ME 525 Applied Acoustics in a nutshell, winter quarter 2024, Peter H. Dahl

1	Small acoustic variables relative to background state, linearized conservation of momentum
2	Linearized conservation of mass
3	Acoustic equation of state and linearized acoustic wave equation
4	Plane waves, characteristic impedance, spherical waves
5	Acoustic near and far field, parameters *kr* and *ka*, kinetic and potential energy
6	Specific acoustic impedance for spherical wave, Jacobsen measurements versus *kr* , Umov vector
7	Complex intensity, active and reactive intensity
8	Spherical source, $ka \ll 1$ limit, Green's function
9	Acoustic monopole and free space Green's function, acoustic doublet and dipole
10	Acoustic doublet, air-water boundary and Lloyd Mirror problem
11	Acoustic dipole
12	Combining monopoles and dipoles, the Helmholtz-Kirchhoff integral
13	The Rayleigh integral, beam patterns, hydrodynamic, and geometric near and far field ranges
14	Numerical implementation of the Rayleigh integral, Fresnel and Fraunhofer zone
15	Spectral analysis of acoustic data: frequency resolution and variance
16	Spectral analysis of acoustic data: best practice, and time-frequency analysis with short-time FFT
17	Impedance tubes, Helmholtz resonator, plane wave reflection
18	Plane wave reflection coefficient, Snell's law and the critical angle
19	Plane wave reflection coefficient from layered media, impedance translation theorem
20	Solved problems plane wave reflection and seabed attenuation
21	Introduction to ray theory
22	Working with ray theory, approximations based on linear sound speed gradient
23	Waveguide propagation: Method of images and method of normal modes
24	Green function based on method of normal modes
25	Normal modes in realistic waveguides, the Pekeris waveguide
26	Range dependent propagation, adiabatic modes
27	Mode group and phase velocity