MECH-4830 – Spring 2022-23
Introduction to Aerospace Computational Fluid Dynamics

List of Topics

1	Introduction, review, OpenFOAM installation workshop
2	Governing equations for incompressible flow: derivation and analysis
3	Finite difference and volume methods: introduction and examples
4	Lab 1: Computing the flow around a 2D airfoil with automated mesh generation at a low Reynolds number (Re)
5	Post-processing, analysis and interpretation of numerical data
6	Error analysis of numerical schemes (temporal and spatial), and numerical stability
7	Turbulence: introduction and modelling
8	Lab 2: Computing the flow around a 2D airfoil with automated mesh generation at a high Re
9	Temporal schemes: basic principles, linear solvers
10	Mesh generation
11	Lab 3: Computing the flow around a 2D airfoil at a high angle of attack (unsteady flow) with manual mesh generation.
12	Advanced topics: immersed boundary, high-order schemes, 3D meshing

Grading Policy (subject to change without notice)
Lab 1: 30%
Lab 2: 35%
Lab 3: 35%

Textbook
Computational Fluid Dynamics: An Introduction. 2009. John F. Wendt