

# Sound Propagation Through Media - Web course

## COURSE OUTLINE

The course is split in seven modules. These cover the following areas.

Module 1: Introduction & Concept Review

Module 2: Wave Propagation in Solids and Fluids

Module 3: Acoustic Waves in Homogenous Fluids

Module 4: Acoustic Waves in Non-Homogenous Fluids

Module 5: Waveguides

Module 6: Transmission Through Walls

Module 7: Radial Propagation and Directivity

## COURSE DETAIL

Module No.	Title	Lectures
01.	Introduction and Concept Review	<ol style="list-style-type: none"> <li>1. Introduction, waves, sound, acoustics, nature of sound, application areas of sound</li> <li>2. Terminology: Octave, decade, wave number, bandwidth, tones, noise</li> <li>3. Decibel, sound power level, sound intensity level, sound pressure level</li> <li>4. Adding decibels for correlated and uncorrelated signals</li> <li>5. Complex time signals, transfer functions, poles and zeros, plots for poles and zeros</li> <li>6. Bode plots - magnitude plots for simple poles, and simple zeros</li> <li>7. Bode plots - phase plots for simple poles, and simple zeros</li> </ol>
02.	1-D Waves in Fluids and Solids	<ol style="list-style-type: none"> <li>8. 1-D wave equation</li> <li>9. 1-D wave equation</li> <li>10. 1-D wave equation</li> <li>11. Waves in liquid media</li> <li>12. Waves in solid media</li> <li>13. Waves in solid media</li> <li>14. Waves in solids, dispersion, group velocity, phase velocity</li> </ol>
03.		



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Mechanical Engineering

### Pre-requisites:

At least third year student in a BE (ME, Civil, Aeronautical, or EE) program.

### Coordinators:

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	Acoustic Waves in Homogenous Fluids	<ul style="list-style-type: none"> <li>15. 3D waves in fluids</li> <li>16. 3D waves in fluids</li> <li>17. Planar waves</li> <li>18. Spherical waves in fluids</li> <li>19. Cylindrical waves in fluids</li> </ul>
<b>04.</b>	Acoustic Waves in Non-Homogenous Fluids	<ul style="list-style-type: none"> <li>20. Acoustic waves in non-homogenous media</li> <li>21. Acoustic waves in non-homogenous media</li> <li>22. Ray paths</li> <li>23. Transmission through two fluid media - normal incidence</li> <li>24. Transmission through two fluid media - oblique incidence</li> <li>25. Transmission through two fluid media - oblique incidence</li> <li>26. Transmission through two fluid media - oblique incidence</li> <li>27. Transmission through two fluid media - oblique incidence</li> </ul>
<b>05.</b>	Waveguides	<ul style="list-style-type: none"> <li>28. Waveguides, transmission line equations</li> <li>29. 1-D Waves: examples, standing waves, notion of impedance</li> <li>30. 1-D wave: Open tubes, impedance</li> <li>31. 1-D waves: Tubes with imperfect termination</li> <li>32. Kundt's apparatus</li> </ul>
<b>06.</b>	Sound Transmission through Walls	<ul style="list-style-type: none"> <li>33. Sound transmission through walls: normal incidence</li> <li>34. Sound transmission through walls: oblique incidence</li> <li>35. Three media problem</li> </ul>
<b>07.</b>	Radial Propagation & Directivity	<ul style="list-style-type: none"> <li>36. Radial propagation of sound, monopoles, and dipoles</li> <li>37. Radial propagation of sound, monopoles, and dipoles</li> <li>38. Radial propagation of sound, monopoles, and dipoles</li> <li>39. Directivity</li> <li>40. Summary</li> </ul>

**References:**

1. Acoustics, Beranek Leo L., Acoustical Society of America, 1993.
2. Introduction to Acoustics, Finch Robert D., Pearson Prentice Hall, 2005.
3. Fundamentals of Acoustics, Kinsler Lawrence E., et al, 4th ed., John Wiley & Sons, 2005.
4. Sound and Structural Vibration, Fahy Frank, et al, 2nd ed., Academic Press 2007.