

Course Name	Advanced Fluid Engineering		
Semester, Year	Second Semester, 2018 (Winter Term)	Number of Credits	2 credits
Course level	5000	Course Number	27104
Instructor(s) (Institution)	Nobuyuki OSHIMA (大学院工学研究院) Masao WATANABE (大学院工学研究院) Yuichi MURAI (大学院工学研究院) Hiroshi TERASHIMA (大学院工学研究院) Kazumichi KOBAYASHI (大学院工学研究院) Yuji TASAKA (大学院工学研究院)		
Course Objectives	Six professors give an omnibus lecture on fundamental physics in fluid mechanics. The course is divided in three parts; fundamentals of theoretical fluid mechanics, numerical methods for computational fluid mechanics, and experimental method for fluid engineering.		
Course Goals	Understanding the advanced contents on fluid engineering.		
Course Schedule	<ol style="list-style-type: none"> 1. Basic theory of continuum mechanics (2 sessions) 2. Basic theory of conservation equations (3 sessions) 3. Basic theory of turbulent flows (3 sessions) 4. Basic theory of micro flow in porous media (2 sessions) 5. Particle motion in arbitrary fluid flow (2 sessions) 6. Theory of quantitative flow visualization (3 sessions) <p>The first five sessions given by Profs. Watanabe and Kobayashi deal with fundamentals of theoretical fluid mechanics, including fundamental theory of continuum mechanics, concepts of stress tensors, constitutive equations, derivation of governing equations.</p> <p>The middle five sessions given by Profs. Oshima and Tsubokura deal with theory and numerical models of turbulent flow and its application to vehicle aerodynamics, and mass transport theory and numerical models in porous media and electrochemistry in polymer electrolyte fuel cell (PEFC).</p> <p>The last five sessions given by Profs. Murai and Tasaka lecture on equation of motion of particles subject to arbitrary fluid flow, and its application to quantitative flow visualization in multi-dimensional time-dependent flow configurations.</p>		
Homework	Lecture is based on a fundamental knowledge of fluid engineering studied in undergraduate level. Students should preliminary finish to learn it before attending the lecture.		
Grading System	based on class participation (50%), and report results (50%)		
Textbooks / Reading List			
Websites			
Website of Laboratory			
Additional Information	Students are required a basic knowledge of fluid engineering studied in undergraduate level.		