课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**MAE5030 格子波尔兹曼方法的理论与应用** The theory and application of lattice Boltzmann method
2.	**课程性质** **Compulsory/Elective**	专业选修课
3.	**课程学分/学时** **Course Credit/Hours**	3/48
4.	**授课语言** **Teaching Language**	英语
5.	**授课教师** **Instructor(s)**	单肖文
6.	**先修要求** **Pre-requisites**	
7.	**教学目标** **Course Objectives**	
	Give a rudimentary review of kinetic theory and its application in CFD software. Quickly bring the students up to speed with the current research in the lattice Boltzmann method.	
8.	**教学方法** **Teaching Methods**	
	Lecture	
9.	**教学内容** **Course Contents**	
	Section 1	**1.1 The statistical physics of fluids**
	Section 2	**1.2 The Boltzmann equation**
	Section 3	**1.3 A brief history of lattice gas and lattice Boltzmann method**
	Section 4	**2.2 The non-dimensionalization of Boltzmann-BGK equation**
	Section 5	**2.3 The conservation laws and hydrodynamics**
	Section 6	**2.4 The ES collision model**
	Section 7	**2.5 Polyatomic gases**
	Section 8	**3.1 Discretization of the Boltzmann-BGK equation**
	Section 9	**3.2 Chapman-Enskog approximation**
	Section 10	**3.3 Lattice-Boltzmann Equations and extensions**
	Section 11	**3.4 High-order lattices**
	Section 12	**3.5 The multi-relaxation-time collision models**
	Section 13	**4.1 The classic thermodynamic theory of phase transition**
	Section 14	**4.2 The kinetic theory of non-ideal gases**
	Section 15	**4.3 The pseudo-potential non-ideal gas model**
	Section 16	**5.1 Non-ideal gas mixtures**
10.	**课程考核** **Course Assessment**	

	考查，平时作业 50%，project50%
11.	**教材及其它参考资料** **Textbook and Supplementary Readings**
	无