

数学软件认识实习 教学大纲

Practice of Statistics Software Subject Syllabus

一、课程信息 Subject Information

课程编号: Subject ID	3100314001	开课学期: Semester	3
课程分类: Category	专业教育 PA	所属课群: Section	专业平台 MT
课程学分: Credit Points	2	总学时/周: Total Hours/Weeks	2 周
理论学时: LECT. Hours	0	实验学时: EXP. Hours	0
PBL 学时: PBL Hours	0	实践学时/周: PRAC. Hours/Weeks	2
开课学院: College	东北大学 悉尼智能科技学院	适用专业: Stream	应用统计学 AS
课程属性: Pattern	必修 Compulsory	课程模式: Mode	自建 NEU
中方课程协调人: NEU Coordinator	张建波 Jianbo Zhang	成绩记载方式: Result Type	百分制 Marks
先修课程: Requisites	数学程序设计导论 Introduction to Programming for Mathematics		
英文参考教材: EN Textbooks	Charles R. Severance, Python for Everybody, Create Space Independent Publishing Platform, 2016.		
中文参考教材: CN Textbooks	王恺, 王志 等. Python 语言程序设计, 机械工业出版社, 2021 年		
教学资源: Resources	无		
课程负责人(撰写人): Subject Director	张建波 Jianbo Zhang	提交日期: Submitted Date	单击或点击此处输入日期。
任课教师(含负责人): Taught by	张建波 Jianbo Zhang		
审核人: Checked by	韩鹏	批准人: Approved by	史闻博
		批准日期: Approved Date	单击或点击此处输入日期。

二、教学目标 Subject Learning Objectives (SLOs)

注：毕业要求及指标点可参照悉尼学院本科生培养方案，可根据实际情况增减行数

Note: GA and index can be referred from undergraduate program in SSTC website. Please add/reduce lines based on subject.

<p>整体目标: Overall Objective</p>	<p>实习的目的是使学生巩固和运用所学的基础知识和基本技能，建立统计意识和思想，运用收集数据的方法，并能够根据数据的特点选用恰当的统计方法进行分析和推断，获得相关经验。本课程让学生通过开源的 Python 语言编程解决统计相关的数据采集、分析及计算问题。</p> <p>The purpose of the internship is to enable students to consolidate and apply the basic knowledge and skills they have learned, establish statistical awareness and thinking, apply data collection methods, and be able to select appropriate statistical methods for analysis and inference based on the characteristics of the data, in order to gain relevant experience. This course allows students to solve statistical data collection, analysis, and calculation problems through open-source Python programming.</p>	
	<p>1-1</p>	<p>了解 Python 编程环境的使用 Recognize setup of programming environment (IDE) 掌握分支结构和循环结构 Master branching structure and loop structure 理解生成器、迭代器及可迭代对象之间的关系 Understand Generator, iterator, and iterative object</p>
	<p>1-2</p>	<p>理解函数的基本概念，函数的定义与调用方法 Understand functions and their definition and calling 掌握形参和实参的概念、种类及特点，返回值 Master parameters and arguments, return values 结合统计数据的数据分析与处理，掌握模块和包的概念及作用，模块的定义、导入方式和使用方法 Master modules and packages, and their importing and usages 了解变量的作用域，函数的高级应用，常见的内置函数 Recognize scope of variables, advance usage of functions, common build-ins</p>
	<p>1-3</p>	<p>了解目录和文件的相关操作 Recognize common operations about directories and files 结合统计数据获取，掌握一般文件和 CSV 文件的打开、读写和关闭操作 Master opening, reading, writing and closing general files and CSV files 掌握异常的概念，异常处理的相关方法 Master exceptions and the related operations</p>
	<p>1-4</p>	<p>能够用 python 编程解决相关统计计算问题 Use Python programming to solve related statistical calculation problems 能够用 python 编程根据数据的特点选用恰当的统计方法进行分析推断</p>

		Use Python programming to select appropriate statistical methods for analysis and inference based on the characteristics of the data
	1-5	获得相关实践经验, 进一步理解统计的特点与规律, 培养与提高学生独立从事统计工作的能力 Gain relevant practical experience, further understand the characteristics and laws of statistics, and cultivate and improve students' ability to independently engage in statistical work
(2) 德育目标: Essential Quality	2-1	培养具有不畏困难、不惧失败、锲而不舍、敢于尝试、迎难而上的精神, 并在学习过程中培养自己的细心和耐心的勇气和精神 Cultivate the spirit of not fearing difficulties or failure, perseverance, daring to try, and cultivate their own careful and patient courage and spirit in the process of learning
	2-2	培养服务意识, 具有“以人为本”的服务精神 Cultivate service consciousness and have the service spirit of "people-oriented"
	2-3	培养遵守法律、懂规则、守规则的新时代公民 Cultivate citizens of the new era who abide by the law, understand and obey the rules
	2-4	了解主要矛盾和次要矛盾, 在面对复杂问题的时候要实事求是、抓住主要矛盾 Understand the main contradiction and secondary contradiction, seek truth from facts and grasp the main contradiction in the face of complex problems
	2-5	培养有条理和计划, 做到心中有数、有条不紊、循序渐进地完成一项工作 Cultivate a sense of order and plan, and complete a work in an orderly and gradual manner
	课程教学目标与毕业要求的对应关系 Matrix of GA & SLOs	
毕业要求 GA	指标点 GA Index	教学目标 SLOs
3、设计/开发解决方案: 能够设计针对复杂实际问题的解决方案, 设计满足特定需求的系统、单元或流程, 并能够在设计环节中体现创新意识, 考虑社会、健康、安全、法律、文化以及环境等因素 3. Design/Development of Solutions: Design solutions for complex practical problems and design systems, components or processes that meet specified needs with	3-1: 能够设计针对本专业相关复杂实际问题的解决方案 3-1: Capable of designing solutions to complex practical problems related to this major	1-1 到 1-5 2-1 到 2-5
	3-2: 能够对不同设计方案进行比较和优化, 在工作各环节中具有创新意识和批判意识, 善于发现、分析、系统表述和解决实际问题 3-2: Capable of comparing and optimizing different design schemes, having a sense of innovation and criticism in all aspects of work, and be good at discovering, analyzing, systematically elaborating and	

<p>appropriate consideration for public health, and safety, cultural, societal and environmental considerations.</p>	<p>solving practical problems</p>	
<p>4、研究：能够基于科学原理并采用科学方法对复杂实际问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论 4. Investigation: Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions</p>	<p>3-3: 能够在设计和开发的各个环节中综合考虑社会、健康、安全、法律、文化以及环境等因素 3-2: Capable of comparing and optimizing different design schemes, having a sense of innovation and criticism in all aspects of work, and be good at discovering, analyzing, systematically elaborating and solving practical problems</p> <p>4-1: 能够基于科学原理并采用科学方法，在本专业相关理论指导下对复杂实际问题设计实验进行研究 4-1: Capable of design experiments on complex problems with scientific knowledge and research methods of this major</p> <p>4-2: 能够结合本专业对实验数据进行分析与解释，设计并优化实验方案，并通过信息综合得到合理有效的结论 4-2: Capable of analyzing and interpreting the experimental data, designing and optimizing the experimental schemer with the knowledge of this major; reasonable and effective conclusions are obtained through information synthesis</p>	<p>1-1 到 1-5 2-1、2-4、2-5</p>
<p>5、使用现代工具：能够针对复杂实际问题，开发、选择与使用恰当的技术、资源、现代信息技术工具，包括对复杂实际问题的预测与模拟，并能够理解其局限性 5. Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools,</p>	<p>5-2 熟悉解决本专业相关复杂实际问题所需的技术和资源，能够运用现代信息技术进行文献检索和资料查询，获取专业解决方案 5-2: Familiar with the technology and resources required to solve complex practical problems related to the major, capable of using modern information technology to conduct document retrieval and data query, and obtaining professional solutions</p>	<p>1-1 到 1-5 2-4、2-5</p>

including prediction and modeling, to complex practical problems, with an understanding of the limitations	5-3: 能够针对本专业相关复杂实际问题, 选择与使用恰当的技术、资源、现代信息技术工具 5-3: Capable of selecting and using appropriate technology, resources, and modern information technology tools in response to complex practical problems related to the major	
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三、教学内容 Content (Topics)

注：以中英文填写，各部分内容的表格可根据实际知识单元数量进行复制、扩展或缩减

Note: Filled in both CN and EN, extend or reduce based on the actual numbers of knowledge unit

(1) 理论教学 Lecture

知识单元序号: Knowledge Unit No.	1	支撑教学目标: SLOs Supported	1-1、1-4、1-5
知识单元名称 Unit Title	Python 虚拟环境设置 Python Virtual Environment Settings		
知识点: Knowledge Delivery	安装 Python Installing Python		
	安装 conda 及创建虚拟环境 Install <i>conda</i> and create a virtual environment		
	安装 Jupyter 及插件 Install Jupyter and related plugins		
	插件使用方法 Usage of the plugins		
	调试程序方法 Methods of debugging		
	学习目标: Learning Objectives	了解: Recognize	安装 Python Installing Python
安装 conda 及创建虚拟环境 Install <i>conda</i> and create a virtual environment			
安装 Jupyter 及插件 Install Jupyter and related plugins			
理解: Understand		插件使用方法 Usage of the plugins	
掌握: Master		调试程序方法 Methods of debugging	
德育目标 Moral Objectives	2-1 到 2-5		
重点: Key Points	插件使用方法 Usage of the plugins		
难点: Focal Points	调试程序方法 Methods of debugging		

知识单元序号: Knowledge Unit No.	2	支撑教学目标: SLOs Supported	1-2 到 1-5
知识单元名称 Unit Title	NumPy 基础及进阶 Fundamentals and Advancements of NumPy		
知识点: Knowledge Delivery	NumPy 简介及安装 Introduction and Installation of NumPy		
	NumPy 常规使用方法 General Usage of NumPy		
	NumPy 进阶 Advancements of NumPy		
学习目标: Learning Objectives	了解: Recognize	NumPy 简介及安装 Introduction and Installation of NumPy	
	理解: Understand	NumPy 常规使用方法 General Usage of NumPy	
	掌握: Master	NumPy 进阶 Advancements of NumPy	
德育目标 Moral Objectives	2-1、2-4、2.5		
重点: Key Points	NumPy 常规使用方法 General Usage of NumPy		
难点: Focal Points	NumPy 进阶 Advancements of NumPy		

知识单元序号: Knowledge Unit No.	3	支撑教学目标: SLOs Supported	1-2 到 1-5
知识单元名称 Unit Title	SciPy 基础及进阶 Fundamentals and Advancements of SciPy		
知识点: Knowledge Delivery	SciPy 简介 Introduction and Installation of SciPy		
	SciPy 常规使用方法 General Usage of SciPy		
	SciPy 进阶 Advancements of SciPy		
学习目标: Learning Objectives	了解: Recognize	SciPy 简介 Introduction and Installation of SciPy	
	理解: Understand	SciPy 常规使用方法 General Usage of SciPy	
	掌握: Master	SciPy 进阶 Advancements of SciPy	
德育目标 Moral Objectives	2-1、2-4、2.5		
重点: Key Points	SciPy 常规使用方法 General Usage of SciPy		

难点: Focal Points	SciPy 进阶 Advancements of SciPy
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知识单元序号: Knowledge Unit No.	4	支撑教学目标: SLOs Supported	1-2 到 1-5
知识单元名称 Unit Title	SymPy 基础及进阶 Fundamentals and Advancements of SymPy		
知识点: Knowledge Delivery	SymPy 简介 Introduction and Installation of SymPy		
	SymPy 常规使用方法 General Usage of SymPy		
	SymPy 进阶 Advancements of SymPy		
学习目标: Learning Objectives	了解: Recognize	SymPy 简介 Introduction and Installation of SymPy	
	理解: Understand	SymPy 常规使用方法 General Usage of SymPy	
	掌握: Master	SymPy 进阶 Advancements of SymPy	
德育目标 Moral Objectives	2-1、2-4、2.5		
重点: Key Points	SymPy 常规使用方法 General Usage of SymPy		
难点: Focal Points	SymPy 进阶 Advancements of SymPy		

知识单元序号: Knowledge Unit No.	5	支撑教学目标: SLOs Supported	1-2 到 1-5
知识单元名称 Unit Title	Matplotlib 基础及进阶 Fundamentals and Advancements of Matplotlib		
知识点: Knowledge Delivery	Matplotlib 简介 Introduction and Installation of Matplotlib		
	Matplotlib 常规使用方法 General Usage of Matplotlib		
	Matplotlib 进阶 Advancements of Matplotlib		
学习目标: Learning Objectives	了解: Recognize	Matplotlib 简介 Introduction and Installation of Matplotlib	
	理解: Understand	Matplotlib 常规使用方法 General Usage of Matplotlib	
	掌握: Master	Matplotlib 进阶 Advancements of Matplotlib	
德育目标 Moral Objectives	2-1、2-4、2.5		

重点: Key Points	Matplotlib 常规使用方法 General Usage of Matplotlib
难点: Focal Points	Matplotlib 进阶 Advancements of Matplotlib

(2) 实验教学 Experiments

None

(3) 课外实践教学 PBL

None

四、教学安排 Teaching Schedule

注：可根据实际情况增减行数

Note: Please add/reduce lines based on subject.

教学内容 Teaching Content	学时(周) Hour(Week)			
	理论 LECT.	实验 EXP.	课外实践 PBL	集中实践 PRAC.
Python 虚拟环境设置 Python Virtual Environment Settings	2			0
NumPy 基础及进阶 Fundamentals and Advancements of NumPy	2			4
SciPy 基础及进阶 Fundamentals and Advancements of SciPy	4			4
SymPy 基础及进阶 Fundamentals and Advancements of SymPy	4			4
Matplotlib 基础及进阶 Fundamentals and Advancements of Matplotlib	4			4
总计 Total	16			16

五、教学方法 Teaching Methodology

注：可根据实际情况增减行数或修改内容

Note: Please add/reduce lines or revise content based on subject.

勾选 Check	教学方法与特色 Teaching Methodology & Characters
<input checked="" type="checkbox"/>	多媒体教学：基于信息化设备的课堂教学 Multi-media-based lecturing
<input checked="" type="checkbox"/>	实践能力传授：理论与行业、实际案例相结合 Combining theory with industrial practical problems
<input checked="" type="checkbox"/>	课程思政建设：知识讲授与德育相结合 Knowledge delivery with ethic education

<input type="checkbox"/>	PBL 教学：问题驱动的分组学习与交流 Problem-based learning
<input type="checkbox"/>	其他:单击或点击此处输入文字。 Other:单击或点击此处输入文字。

六、成绩评定 Assessment

注：可根据实际情况增减行数或修改内容

Note: Please add/reduce lines or revise content based on subject.

考核环节: Assessment Content	平时 Behavior	环节负责人: Director	张建波 Jianbo Zhang 张琨 Kun Zhang
给分形式: Result Type	百分制 Marks	课程总成绩比重(%): Percentage (%)	20
考核方式: Measures	满分 100 分，考核学生的出勤、态度、上交报告时间。 Full score is 100 points, assessing students' attendance, attitude, and report submission time.		

考核环节: Assessment Content	期末 Final	环节负责人: Director	张建波 Jianbo Zhang 张琨 Kun Zhang
给分形式: Result Type	百分制 Marks	课程总成绩比重(%): Percentage (80%)	50
考核方式: Measures	满分 100 分，考核学生报告的格式和内容。 Full score is 100 points, assessing the format and the content of students' reports.		

考核环节: Assessment Content	期末 Final	环节负责人: Director	张建波 Jianbo Zhang 张琨 Kun Zhang
给分形式: Result Type	百分制 Marks	课程总成绩比重(%): Percentage (%)	30
考核方式: Measures	满分 100 分，通过教师提问考核学生的综合创新能力。 Full score is 100 points, assessing students' comprehensive innovation ability through teacher questioning.		

七、改进机制 Improvement Mechanism

注：未尽事宜以教学团队以及学院教学指导委员会商定为准。

Note: Matters not covered in this file shall be determined by TAB of SSTC, NEU.

教学大纲改进机制 Subject Syllabus Improvement Mechanism
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考核周期(年): Check Period (YR)	4	修订周期(年): Revise Period (YR)	4
改进措施: Measures	<p>课程负责人根据课程教学内容与人才培养目标组织课程团队讨论并修改教学大纲，报分管教学工作副院长审核后由执行院长批准。</p> <p>The subject coordinator shall be responsible for the syllabus discussion and improvement, and the revised version shall be submitted to deputy dean (teaching affairs) for reviewing then to executive dean for approval</p>		
成绩评定改进机制 Assessment Improvement Mechanism			
考核周期(年): Check Period (YR)	1	修订周期(年): Revise Period (YR)	1
改进措施: Measures	<p>课程负责人根据课程教学内容、课堂教学效果以及成绩分布，对课程教学方法和成绩评定环节进行改进，并同步优化评定办法。</p> <p>The subject coordinator shall revise the syllabus based on the teaching content, effect and result distribution while optimize the assessment measures.</p>		