**上海交通大学硕士研究生课程教学大纲**

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| 课程基本信息（Course Information） |
| 课程代码（Course Code） | EP26001 | \*学时（Credit Hours） | 48 | \*学分（Credits） | 3 |
| \*课程名称（Course Name） | （中文）高等工程流体力学 |
| （英文）Advanced Fluid Dynamics in Engineering |
| 课程性质(Course Type) | 专业基础课Discipline Fundamental Course |
| 授课语言(Language of Instruction) | 英文English |
| \*开课院系（School） | 中英国际低碳学院China-UK Low Carbon College |
| 先修课程（Prerequisite） | 矢量张量分析 Vector and Tensor Analysis流体力学 Fluid Mechanics工程热力学 Engineering Thermodynamics |
| 授课教师（Teacher） | 党琪Qi Dang | 课程网址(Course Webpage) |  |
| \*课程简介（Description） | Fluid mechanics is a subject with a significant importance in several fields of engineering and science. This course aims at helping students understand the fundamental principles of fluid flows and the application of these laws to real engineering problems. This course will cover key physical concepts, basic laws of conservation (mass, momentum, and energy), analytical methods for different flows (inviscid flow and viscous flow, steady flow and unsteady flow, impressible flow and compressible flow), and applications of the fundamental principles in fluid flow situations.This course will help students develop an orderly approach to problem solving. We usually start with governing equations, state assumptions for specific problems, and try to solve the problem and relate the mathematical expressions to the physical flow behaviors.  |
| \*课程简介（Description） |  |
| 课程教学大纲（course syllabus） |
| \*学习目标(Learning Outcomes) | * Master the important laws and principles including the conservation of mass, momentum, and energy
* Apply these principles to understanding of fluid phenomena including incompressible and compressible flows, inviscid and viscous flows
* Solidify key concepts that are the essential building blocks of design and analysis of fluid mechanics
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| \*教学内容、进度安排及要求(Class Schedule& Requirements) |

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| Week 1  | Overall introduction and fundamental concepts | Analysis and description methods; Flow field;  | Week 9  | Incompressible viscous flow | Boudary layer theory |
| Week 2  | Fundamental concepts and kinematics of fluid | Substantial Derivatives; Flow lines; Kinematics of fluid;  | Week 10 | Incompressible viscous flow | Laminar-Turbulent Transition |
| Week 3  | Kinematics of fluid and conservations laws | Reynolds Transport Theorem; Continuity equation; | Week 11 | Incompressible viscous flow  | Turbulence |
| Week 4  | Conservation laws | Stress field;Momentum equation | Week 12 | Incompressible viscous flow  | Turbulence |
| Week 5 | Conservation laws | Conservation of energy; Govening equations for Newtonian fluid | Week 13 | Compressible flow | Propagation of sound waves; Local isentropic stagnation properties |
| Week 6 | Incompressible inviscid flow | Euler’s equation;Bernoulli equation; Stream function; Fundamental potential flows | Week 14 | Compressible flow | Flow in a converging-diverging nozzle; Normal shocks |
| Week 7 | Incompressible inviscid flow | Superposed potential flows | Week 15 | Review  | Review and extra learning stuff |
| Week 8 | Incompressible viscous flow | Analytical solutions of 2D viscous incompressible flow | Week 16 | Review | Review and extra learning stuff |
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| \*考核方式(Grading) | The performance of students will be evaluated through a combination of regular assignments (40%) and a final exam at the end of the semester (60%). The emphasis will be placed on the selection of the appropriate physical principles and their application to engineering problems of particular interests. The students are required to numerically evaluate the analytical expressions for engineering problems. |
| \*教材或参考资料(Textbooks & Other Materials) | 英文教材：Fluid Mechanics for Engineers; Meinhard T. Schobeiri. Springer. 2010Fundamental Mechanics of Fluids; I.G. Currie. CRC Press. 2012Fox and McDonald’s Introduction to Fluid Mechanics; Philip J. Pritchard. John Wiley and Sons, Inc. 2011中文教材：《高等工程流体力学》；张鸣远，景思睿，李国君编著，高等教育出版社出版，2012 |
| 其它（More） |  |
| 备注（Notes） |  |

备注说明：

1.课程大纲一般为教师网上填写，填写要求会自动提示；对于新开课程，需要填着纸质大纲，并经院系教学委员会或专业委员会通过。

2．带\*内容为必填项。

3．课程简介字数为300-500字；课程大纲以表述清楚教学安排为宜，字数不限。