

钢结构(1) (英)

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30030493,,钢结构(1) (英) ,Steel Structure (1) (in English)

总学分: 3,总学时: 48,周学时:48/0/96

开课单位: 土木工程系,课程类别: 本科专业基础课,课程特色:
全外文授课,课程面向: 本科生

考核方式: 考试,教学方式: 课堂讲授为主

课程团队: 班慧勇 石永久

课程内容简介:本课程是土木工程专业的主修课程之一,主要讲授钢结构的原理与设计方法,具体包括钢结构体系的基本特点和优势,钢结构的发展和应用现状,钢结构的设计基本要求;钢结构材料生产过程,结构钢材的主要性能指标和选用;钢结构的连接方法,焊缝连接和螺栓连接基本性能、力学分析和设计计算、构造要求;轴心受力构件的破坏模式,及其强度、刚度、整体稳定和局部稳定计算方法,轴心受力构件截面设计与验算;受弯构件的承载力计算与分析,受弯构件受力特征,及其强度、刚度、整体弯扭稳定、翼缘和腹板局部稳定计算,型钢梁和焊接组合梁的截面设计与构造要求;拉弯和压弯构件的受力性能,及其强度和稳定承载力的计算方法和构造要求;框架结构典型节点的受力性能、构造要求、承载力设计和计算方法。课程涉及的规范以中国规范为主,并包括欧美等地主流设计规范。

Course Description: This course is one of the most important specialised courses for undergraduates majoring in civil engineering. It mainly introduces principles of mechanism and design methods by means of lectures. More specifically, the contents include: i) characteristics and advantages of steel structures, their development and application as well as basic requirements for their design; ii) manufacturing process, mechanical properties and selection of steel structural materials; iii) connections in steel structures, and fundamental behaviour, mechanical analysis, design method and configuration requirements of both welded and bolted connections; iv) failure modes of steel members subjected to axial loadings, design theories of their strength, stiffness, overall and local buckling, as well as design and checking of their cross-sections; v) flexural behaviour of steel members including calculation of their strength, stiffness, flexural-torsional buckling and local buckling within flanges and web, as well as design of cross-sections and configuration requirements of hot-rolled and welded steel beams; vi) mechanical performance of steel members subjected to bending with tension or

compression in combination, including calculation method of their strength and buckling and configuration details; vii) typical joints in steel frame structures and their loading capacities, configurations. National standards are also incorporated in this course, including the China's one and the European and American ones.

先修要求:先修材料力学、结构力学

适用院系专业:土木工程

教学目标:通过本课程的通过课内外教学活动,使学生具备基本的知识和能力,具体教学目标: (1) 理解钢结构的基本特点和应用范围,熟悉钢结构的材料、钢材的主要性能。(2) 熟练运用数学、力学等知识进行钢结构连接和基本构件的受力分析及设计方法。(3) 能够运用钢结构基本理论进行设计,解决钢结构中基本构件和连接节点的设计及承载力验算问题。(4) 熟悉查阅专业相关规范和手册,应用本课程的知识解决实际工程问题。(5) 具有较为宽广的国际视野及基本的专业英语沟通能力。

预期学习成效: (1) 了解钢结构的应用范围及基本特征; (2) 掌握钢结构材料的基本力学性能; (3) 掌握钢结构连接(包括螺栓连接和焊缝连接)的基本受力原理、设计方法与构造要求; (4) 掌握钢结构轴心受力构件(包括轴拉和轴压构件)的基本受力原理、设计方法与构造要求; (5) 掌握钢结构受弯构件的基本受力原理、设计方法与构造要求; (6) 掌握钢结构拉弯和压弯构件的基本受力原理、设计方法与构造要求; (7) 掌握钢结构节点(包括梁柱节点、柱脚等)的基本受力原理、设计方法与构造要求; (8) 了解钢结构体系的基本设计方法与构造要求; (9) 初步掌握钢结构静力、稳定、疲劳分析的一般方法。

参考书: [1] NS Trahair, MA Bradford, DA Nethercot, L Gardner. The Behaviour and Design of Steel Structures to EC3 (Fourth edition), New York: Taylor & Francis, 2008. [2] 王国周, 瞿履谦. 钢结构原理与设计. 北京: 清华大学出版社, 1993. [3] 陈绍蕃, 顾强. 钢结构(上册)——钢结构基础(第三版). 北京: 中国建筑工业出版社, 2014.