Analytical Physics III Course Outline

- **Fluids**
  - Pressure increase with depth
  - Archimedes principle (buoyant force)
  - Pascal's principle
  - Equation of Continuity
  - Bernoulli's Equation
- **EM Waves**
  - EM waves as solutions to Maxwell's Equations
  - Poynting vector, intensity, and radiation pressure
  - Polarization
  - Index of Refraction, media and EM wavelength, Snell's Law
- **Interference & Diffraction**
  - Two slit interference conditions for minima and maxima
  - Phasors
  - Two slit interference intensity on a screen
  - One slit diffraction condition for minima
  - One slit diffraction intensity on a screen
  - One slit diffraction condition for maxima
  - Impact of diffraction on two slit interference

- **Thermodynamics**
  - Thermal Expansion
  - Thermal Energy, Working, and Heating
  - Thermal Energy, Temperature, and Phase Changes
  - First Law of Thermodynamics and types of thermodynamic processes
  - Modes of heat transfer (thermal conductivity, Stefan's Law)
- **Kinetic Theory**
  - Ideal Gas Law
  - Equipartition Theorem
  - Ideal Gas specific heats
  - Ideal Gass Adiabatic Expansion
  - Maxwell speed distribution
- **Quantum Light & Photons**
  - Rayleigh-Jeans Law
  - Wien's distribution and Displacement Law
  - Planck distribution and quantization

- Photoelectric Effect and photons

- **Special Relativity**
  - Galilean relativity review
  - Time dilation and length contraction; proper measurements
  - Lorentz transformation
  - Minkowski space-time diagrams
  - Doppler shift
  - Space-time intervals and causality
  - Velocity transformations
  - Momentum and force
  - Energy: mass, kinetic, total
  - Mass-energy conversion
  - Compton Effect