Turbulence Modeling (3 Credits)

Weeks	Sessions	Subjects
1	1st , 2nd	Conservation Laws of Fluid Motion
2	3rd , 4th	Forces on fluid particles
3	5th, 6th	Momentum equation in turbulent flow
4	7th, 8th	Is the flow turbulent?, Effect of turbulence on Navier-Stokes equations
5	9th, 10th	Turbulent boundary layer, What is turbulence?
6	11th, 12th	Scales of turbulence, Vorticity and vortex stretching
7	13th, 14th	Turbulence modeling objective
8	15th, 16th	Reynolds Averaged Navier-Stokes (RANS) Equations
9	17th, 18th	Boussinesq hypothesis, Turbulent viscosity
10	19th, 20th	Mixing length model, Spalart-Allmaras one-equation model
11	21th, 22th	The k-ε model, RNG k- ε, realizable k-ε
12	23th, 24th	k-ω model, Non-linear models, Reynolds stress model
13	25th, 26th	Direct Numerical Simulation (DNS)
14	27th, 28th	Large Eddy Simulation (LES)
15	29th, 30th	Student Project Presentation
16	31th, 32th	Student Project Presentation

References:

TURBULENT FLOWS ; Pope; *Cambridge University Press (2000)*

A First Course in Turbulence; Tennekes & Lumley; *The MIT Press (1972)*

Turbulence Modeling for CFD; David C. Wilcox; *DCW Industries (2006)*