上海交通大学研究生课程开设申请表

New Graduate Course Application Form, SJTU

<table>
<tr><th colspan="6">课程基本信息 Basic Information</th></tr>
<tr><td>*课程名称
Course Name</td><td colspan="5">（中文 Chinese）测试数据智能挖掘
（英文 English）Intelligent mining of test data</td></tr>
<tr><td>*学分
Credits</td><td>2</td><td>*学时
Teaching Hours</td><td colspan="3">32（1 学分≥16 课时）</td></tr>
<tr><td>*开课学期
Semester</td><td>春季学期 Spring</td><td>*是否跨学期
Cross-semester?</td><td>否 No</td><td colspan="2">跨 Spanning over 个学期
Semesters（含夏季学期）。</td></tr>
<tr><td>*课程性质
Course Category</td><td>专业课 Specialized Course</td><td>*课程分类
Course Type</td><td colspan="3">全日制课程 For full-time students</td></tr>
<tr><td>*授课语言
Instruction Language</td><td>中文 Chinese</td><td>主要授课方式
Teaching Method</td><td colspan="3">课堂教学 In class teaching</td></tr>
<tr><td>*成绩类型
Grade</td><td>等第制 Letter grading</td><td>主要考核方式
Exam Method</td><td colspan="3">论文 Essay</td></tr>
<tr><td>*开课院系
School</td><td colspan="5">材料科学与工程学院</td></tr>
<tr><td>所属学科
Subject</td><td colspan="5">材料科学与工程</td></tr>
<tr><td rowspan="2">负责教师
Person in charge</td><td>姓名 Name</td><td>工号 ID</td><td>单位 School</td><td colspan="2">联系方式 E-mail</td></tr>
<tr><td>蔡艳</td><td></td><td>材料学院</td><td colspan="2">ycai@sjtu.edu.cn</td></tr>
<tr><th colspan="6">课程扩展信息 Extended Information</th></tr>
<tr><td>*课程简介
(中文)
Course Description</td><td colspan="5">（分段概述课程定位、教学目标、主要内容、先修课程等；不少于 200 字。）

基于计算机和人工智能技术在材料制备或加工过程中进行测试和数据挖掘是材料专业学生必须掌握的基本知识，是今后的科学研究和生产实践的基本技能。通过本课程的学习，学生具备初步的数字化采集和数据智能分析的理论知识和实践能力，能够基于 Labview 或 Python 平台完成信号采集与分析，为后续科研工作奠定数据分析基础。

本课程为学生提供较为系统的信号采集和数据挖掘的理论知识和实践操作指导，具体授课内容包括测量方法基本概念、虚拟仪器系统基本组成、信号传感、电信号数据采集系统和关键参数，以及测量数据的时域分析、频域分析、回归分析、智能分类等。通过课程讲授和基于 Labview、Python 语言的编程练习，完成知识点的学习与实践。本课程设置温度/压力测量和热加工过程稳定性分析两个课程设计环节，通过调研、实践和研讨的方式完成实际测量系统的搭建、测量程序的时域频域分析、测量数据的挖掘和知识获取，培养学生掌握基本的虚拟仪器测试方法和数据智能挖掘方法。

建议先修课程为材料学院研究生课程“材料加工智能制造基础”。</td></tr>
<tr><td>*课程简介
（English）
Course Description</td><td colspan="5">（须与中文一致，翻译请力求信达雅。）

Digital collection and intelligent mining of processing data in materials preparation and processing are the basic knowledge that engineering students must master, and are the basic skills of scientific research and production practice in the future. This course provides students with systematic theoretical knowledge and practical operation guidance of signal acquisition and data mining. The specific teaching contents include basic concepts of measurement methods, basic</td></tr>
</table>

components of virtual instrument system, signal sensing, electrical signal data acquisition system and key parameters, as well as time domain analysis, frequency domain analysis, regression analysis and intelligent classification of measurement data. Through the course teaching and programming practice based on LabVIEW and python language, the learning and practice of knowledge points are completed. This course includes two parts: temperature measurement and stability analysis of hot working process. Through investigation, practice and discussion, it completes the construction of actual measurement system, the compilation of measurement program, the processing and analysis of measurement data, and trains students to master the basic virtual instrument test methods and data mining methods. Through the study of this course, students have the preliminary theoretical knowledge and practical ability of digital signal acquisition and intelligent data analysis and can complete simple LabVIEW or python programming tasks.

"Fundamentals of material processing and intelligent manufacturing" is suggested as prerequisite courses, but not compulsory.

*教学大纲
(中文)
Syllabus

（建议列表形式，各列内容：章节、主要内容、课时数、教学方式）

教学内容	授课学时	教学方式
课程介绍：如何采用虚拟仪器和数据挖掘技术助力科研？	2	课堂讲授
信号采集基础知识	2	课堂讲授
虚拟仪器组成与实现	2	课堂讲授
LabVIEW 编程基础	2	授课、实操
热加工过程多信号感知	2	授课、实操
热加工过程温度信号采集	2	授课、实操
热加工过程图像信号采集	2	授课、实操
课程设计（1）：热加工过程感知实践	2	实操、研讨
智能数据挖掘基础知识	2	授课、实操
Python 编程基础	2	授课、实操
如何对试验数据分类？（聚类分析）	2	授课、实操
如何建立数据与试验结果的映射？（SVM 建模）	2	授课、实操
如何智能评价试验结果？（神经网络）	2	授课、实操
热加工智能数据挖掘案例	4	授课、参观
课程设计（2）：热加工过程智能化实践	2	实操、研讨

*教学大纲
（English）
Syllabus

（须与中文一致，翻译请力求信达雅。）

Content	Hours	Format
Course introduction: how to use virtual instrument and data mining technology to assist scientific research?	2	Classroom teaching
Basic knowledge of signal acquisition	2	Classroom teaching
System component and implementation of virtual instrument	2	Classroom teaching
Fundamentals of LabVIEW programming	2	Teaching, Practice
Multi signal sensing in hot working process	2	Teaching, Practice
Temperature signal acquisition in hot working process	2	Teaching, Practice

		Image signal acquisition in hot working process	2	Teaching, Practice
		Course design (1): perception system of hot working process	2	seminar
		Basic knowledge of intelligent data mining	2	Teaching, Practice
		Fundamentals of Python programming	2	Teaching, Practice
		How to classify test data? (cluster analysis)	2	Teaching, Practice
		How to establish the mapping between data and test results? (SVM modeling)	2	Teaching, Practice
		How to evaluate test results intelligently? (neural network)	2	Teaching, Practice
		Intelligent data mining case of hot working	4	Teaching, visiting
		Course design (2): intelligent system of hot working process	2	seminar
*课程要求（中文）Requirements	（课程考核方式、考核标准等；不少于 50 字） 本课程要求学生准时出勤，按时按质完成课内和课后作业，根据授课进度完成两次课程设计，通过实际操作完成数据测试与分析，并以书面报告或 PPT 方式呈现，具体考核标准如下： 平时成绩 20% +课后作业 20% +课程设计 60%			
*课程要求（English）Requirements	（须与中文一致，翻译请力求信达雅。） Students are required to attend all courses or practices on time, to finish class assignments and homework, and to carry out two course designs according to the teaching schedule. They should complete data testing and analysis through actual operation, and present it in written report or PPT. The specific assessment criteria are as follows: Usual performance 20% + homework 20% + course design 60%			
课程资源（中文）Resources	（教材、教参、网站资料等。） ✧ 袁夫全等.《现代虚拟仪器测量技术》，电子工业出版社，2015 年版 ✧ 石德全等.《热加工测控技术》，北京大学出版社，2010 年版 ✧ Sherin Thomas 等.《PyTorch 深度学习与实战》，机械工业出版社，2020 年版 ✧ 齐伟.《Python 数据分析》，电子工业出版社，2018 年版			
课程资源（English）Resources	（须与中文一致，请力求信达雅。） ✧ Yuan Fuquan, et al. Modern virtual instrument measurement technology, electronic industry press, 2015 edition ✧ Shi Dequan et al. Measurement and control technology of hot working, Peking University Press, 2010 edition ✧ Sherin Thomas et al. Pytorch deep learning and practice, China Machine Press, 2020 ✧ Qi Wei. Python data analysis, electronic industry press, 2018			
备注 Note				