K.N. Toosi University of technology   Aerospace Engineering Faculty

Program and Degree: **BSc in Aerospace Engineering**	
Course Description	
Course Title	**Aerodynamic I**
Prerequisites	Fluid mechanics
The course aims	-To provide students with knowledge of basic aerodynamics and subsonic flow analysis -Assess the applicability of aerodynamic models to predict the forces on and performance of realistic two-dimensional configurations -Ability of analysis of boundary layer and aerodynamic forces -Ability of modelling an analysis of aerodynamic phenomenon in incompressible flow
Contents	-Introduction to Experimental Aerodynamics -Introduction to fundamental principles of aerodynamics: fundamental aerodynamic variables, aerodynamic forces and moments, center of pressure, flow similarity. -Equations and basics of principles of aerodynamics: vorticity, circulation, potential function, flow function, speed field. -Inviscid and compressible flow: Bernoulli equations, low speed wind tunnel, pressure coefficient, governing equation for incompressible flow. -Incompressible flow over wing sections: definition of wing section and its geometric and Aerodynamic characteristics. -Incompressible flow over a finite Wing: Three-dimensional flow over a finite Wing, tip vortexes, downwash, induced drag, vortex theory of Helmholtz, sweepback wings and triangular wings. -Three dimensional incompressible flow: three-dimensional source and sink, flow over a sphere, numerical methods of simulation of three-dimensional flow -Explain the basic elements of the finite volume approximation to the compressible Euler and Navier-Stokes equations
Duration	**1 Semester (16 weeks)**
Course Hours	**3 hours/week**
Course Type	**Required**