentals of Acoustics. My name is Nachiketa Tiwari, I am the main instructor for this course and I teach at Indian Institute of Technology, Kanpur. This course is going to run over 12 weeks and we will cover series of topics in this course. So, what I plan to do in this particular module that is in today's lecture is give you an overview of what this course is all about and how are we going to conduct this course.

First thing is that this course is being run by NPTEL and it is a video course and if you need some more information related to this course, there are several other resources available and the first resource is this virtual laboratory on Acoustics and if you login to this website, http: 202.3.77.82 you will be able to get some additional related to this course and then you may have if you are interested in more information on this course and activities which are conducted at IIT, Kanpur in areas of acoustics, then you may want to visit this particular URL, which is related to Dhwani labs or Acoustics laboratory at IIT, Kanpur.

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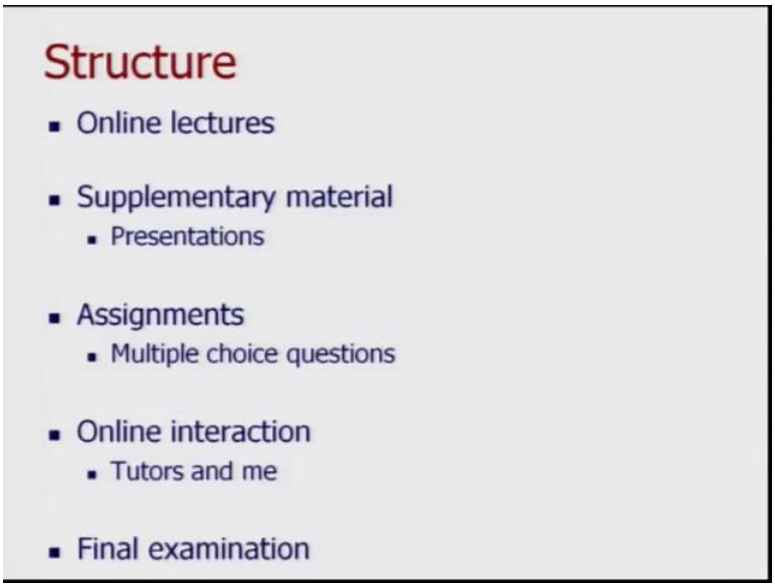

In terms of the structure of this course, what we will have is that the course is going to run for a period of 12 weeks, each day there will be a 20 to 25 minutes long video lecture and each week there will be 6 lectures running from Monday to Saturday and then in additional to that, you may get access to some supplementary materials on a week by week basis and some of these materials may constitute presentations or power point presentations and then each week you will also be expected to do assignments and most of these assignments will be of a multiple choice question type; MCQ type.

What you have to do to good in those assignments is you have to review all the material which we cover over the week and based on that we hope that you will be do; you will be able to perform well in the assignments. If you have any questions then you may interact with the tutors and also with me and the information on tutors, they have 3 tutors in this course, one is Mr. Rahul Oorath, the second person is Mr. Arun Kumar Singh and the third person is Mr. V. S. Sreejith. So, these are the 3 tutors and with their help, you should be able to do this help, if you have any doubts or questions you should be able to get those sorted out.

And finally, when we close the course, there will be a final examination and you if you are signing up to get a certificate in the course, then your performance in the final examination and also in the assignments will help you to determine your marks and how you did in the course.

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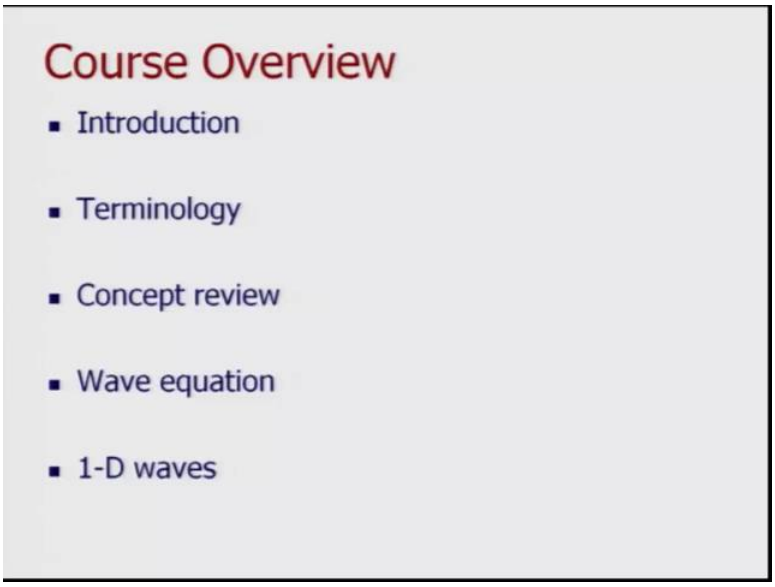

That is the overall structure of the course and what we plan to do over next 5-10 minutes is we will discuss all sorts of topics which we will cover in this course. So, essentially what we will do is we will start this course starting this week. So, this week is going to be introductory in nature and what we will discuss is basically different terminologies concepts related to Acoustics and also giving you a very broad based idea of what sound is all about.

Then in the next week, we will start working on some of the specifics and what we will do is we will do a concept review and specifically we will see that later in the course that there will be 3 concepts which are very important for you to perform well in this course. The first is related to complex algebras. So, you will have a very quick overview of complex algebra then we will also have a review of stuff related to math, specifically in context of Fourier transforms and Fourier functions and stuff like that. So that will be essentially concept review and another related concept which is important for you to have a good grasp on to do well in this course is related to bode plots and these plots are typically thought in electrical engineering.

But this course is open to everyone as long as you are interested in this course. So what we will also do is we will cover this notion of bode plots. So that is what we will do in the concept review stage and once that is done, then we will actually start working out all the details of the course and we will start with the wave equation. So, we will actually derive the wave equation and then solve the wave equation for one dimensional wave.

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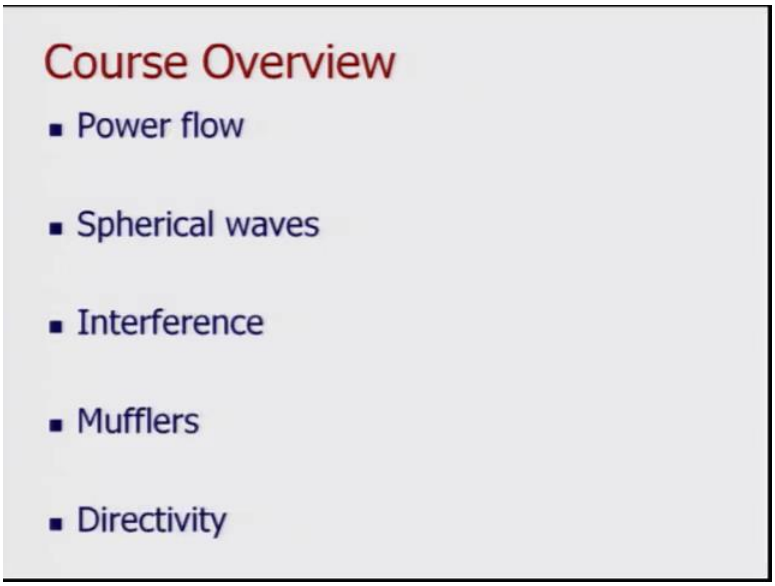

After that we will discuss, what is Acoustical power and here we will draw analogies between acoustical power as we see it in context of sound and electrical energy or electrical power and from that we will derive some important conclusions and once we have done with that then we will start discussing spherical waves because in nature, most of the time when wave propagates, it propagates in a spherical, spherically distributed way.

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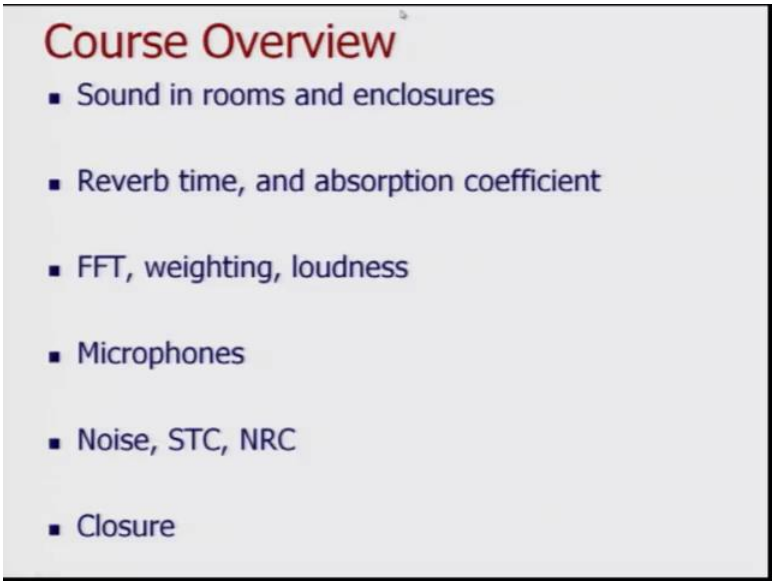

Then we will discuss concepts related to interference and mufflers and directivity. So, these are some other concepts and please do understand that the way this course is structured is that it will help you to solve some of the real life problems. So, it is partly based on Acoustical theories, but a significant chunk of this course is also oriented in such way that you can solve some practical problems. So, that is why we will be treating the topic of mufflers and we will also try to understand, how sound propagates in rooms and enclosures. So, this is again there to help you understand Acoustical principles from the stunt point of some common applications and in context of propagation of sound in rooms and enclosures, we will also cover concepts like reverberation time and sound absorption coefficient of different materials.

A lot of times, when we gather Acoustical data that is essentially a function of pressure with respect to time, but then subsequently, we analyze the data in the Fourier on the frequency domain and we do that using mathematical techniques, several mathematical techniques and one of these techniques is known as FFT or Fast Fourier Transform.

We will also discuss how Fast Fourier Transform is performed and how you can resolve time related data into frequency domain and then in that context, we will also discuss principles like weighting, what is meant by loudness, when we talk about loudness or sound, we will also discuss about microphones, what are the different types of microphones and how do we go around selecting them and using these devises.

And then we will start discussing about noise, how it can be managed and in context of noise some terms like STC and NRC which is Noise Reduction Coefficient and that will essentially bring ups to the closure of this course. So, that is what the overall course is going to look like and these are some of the references which you may want to relate to.

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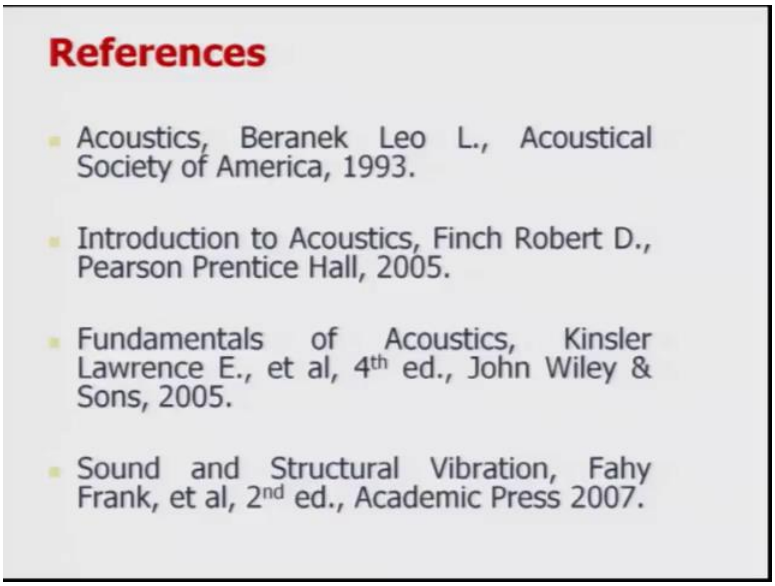

The first one is a book by Leo Beranek Acoustics and some of these books may be available on the web or you access libraries. Another book I will be referring to is Introduction to Acoustics by Finch and then Fundamentals of Acoustics by Kinsler and then the last one is Sound and Structural Vibrations by Fahy Et Al.

That is how this course is going to work out and that is what I pretty much wanted to cover in today's lecture. We will meet once again tomorrow and then we will start discussing some of the introductory concepts of sound.

Have a great day and I look forward to seeing you tomorrow.

Thank you.