Tentative Syllabus

**Week 1**
- Introduction: What is a differential equation?
- First order equations (linear case, separable equations, existence and uniqueness)
- Second order equations (linear homogeneous equations, reduction of order)

**Week 2**
- Second order equations (linear inhomogenous equations, variation of parameters, mechanical vibrations)

**Week 3**
- Series Solutions (regular points, convergence, Euler equations and singular points)

**Week 4**
- Laplace transform (motivation, properties, discontinuous and impulse right-hand-sides, convolution)

**Week 5**
- Linear Systems (motivation, eigenvalues/eigenvectors, fundamental solution, solution representation)