

课程教学大纲

课程基本信息 (Course Information)					
课程代码 (Course Code)	PH330	学时 (Credit Hours)	51	学分 (Credits)	3
课程名称 (Course Name)	流体力学				
	Fluid Mechanics				
课程性质 (Course Type)	(培养计划课程/通识核心/公共选修/新生研讨/其他等)				
授课语言 (Language of Instruction)	英文				
开课院系 (School)					
先修课程 (Prerequisite)	Mathematical Physics, Thermodynamics, Tensor calculus				
授课教师 (Teacher)	Nasr A M Hafz	电邮、电话 (email& phone)	(选填)		
办公时间 (Office Time)	(选填)	办公地点 (Office Location)	(选填)		
课程网址 (Course Webpage)	(选填)				
*课程简介 (Description)	(Chinese 中文版, 含概括描述课程目标)				
*课程简介 (Description)	<p>The course is introductory-level Fluid Mechanics where I teach junior students the fundamental concepts for the physics of fluids. Ideal fluids will be given first where the basic equations such as the equation of continuity, Euler equation and Bernoulli's equation will be derived. Then the concepts of energy flux, momentum flux and potential flow will be given in details.</p> <p>Then we will start the study of Viscous Fluids in which the equations of motion (including the momentum flux tensor, stress tensor and Navier-Stokes equation), law of similarity and the importance of the Reynolds number will be derived in great details.</p> <p>Then we will study the Turbulence problems such as the stability of steady and rotary flows. In this chapter we will also study the theory of fully developed turbulence, the velocity correlation functions and Zhukovskii's theorem.</p> <p>Then we will study the flow in boundary layers (laminar and turbulent) and then we can drive the logarithmic velocity profile. Next we will study the thermal conduction in fluids where we will derive the general equation of heat transfer and the thermal</p>				

	<p>conduction in incompressible fluid. Then we will study the thermal conduction in infinite and finite media. Next we will study the diffusion problem, where we will derive the equation of fluid dynamics for a mixture of fluids and then we will study the mass transfer and thermal diffusion.</p> <p>Then we are going to study the surface phenomena including the Laplace's formula and Capillary waves.</p> <p>Finally we will study the physics of Sound. Here we will derive the energy and momentum of sound waves and the reflection and refraction of sound waves. Then the propagation of sound waves in a moving medium, Spherical waves, cylindrical waves, the general solution of the wave equation etc.</p>
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课程教学大纲 (course syllabus) (以下内容根据所选语言, 如为外文授课, 需必填中文、英文相对应的两部分内容, 小语种课程可选填对应语言)

<p>*学习目标 (Learning Outcomes)</p>	<p>(须根据课程性质, 着重描述课程教学在培养学生知识、能力、素质等方面的贡献, 是课程目标的细化, 专业培养计划内课程必须与专业培养目标具体贡献点相对应; 其他类型课程请根据课程实际情况从三方面描述。</p> <ol style="list-style-type: none"> 1. 2. 3.
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<p>*教学内容、进度安排及要求 (Class Schedule & Requirements)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">教学内容 topics</th> <th style="width: 10%;">学时 Credit hours</th> <th style="width: 10%;">教学方 式</th> <th style="width: 15%;">作业及要 求</th> <th style="width: 15%;">基本要求</th> <th style="width: 25%;">考查方式</th> </tr> </thead> <tbody> <tr> <td>Fundamentals</td> <td>5</td> <td></td> <td>Homework set 1</td> <td></td> <td></td> </tr> <tr> <td>Ideal Fluids</td> <td>5</td> <td></td> <td>Homework set 2</td> <td></td> <td></td> </tr> <tr> <td>Viscous Fluids</td> <td>8</td> <td></td> <td>Homework set 3</td> <td></td> <td></td> </tr> <tr> <td>Turbulence</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Boundary Layers</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Thermal Conduction in Fluids</td> <td>6</td> <td></td> <td>Homework set 4</td> <td></td> <td></td> </tr> <tr> <td>Diffusion in Fluids</td> <td>3</td> <td></td> <td>Homework set 5</td> <td></td> <td></td> </tr> <tr> <td>Surface Phenomena in Fluids</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Sound</td> <td>8</td> <td></td> <td>Homework set 6</td> <td></td> <td></td> </tr> <tr> <td>Introduction on</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	教学内容 topics	学时 Credit hours	教学方 式	作业及要 求	基本要求	考查方式	Fundamentals	5		Homework set 1			Ideal Fluids	5		Homework set 2			Viscous Fluids	8		Homework set 3			Turbulence	4					Boundary Layers	4					Thermal Conduction in Fluids	6		Homework set 4			Diffusion in Fluids	3		Homework set 5			Surface Phenomena in Fluids	3					Sound	8		Homework set 6			Introduction on	3				
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	Shock Waves				
	Final Exam	2			
*考核方式 (Grading)	I assess students based on the following: 1. Activity in class 2. Assignments and homework 3. Attendance 4. Final exam results				
*教材或参考资料 (Textbooks & Other Materials)	1. Fluid Mechanics (2 nd edition). Landau and Lifshitz Course of Theoretical Physics Volume 6 2. Tensor Calculus (Schaum's outlines). David C. Kay. Mac Graw Hill				
其它 (More)					
备注 (Notes)					

备注说明:

1. 多于1位教师授课的课程,如公共课程、基础课程等经教学团队商议后由负责人填写。
2. 带*为必填项目,其他栏目根据课程情况选填。
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。