Final Year Undergraduate Course in Aeroacoustic Measurements


**Turbulence and Sound**

1.1 Aeroacoustics of Low Mach Number Flows
1.2 Sound Waves and Turbulence
1.3 Quantifying Sound Levels and Annoyance

**Linear Acoustics**

3.1 The Acoustic Wave Equation
3.2 Plane waves and Spherical waves
3.3 Harmonic Time Dependence
3.4 Sound Generation by a Small Sphere
3.5 Sound Scattering by a Small Sphere
3.6 Superposition and Far Field Approximations
3.8 Acoustic Intensity and Sound Power Output

**Lighthill's Acoustic Analogy**

4.1 Lighthill's Analogy
4.3 Curle's theorem
4.4 Monopole, Dipole and Quadrupole Sources

**Turbulence and Stochastic Processes**

8.1 The Nature of Turbulence
8.2 Averaging and the Expected Value
8.3 Averaging of the Governing Equations and Computational Approaches
8.4 Description of Turbulence for Aeroacoustic Analysis

**Aeroacoustic Testing and Instrumentation**

10.1 Aeroacoustic Wind Tunnels
10.2 Wind Tunnel Acoustic Corrections
10.3 Sound Measurement
10.4 The Measurement of Turbulent Pressure Fluctuations
10.5 Velocity Measurement

**Measurement, Signal Processing and Uncertainty**

11.1 Limitations of Measured Data
11.2 Uncertainty
11.3 Averaging and Convergence
11.4 Numerically Estimating Fourier Transforms
11.5 Measurement as seen from the Frequency Domain
11.6 Calculating Time Spectra and Correlations
11.7 Wavenumber Spectra and Spatial Correlations

**Phased Arrays**

12.1 Basic Delay and Sum Processing
12.2 General approach to array processing
12.3 Deconvolution Methods
12.4 Correlated Sources and Directionality
12.5 Methods Based on Source Models