

# 工程经济学 教学大纲

## Engineering Economics Subject Syllabus

### 一、课程信息 Subject Information

课程编号: Subject ID	3100113011.01	开课学期: Semester	1
课程分类: Category	专业教育 PA	所属课群: Section	工程能力 EA
课程学分: Credit Points	3.5	总学时/周: Total Hours/Weeks	56/14
理论学时: LECT. Hours	56	实验学时: EXP. Hours	0
PBL 学时: PBL Hours	0	实践学时/周: PRAC. Hours/Weeks	0
开课学院: College	东北大学 悉尼智能科技学院 Sydney Smart Technology College Northeastern University	适用专业: Stream	CST/CE
课程属性: Pattern	必修 Compulsory	课程模式: Mode	引进 UTS
中方课程协调人: NEU Coordinator	罗小艺 Luo Xiaoyi	成绩记载方式: Result Type	百分制 Marks
先修课程: Requisites			
英文参考教材: EN Textbooks	Park, CS (2016) Contemporary Engineering Economics, Pearson.		
中文参考教材: CN Textbooks	无 None		
教学资源: Resources	<a href="https://lms.cloudcampus.com.cn/courses/42">https://lms.cloudcampus.com.cn/courses/42</a>		
课程负责人(撰写人): Subject Director		提交日期: Submitted Date	
任课教师(含负责人): Taught by			
审核人: Checked by	韩鹏	批准人: Approved by	史闻博
		批准日期: Approved Date	

## 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>本课程旨在使学生学习并理解工程项目实施过程中涉及到的公司财务和经济学理论。课程将增强学生使用经济和财务技术，来降低项目成本和更好管理工程项目的能力；将讲授例如现金流量分析、价格评估和成本分析等方法；将通过分析财务报告和评估工程项目对企业财务业绩的影响，培养学生在工程领域内进行财务经济决策的能力。</p> <p>In this subject, students understand finance and economics as they apply to engineering projects. Students increase their ability to accurately cost and manage engineering projects by applying economic and financial techniques, such as cash flow, valuation and costing. Students also develop competence in the financial language in the engineering domain by analysing financial reports and assessing the impacts of engineering projects on the financial performance of a business.</p>	
<p>(1) 专业目标: Professional Ability</p>	<p>1-1</p>	<p>经过对本课程的学习，学生们可以在专业工程环境中运用工程经济学的基本原理、理论和实践；可以分析、理解和构建影响工程项目经济环境的各个指标；能够胜任分析工程项目不同财务报告的要求。</p> <p>Apply the basic principles, theories and practice of engineering economics in professional engineering contexts. Analyze the factors that shape the economic environment of an engineering project, analyze different financial statements within accounting systems of an engineering project.</p>
	<p>1-2</p>	<p>具有卓越的工程经济技术素养；具备突出的财务分析技术与工程实践技能，具备在工程项目及其相关领域通过财务理论和经济方法创造性的解决工程项目问题；通过工程项目评价学习过程培养工程经济素养。</p> <p>Excellent engineering economics literacy, outstanding practical skills in financial analyze technology, and capable of creatively solving complex engineering problems in <b>communication engineering</b> and related fields through financial theories and economics methods, as well as reflect on the outcome of their complex technical analyses from an engineering project assessment and their learning process.</p>
	<p>1-3</p>	<p>具有扎实的专业基础与学科特长，系统掌握财务分析方法和技能，例如工程项目的现金流量分析技术；通过衡量评价财务和经济信息的影响，来评价项目可行性，</p> <p>A solid professional foundation and competency, systematical mastery of the specialized knowledge and skills in financial analysis techniques and skills such as cash-flow analysis for an</p>

		engineering project, evaluate the impacts of financial and economic information on an engineering project to assess project viability.
	1-4	具有卓越的技术素养和突出的领导能力,具备在工程技术及通信学及其相关领域通过工程经济技术理论和方法创造性地解决复杂问题、从事学术前沿问题研究的能力。 Excellent technical literacy, outstanding practical skills in Engineering Economics technology and communications, and capable of creatively solving complex engineering problems in applied statistics and related fields through scientific and technological theories and engineering practical methods, as well as the ability of doing academic cutting-edge project research.
(2) 德育目标: Essential Quality	2-1	理解工程经济教育对提高自主创新能力,建设创新型国家的重要意义。 Understand the significant meanings of Engineering Economics education in improving the ability of independent innovation and building an innovation-oriented country.
	2-2	认知提升工程科技人才的创新创业能力、构建产学研合作的教育网络提高中国在全球发展核心竞争力。 Enhance the innovation and entrepreneurship ability of engineering science and technology talents and construct the education network of industry-university cooperation to improve the core competitiveness of China in the global development.

**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
1、工程知识: 能够将数学、自然科学、工程基础和专业知识用于解决复杂工程问题。	指标点 1-3: 了解本专业涉及相关行业的发展趋势以及相关产业的运营模式,具备在本专业相关领域进行工程设计、技术创新的能力。	1-1, 1-2, 2-2
3、设计/开发解决方案: 能够设计针对复杂工程问题的解决方案,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。	指标点 3-1: 能够设计针对本专业相关复杂工程经济问题的解决方案;	1-4, 2-1, 2-2
	指标点 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。	1-3, 1-4
4、研究: 能够基于科学原理并采用科学方法对复杂工程问题进行研究,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。	指标点 4-3: 能够追踪国际前沿技术动态,掌握本专业涉及的重要技术指标以及达到指标所需的技术途径。	1-4, 2-1, 2-2

11、项目管理与财务：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。	指标点 11-1：掌握基本的工程管理原理和经济决策方法，能对通信相关领域的新技术、新应用进行财务与经济技术分析和比较；	1-3, 1-4
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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, 1-2,1-3, 1-4
知识单元名称 Unit Title	工程经济学简介 Introduction to Engineering Economics		
知识点: Knowledge Delivery	工程经济学概述 An overview of engineering and economics		
	完成课前作业 Pework		
学习目标: Learning Objectives	了解: Recognize	课程内容设计结构与意义 Porotype and significance of Engineering Economics	
	理解: Understand	工程经济学的课程框架 The framework of the course	
	掌握: Master	工程经济学相关的基本概念 Master the basic concept of EE	
德育目标 Moral Objectives	了解工程经济学对于社会经济发展、区域安全的重要意义 Be aware of the significant meanings of engineering economics in society development and district security		
重点: Key Points	清晰理解财务和经济理论对不确定决策和有效改变商业生态的作用 Clearly understand economics and finance to make uncertain decision and changing business environments effectively		
难点: Focal points	工程经济项目效用或成本的边际影响 Marginal effect on the EE project's utility or cost		

知识单元序号: Knowledge Unit No.	2	支撑教学目标: SLOs Supported	1-2, 1-4
知识单元名称 Unit Title	会计和财务基础 Basics of Accounting and Finance		
知识点: Knowledge Delivery	三大财务报表 Basic financial statements,		
	现金流和营利性分析 Cash flows and profitability analysis		

学习目标: Learning Objectives	了解: Recognize	会计和财务基本术语 Basics terminology of accounting and finance 资源评价的重要性 The importance of evaluating sources
	理解: Understand	投资者和经理人员必会的财务报表分析技术 Techniques used by investors and managers to analyze financial statements
	掌握: Master	财务和会计基础流程 The fundamental finance and accounting processes
德育目标 Moral Objectives	通过具体工程经济项目案例，加强会计和财务伦理理解 Strengthen accounting ethics and financial morality through positive and negative cases during engineering projects implementation	
重点: Key Points	三大报表 The firm's financial statements	
难点: Focal points	财务和会计的策略和方法 Finance and accounting methods and strategies	

知识单元序号: Knowledge Unit No.	3、4	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	资金管理 Money Management		
知识点: Knowledge Delivery	利息、利率、单利和复利 Interest, interest rate, simple interest and compound interest		
学习目标: Learning Objectives	了解: Recognize	资金时间价值 The time value of money	
	理解: Understand	资金的现值和将来值 Compare the value of money in hand versus the relative value of money you receive or payout in the future	
	掌握: Master	年利率的概念 The concept of APR (Annual Percentage Rate),	
德育目标 Moral Objectives	培养工程思维，基于信息来源做出评断 Developing engineering mind, and make judgments based on information sources		
重点: Key Points	通货膨胀、风险因素、潜在投资回报和贷款利息对商业决策的影响 Inflation, risk factors, potential investment returns and loan interest impact business decisions		
难点: Focal points	名义利率和实际利率 Nominal interest and Effective interest		

知识单元序号: Knowledge Unit No.	5、6	支撑教学目标: SLOs Supported	1-1, 1-2, 1-4
知识单元名称 Unit Title	现金流量分析 Project Cash-Flow		
知识点: Knowledge Delivery	现金流动和银行结存 The movement of cash and bank balances		
	折旧理论 Depreciation theory		
学习目标: Learning Objectives	了解: Recognize	项目现金流的概念 The concept of project cash flow	
	理解: Understand	现金流入和流出 Identify any incoming or outgoing cash problems	
	掌握: Master	现金流的成本-收益分析 Both the Costs and Benefits side of Cash flow analysis	
德育目标 Moral Objectives	了解工程经济学对于社会经济发展、区域安全的重要意义 Be aware of the significant meanings of EE in society development and district security		
重点: Key Points	现行现金流量分析 Ongoing cash flow analysis		
难点: Focal points	折旧和现金流量表 Depreciation and the project cash flow statement		

知识单元序号: Knowledge Unit No.	7、8	支撑教学目标: SLOs Supported	1-2, 1-3, 1-4
知识单元名称 Unit Title	财务评价 Financial Evaluation		
知识点: Knowledge Delivery	投资回收期、净现值和成本收益率 The payback period (PB), Net Present Value (NPV) and Benefit-Cost Ratio (BCR)		
	生命周期成本、约当年平均成本和内部收益率 The Life Cycle Cost (LCC), Equivalent Annual Cost (EAC) and Internal Rate of Return (IRR)		
学习目标: Learning Objectives	了解: Recognize	投资目标的财务评价 The financial evaluation of investment proposals	
	理解: Understand	财务评价的关键点和切入点 Key and starting points of the Financial Evaluation	
	掌握: Master	财务指标的计算 How to calculate the indicators	
德育目标 Moral Objectives	培养工程思维, 基于任务需求选择最适合的技术方法 Developing engineering mind, and matching the most appropriate technical approach with task requirements		
重点: Key Points	净现值 Net Present Value (NPV)		

难点: Focal points	内部收益率 Internal Rate of Return (IRR)
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周: Week.	9、10	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	项目风险评估 Project Risk Assessment		
知识点: Knowledge Delivery	通胀及其对项目现金流的影响 The inflation concept and how the inflation rate can impact the project cash flow statement		
	不确定性和风险 Uncertainty and risk		
学习目标: Learning Objectives	了解: Recognize	通货膨胀概念 The inflation concept	
		蒙特卡洛模拟 Monte Carlo Method	
	理解: Understand	通胀和现金流 Inflation and project cash flow	
		通胀下的等值现金 Money equivalence under inflation	
掌握: Master	敏感性分析 Sensitivity analysis		
	德育目标 Moral Objectives		
重点: Key Points	培养工程思维, 基于任务需求选择最适合的技术方法 Developing engineering mind, and matching the most appropriate technical approach with task requirements		
重点: Key Points	真实价值 (“不变美元”价值) 计算 Calculating constant dollars		
难点: Focal points	基于 CPI 的通胀计算 Calculating inflation based on CPI method		

周: Week.	11	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	公共项目评价 Public Projects Evaluation		
知识点: Knowledge Delivery	公共项目的财务和经济评价方法 Financial evaluation and Economic evaluation methods		
学习目标: Learning Objectives	了解: Recognize	公共项目定义 The definition of public projects	

	理解: Understand	公共项目和私有项目的本质区别 Nature of Projects' Ownership (Private vs Public)
	掌握: Master	财务和经济评价的关键步骤 Key steps in financial evaluation and economic evaluation
重点: Key Points	公共项目评估的分析框架 Analytical framework of Public Projects Evaluation	
难点: Focal points	公共项目成本效益分析 Valuation of costs and benefits of Public Projects	

周: Week.	12	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	EE 理论体系梳理 Systematic Theory of Engineering Economics		
知识点: Knowledge Delivery	前期知识回顾 Review the subject materials delivered		
学习目标: Learning Objectives	了解: Recognize	工程经济学的整体把握 The overview of the EE	
	理解: Understand	工程经济学的分析逻辑 The logic of the EE.	
	掌握: Master	现金流量、财务分析和风险控制的方法和技术 The methods and technologies in cash flow, finance evaluation and risk management	
德育目标 Moral Objectives	培养工程思维, 基于任务需求选择最适合的技术方法 Developing engineering mind, and matching the most appropriate technical approach with task requirements		
重点: Key Points	编制现金流量表 Cash flow diagram		
难点: Focal points	风险控制模型 Risk control model		

周: Week.	13	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	工程经济多目标决策 Decision Making Considering Multi-attributes		
知识点: Knowledge Delivery	多目标决策模型 Multi-attributes Models		



学习目标: Learning Objectives	了解: Recognize	目标选择 Choice of Attributes
	理解: Understand	测量尺度的选择 Selection of a Measurement Scale
	掌握: Master	工程经济问题的维度 Dimensionality of the Problem of EE
德育目标 Moral Objectives	培养工程思维, 基于任务需求选择最适合的技术方法 Developing engineering mind, and matching the most appropriate technical approach with task requirements	
重点: Key Points	非补偿模型 Non-compensatory Models	
难点: Focal points	补偿模型 Compensatory Models	

周: Week.	14	支撑教学目标: SLOs Supported	1-1, 1-2, 1-3, 1-4
知识单元名称 Unit Title	工程项目报告分析改进建议 Subject Assesments Analyzation and Suggestion		
知识点: Knowledge Delivery	工程项目方法具体应用 The methods about EE project based on special project		
学习目标: Learning Objectives	了解: Recognize	项目识别 Project identification	
	理解: Understand	工程经济学的指标和模型 The indicators and the models of EE	
	掌握: Master	准确计算和正确应用 How to calculate correctly and how to apply properly.	
德育目标 Moral Objectives	培养工程思维, 基于任务需求选择最适合的技术方法 Developing engineering mind, and matching the most appropriate technical approach with task requirements		
重点: Key Points	工程经济项目分析框架 The analysis framework of EE project.		
难点: Focal points	项目逻辑 Organize the materials.logicly		

#### 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.	实践 PRAC.	PBL

工程经济学简介 Introduction to Engineering Economics	4	0	0	0
会计和财务基础 Basics of Accounting and Finance	4	0	0	0
资金管理-第 1 部分 Money Management- Part 1	4	0	0	0
资金管理-第 2 部分 Money Management- Part 2	4	0	0	0
现金流量分析-第 1 部分 Project Cash-Flow - Part 1	4	0	0	0
现金流量分析-第 2 部分 Project Cash-Flow - Part 2	4	0	0	0
财务评价-第 1 部分 Financial Evaluation - Part 1	4	0	0	0
财务评价-第 2 部分 Financial Evaluation - Part 2	4	0	0	0
项目风险评估-第 1 部分 Project Risk Assessment-Part 1	4	0	0	0
项目风险评估-第 2 部分 Project Risk Assessment-Part 2	4	0	0	0
公共项目评价 Public Projects Evaluation	4	0	0	0
EE 理论体系构建 Systematic Theory of Engineering Economics	4	0	0	0
工程经济多目标决策 Decision Making Considering Multi-attributes	4	0	0	0
工程项目课设分析建议 Subject Assements Analyzation and Suggestion	4	0	0	0
总计 Total	56	0	0	0

## 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 checked="" type="checkbox"/>	PBL 教学：问题驱动的分组学习与交流 Problem-based learning

□	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。
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## 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	过程考核	环节负责人: Director	孙建勇
给分形式: Result Type	百分制 Marks	课程总成绩比重(%): Percentage (%)	100%
考核方式: Measures	<p>最终成绩为四个评估单元成绩之和，四个评估单元（项目概述、财务分析、项目评价和项目反思）分数所占比例为：15%，20%，45% and 20%.</p> <p>The final grade is the sum of the four Assessment Tasks (Project Identification, Project portfolio, Project Evaluation, Reflective Report) with the proportions of the seven assessment units: 15%, 20%, 45% and 20%.</p>		

## 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			
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 improvement.</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>		