东北大学秦皇岛分校本科课程教学大纲

一、课程基本信息

<table>
<tr><td>开课单位</td><td colspan="3">东北大学悉尼智能科技学院</td><td>课程代码</td><td colspan="5">3100213003</td></tr>
<tr><td>中文名称</td><td colspan="8">业务需求建模</td></tr>
<tr><td>英文名称</td><td colspan="8">Business Requirements Modelling</td></tr>
<tr><td>总学时</td><td>56</td><td>理论学时</td><td>56</td><td>实验学时</td><td>0</td><td>上机学时</td><td>0</td><td>设计学时</td><td>0</td><td>课外学时</td><td>0</td></tr>
<tr><td>学　分</td><td>3.5</td><td colspan="10"></td></tr>
<tr><td>课程类型</td><td colspan="8">☑理论课程　☐理论（含实验）课程　☐实践类课程</td></tr>
<tr><td>课程类别</td><td colspan="8">☐通识类　☐学科基础类　☑专业方向类　☐实践类</td></tr>
<tr><td>适用专业</td><td colspan="8">计算机科学与技术</td></tr>
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<tr><td>建议开课学期</td><td colspan="8">☐1-1 ☐1-2 ☑2-1 ☐2-2 ☐3-1 ☐3-2
☐4-1 ☐4-2 ☐5-1 ☐5-2 ☐*（代表每学期都开设）</td></tr>
<tr><td>考核方式</td><td colspan="3">☑考试 ☐考查</td><td>成绩分制</td><td colspan="4">☑百分制 ☐五级制 ☐二级制</td></tr>
<tr><td>使用教材</td><td colspan="8">1、 无</td></tr>
<tr><td>参考书及教学资源</td><td colspan="8">1、 IIBA (2015), A Guide to the Business Analysis Body of Knowledge, BABOK (any version).
2、 掌握需求过程，第三版. Suzanne Robertson James Robertson. 人民邮电出版社.</td></tr>
<tr><td>其他说明</td><td colspan="8">无</td></tr>
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二、课程简介

中文描述

本课程为计算机科学与技术专业必修的核心引入课程。课程深入浅出地介绍了信息系统概念，并以最终用户为核心，详尽阐述了如何利用这些概念精准建模业务需求。它不仅全面覆盖了系统需求提取的策略与提升系统可用性的方法，还深入探讨了敏捷与非敏捷软件工程的核心原理、实践工具及技术，确保学生在小型团队项目中得以实战应用。此外，课程广泛涉猎了当代系统开发中的前沿分析方法，包括面向对象、敏捷开发、业务流程建模及实体关系建模等，深入剖析了这些技术间的关联及其在业务需求捕获与建模中的应用价值。通过一系列小团队案例研究，学生将亲手实践需求引出、分析、建模及规范技术，全方位提升综合能力。

课程还致力于培养学生科学与工程应用的意识和素质，逐步培养学生的探索精神和创新能力。让学生具备优异的国际化发展能力，通晓世界形势与时代发展规律，深刻认识中国的国际战略构想与举措，具备在全英语、跨文化环境下开展学习、研究、实践的能力，具有迎接未来国际化挑战的坚定信心。

English Description

This course is a mandatory core module for all students majoring in Computer Science and Technology. The course introduces the concepts of information systems in simple terms and explains how to use these concepts to accurately model business requirements with the end user at the core. The course not only provides comprehensive coverage of strategies for system requirements extraction and methods for improving system usability, but also delves into the core principles, practical tools and techniques of both agile and non-agile software engineering. This ensures that students can apply their learning in small team projects. Furthermore, the course provides an in-depth exploration of cutting-edge analysis methods in contemporary system development, including object orientation, agile development, business process modelling and entity relationship modelling. It also offers a comprehensive analysis of the correlation between these technologies and their value in business requirements capture and modelling. By working on a series of small team case studies, students will gain hands-on experience in demand elicitation, analysis, modelling and specification, and will develop a comprehensive skill set in all these areas.

The course is also dedicated to fostering students' awareness and understanding of the applications of science and engineering, while also nurturing their spirit of exploration and innovation. Students should be equipped with excellent international development ability, a good understanding of the global situation and the development law of the times, a deep understanding of China's international strategic ideas and measures, the ability to carry out study, research and practice in an all-English, cross-cultural environment, and the confidence to meet the challenges of future internationalization.

三、课程目标

1、知识目标：

1-1：掌握系统开发过程、需求过程、需求启发过程以及需求启发工具

Mastery of the system development process, requirements process, requirements elicitation process, and requirements elicitation tools.

1-2：掌握业务流程建模工具，并能分析业务流程并对其建模

Mastery of business process modeling tools and ability to analyze and model business processes.

1-3：掌握数据建模以及实体关系图

Mastery of data modeling and entity relationship diagrams.

1-4：掌握软件需求规范以及敏捷开发流程

Mastery of software requirements specification and agile methodologies.

1-5：掌握基于 UML 的面向对象模型 - 用例建模

Mastery of UML-based Object-Oriented Models - Use Case Modeling.

1-6：掌握基于 UML 的面向对象模型 – 基于时序图的交互模型

Mastery of UML-based Object-Oriented Models - Interaction models based on Sequence diagrams.

1-7：掌握基于 UML 的面向对象模型 – 状态和事件模型

Mastery of UML-based Object-Oriented Models - State and Event Models.

2、能力目标：

2-1：正确定位利益相关者，了解他们的需求，在系统开发过程中获取其相关需求。

Correctly locate stakeholders, understand their needs, and capture their relevant requirements during the system development process.

2-2：确定并应用有助于理解业务系统工作流程的建模和分析技术工具。

Identify and apply modeling and analysis technology tools that help to understand business system workflows.

2-3：通过软件需求规范 (SRS) 记录各种需求。

Documentation of requirements through Software Requirements Specification (SRS).

2-4：使用多种系统分析技术构建各种模型用以分析指定系统和用户需求。

Constructs models using a variety of systems analysis techniques to analyze specified systems and user requirements.

3、德育/素养目标：

3-1：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 courage and spirit to have the courage to defy difficulties, not to be afraid of failure, to persevere, to dare to try, to rise to the challenge, and to develop one's meticulousness and patience in the learning process.

3-2：培养团队精神，具有合作意识。

Foster teamwork and a sense of co-operation.

3-3：理解业务需求建模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 significance of business requirements modeling education in improving the capability of independent innovation and building an innovative country.

3-4：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 primary and secondary contradictions, and be realistic and grasp the main contradictions when facing complex issues.

3-5：培养工程思维，理解建模意义。

Develop an engineering mindset and an understanding of the significance of modeling.

3-6：了解业务需求建模对于社会经济发展、区域安全的重要意义。

Understand the importance of business requirements modeling for socio-economic development and regional security.

表 1 课程目标与毕业要求的对应关系

毕业要求	指标点	课程目标	关联 (H/M/L)
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 1-2：掌握程序设计、数据结构、算法分析与设计、计算机数字系统、操作系统等专业知识，具备计算机程序设计开发能力和计算机与信息系统设计开发与维护能力；	1-1、2-1、2-2、3-1、3-2、3-3、3-5	H
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问题的解决方案，能够设计和开发实现特定功能、满足特定需求的计算机、软件或网络系统；	1-2、1-3、1-4、1-5、2-1、2-3、3-1、3-3、3-5	M
	指标点 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；	1-3、1-4、1-5、1-6、2-1、2-2、3-1、3-3、3-6	M
	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。	1-5、1-6、1-7、2-1、2-3、2-4、3-4、3-5、3-6	L

四、主要教学内容

（一）理论教学

第 1 章：Subject Outline and Introduction to Business Requirements Modelling(BRM)（支撑教学目标 1-1、2-1、2-4、3-1、3-2、3-3、3-4）

【1】 知识点：

(1) 理解业务需求建模所涉及的内容。

Understand what is involved in the subject Business Requirements Modelling (BRM).

(2) 理解业务需求所需角色。

Understand the role of a Business Analyst (BA).

【2】学习目标：

了解：业务需求场景。

Recognize: Business requirement scenario.

理解：业务需求；业务需求建模。

Understand: What is Business Analysis; What is Business Requirements Modelling (BRM).

【3】重点内容：

(1) 定义利益相关者

Who are Stakeholders.

(2) 定义需求

What are Requirements.

(3) 定义业务需求建模

What is Business Requirements Modelling.

【4】难点内容：

(1) 找到利益相关者

Who are Stakeholders.

(2) 分析利益相关者需求

Analyse stakeholder requirements.

【5】思政案例：

业务需求建模是软件开发过程中至关重要的环节，它能够有效地将业务方需求转化为技术团队能够理解和实现的形式，从而保证软件开发项目的顺利进行。 许多项目在进行过程中会遇到需求变更频繁、功能实现与预期不符等问题，究其原因，往往是需求建模不到位，导致沟通不畅，理解偏差。业务需求建模就像一座桥梁，连接着业务方和技术团队，它能够帮助双方更好地理解彼此，共同达成目标。认识到业务需求建模的价值，有助于激发学生的学习热情，掌握好业务需求建模技巧，能够提高项目效率，降低开发成本，最终为用户提供更优质的软件体验。

Business requirement modelling is a crucial stage in the software development process. It can effectively transform business requirements into a format that the technical team can understand and implement, thus ensuring the smooth progress of software development projects. It is not uncommon for projects to encounter frequent changes in requirements, for the function implementation to fall short of expectations, or for other problems to arise. These issues often stem from a lack of demand modelling, which can result in poor communication and understanding. Business requirements modelling acts as a bridge between the business and technical teams, fostering mutual understanding and enabling the achievement of shared objectives. Recognizing its value encourages students to embrace the subject, develop their business requirements modelling abilities, enhance project efficiency, reduce development costs and, ultimately, provide users with an enhanced software experience.

第 2 章：Requirements Process（支撑教学目标 1-2、2-1、2-2、3-2、3-3、3-4、3-5）

【1】知识点：

(1) 系统开发过程。

System Development Process.

(2) 需求过程。

Requirements Process.

(3) 相关利益人员分析。

Stakeholders Analysis.

【2】学习目标：

了解：了解需求过程的阶段以及每个阶段过程中的任务。

Recognize: Understand the stages/phases of a Requirements Process and activities and tasks within each stage/phase.

理解：理解系统开发过程中的“需求过程”。

Understand: Understand “Requirements Process” within the system development process.

掌握：理解如何定义相关利益人员。

Master: Identify Stakeholders and understand who they are.

【3】重点内容：

(1) 需求获取。

Agile System Development Process.

(2) 需求分析与整理。

Requirements Process.

【4】难点内容：

(1) 不同利益相关者之间的区别。

Why are there differences between stakeholders.

(2) 理解系统开发过程中的“需求过程”。

Understand “Requirements Process” within the system development process.

【5】思政案例：

业务需求建模是软件开发过程的重要组成部分。它好比建筑的蓝图，决定着软件项目的最终形态和质量。掌握业务需求建模技能可以提高工作效率，降低开发成本，更有效地与客户沟通。它能将客户需求转化为可实现的技术解决方案。在当今竞争激烈的就业市场上，企业更加重视软件开发的精确性和效率。

Business requirements modelling is a vital component of the software development process. It is akin to the blueprint of a building, which determines the final shape and quality of the software project. Mastering business requirements modelling skills can lead to improved work efficiency, reduced development costs and more effective communication with customers. It enables the translation of customer needs into achievable technical solutions. In today's competitive job market, businesses are placing a greater emphasis on precision and efficiency in software development. Business requirements modelling plays a pivotal role in achieving these goals.

第 3 章：Requirements Elicitation（支撑教学目标 1-1、1-2、2-1、2-2、2-4、3-1、3-2、3-5、3-6）

【1】知识点：

(1) 需求启发过程。

Requirements Elicitation Process.

(2) 需求启发工具。

Requirements Elicitation Techniques.

【2】学习目标：

了解：了解系统升级前后的业务需求差异。

Recognize: Understand the differences between requirements elicitation for existing systems vs the new system.

理解：为特定的系统选择合适的需求启发工具。

Understand: Identify appropriate technique for eliciting requirements for a given system and situation.

掌握：从利益相关者或其他资源获得业务需求；掌握不同需求启发工具的优缺点。

Master: Plan for and carry out elicitation of requirements from stakeholders and other sources; Understand the benefits and drawbacks of different elicitation techniques.

【3】重点内容：

(1) 需求启发过程。

Requirements Elicitation Process.

(2) 需求启发工具。

Techniques for eliciting requirements.

【4】难点内容：

(1) 定义清晰的需求范围。

Define a clear scope of requirements.

(2) 挖掘潜在需求。

Tap potential requirements.

【5】思政案例：

本章介绍软件开发的一些道德规范。软件开发，如同建筑一座桥梁，需要严谨的设计、可靠的结构以及对使用者负责的态度。 软件开发的道德规范，就是这栋桥梁的基石，它指引着开发

人员在创作过程中遵循的原则和准则，确保软件的安全性、可靠性和公正性。软件开发要遵循诚信、尊重用户隐私、公平公正的原则，对软件的安全性和可靠性负责，不得窃取用户数据或损害计算机系统、不得对用户数据滥用。

This module introduces some of the key ethical considerations in software development. The development of software, like the construction of a bridge, requires a rigorous design process, a solid construction, and a responsible attitude towards users. The Code of Ethics for Software Development serves as the foundation for this bridge, providing guidance on the principles and guidelines that developers adhere to during the creative process, with the aim of ensuring the security, reliability and fairness of software. It is imperative that software development adheres to the principles of integrity, respect for user privacy, fairness and justice. Furthermore, it must assume responsibility for the security and reliability of software, and must not engage in any activities that could compromise user data or damage computer systems. It must also refrain from any abuse of user data.

第 4 章：Requirements Analysis – Business Process Modelling（支撑教学目标 1-2、1-3、2-2、2-4、3-1、3-2、3-3、3-4）

【1】知识点：

(1) 业务流程。

Business Processes.

(2) 业务流程建模。

Business Process Modelling.

(3) 业务流程建模工具 BPMN。

BPMN – A Process Modelling Technique.

【2】学习目标：

了解：建模对业务系统的重要性。

Recognize: Appreciate how modelling techniques can help to understand the working of business systems.

理解：针对特定系统和用户需求的建模要求。

Understand: Discover how modelling can be used to specify system and user requirements.

掌握：使用 BPM 建模，理解建模后的系统业务流程，并给予分析。

Masters: Discover how Business Process Model (BPM) can be used to model, analyze and understand the business processes in an organization.

【3】重点内容：

(1) 需求分析与建模。

Requirements Analysis & Modelling

(2) 使用 BPMN 进行业务过程建模。

Business Process Modelling using BPMN.

【4】难点内容：

(1) 准确理解业务流程。

Understand business processes accurately.

(2) 业务流程的复杂性和多变性。

The complexity and variability of business processes.

【5】思政案例：

2018 年，脸书爆出重大数据泄露事件。一个名为“This Is Your Digital Life”的应用允许用户授权访问其脸书数据，包括基本信息、朋友列表和帖子内容。但该应用利用了脸书 API 的漏洞，不仅获取了用户自身的数据，还获取了用户授权的朋友的数据，范围远超用户最初同意授权的范围，所涉及的人员高达 5000 万。该应用的数据被出售给政治咨询公司 Cambridge Analytica，该公司利用这些数据进行政治目标分析和定向广告投放，甚至被指涉嫌用于操纵选举。脸书在事件

发生后被指责对用户数据安全缺乏足够的保护，对第三方应用的权限管理过于宽松，没有及时发现和阻止数据泄露行为。这次事件引发了全球范围内对用户隐私和数据安全的广泛关注，也对脸书的声誉造成了巨大损害。希望通过这个例子，让同学们重视软件开发的道德规范。

In 2018, Facebook disclosed a significant data breach. The "This Is Your Digital Life" application permits users to grant access to their Facebook data, including basic information, friends lists and posts. However, the app exploited a vulnerability in Facebook's application programming interface (API) to access not only the user's own data but also the data of their authorized friends, exceeding the scope initially consented to by users. This affected up to 50 million individuals. The data obtained from the app was sold to the political consulting firm Cambridge Analytica, which used it for political targeting and targeted advertising. There have even been allegations that the data was used to manipulate elections. Following the incident, Facebook was criticized for failing to adequately protect user data security, its lenient approach to third-party application permission management and its delayed detection and prevention of data breaches. The incident led to a significant loss of confidence in Facebook's ability to protect user data and caused considerable reputational damage to the company. It is my hope that this example will prompt students to consider the ethical implications of software development.

第 5 章：Requirements Analysis - Data Modelling（支撑教学目标 1-3、2-2、2-4、3-1、3-2、3-4、3-6）

【1】知识点：

(1) 数据建模。

Data Modelling.

(2) 实体关系图(ERD)。

Entity Relationship Diagram (ERD).

【2】学习目标：

了解：建模对业务系统的重要性。

Recognize: Appreciate how modelling techniques can help understand the working of business systems.

理解：针对特定系统和用户需求的建模要求。

Understand: Discover how modelling can be used to specify system and user requirements.

掌握：使用 ERD 建模，理解建模后的系统业务流程，并给予分析。

Master: Discover how Entity Relationship Diagram (ERD) can be used to model, analyse and understand the data requirements of an organisation.

【3】重点内容：

(1) 需求分析与建模。

Requirements Analysis & Modelling.

(2) ERD 数据建模。

Data Modelling using ERD.

【4】难点内容：

(1) 分析复杂业务流程。

Analyse complex business processes.

(2) 识别实体以及实体之间的关系，准确定义实体属性。

Identify entities, find relationships between entities, and accurately define entity attributes.

【5】思政案例：

本章将介绍一下雷军的相关事例。雷军在创业初期也经历过很多困难和挫折，比如小米手机刚发布时，市场竞争非常激烈，很多人都认为小米手机没有竞争力，甚至有人嘲笑小米手机是“山寨货”。但是雷军没有选择逃避，而是勇敢地面对问题，他带领团队不断分析市场需求，改进产品设计，提升产品的性能和性价比，最终赢得了用户的认可，小米手机也成为了中国最受欢

迎的手机品牌之一。雷军认为，任何问题都不是无法解决的，只要认真分析，找到根源，并采取有效的措施，就能找到解决问题的办法。就像我们学习遇到难题一样，不要害怕，要认真思考，分析问题的原因，查阅资料，向老师和同学请教，相信通过努力，一定能找到解决问题的办法。

This chapter will present an overview of Lei Jun's background and experience. In the early days of his entrepreneurial career, Lei Jun faced significant challenges and setbacks. When the Xiaomi phone was first launched, the market was highly competitive, with many observers questioning its competitiveness and even labeling it as a "cottage industry product." However, Lei Jun did not opt to avoid the issue; he chose to confront it head-on. He spearheaded efforts to assess market demand, refine product design, enhance product performance and cost-effectiveness. These actions ultimately earned the brand recognition among users, propelling Millet to become one of China's most popular mobile phone brands. Lei Jun believes that any problem can be solved if you analyze it carefully, identify the root cause and implement effective measures. As we learn to tackle challenging problems with confidence, we must approach them with a systematic approach. This involves identifying the root cause, analyzing the problem, seeking guidance from experts and peers, and developing a solution. Through this process, we can find effective solutions to complex problems.

第 6 章：Software Requirement Specification (SRS) and Agile Development（支撑教学目标 1-4、2-3、3-1、3-4、3-5、3-6）

【1】知识点：

(1) 软件需求规范 (SRS)。

Software Requirement Specification (SRS).

(2) 敏捷开发。

Agile Development.

(3) 用户故事。

User stories.

(4) 传统软件需求规范与用户故事（敏捷方法）。

Traditional IEEE SRS vs User Stories (Agile approach).

【2】学习目标：

了解：评估用户故事以及优先级。

Recognize: Understand how user stories are estimated and prioritized.

理解：根据用户故事发现软件需求。

Understand: Discover how user stories can be used to specify software requirements.

掌握：敏捷和传统软件需求规范 (IEEE SRS) 之间的区别。

Master: Understand the difference between agile and traditional software requirement specification (IEEE SRS).

【3】重点内容：

(1) 软件需求规范 (SRS)。

Software Requirements Specification (SRS).

(2) 根据用户故事发现软件需求。

Discover how user stories can be used to specify software requirements.

(3) 传统软件需求规范与用户故事（敏捷方法）。

Traditional IEEE SRS vs User Stories (Agile approach).

【4】难点内容：

(1) 避免 SRS 文档需求遗漏，防止 SRS 文档臃肿。

Avoid missing SRS document requirements and prevent SRS document overcrowding.

(2) 需求变更管理。

Requirement change management.

(3) 敏捷和传统软件需求规范 (IEEE SRS) 之间的区别。

Understand the difference between agile and traditional software requirement specification (IEEE SRS).

【5】思政案例：

本章介绍工程思维的重要性以及如何培养工程思维。工程思维是一种系统化、问题导向的思维方式，它强调从根本上分析问题、设计并进行评估。以设计师卡佛的设计理念为例，引导学生理解工程思维的核心要素：首先，要学会分解复杂问题，将之转化为可管理的子问题；其次，要注重逻辑推理和系统分析，找到问题的根本原因；最后，要注重实践操作和迭代改进，不断优化。在最后鼓励学生积极参与项目实践，并从失败中总结经验，真正掌握工程思维，为未来的创新和发展打下坚实基础。

This chapter sets out the importance of engineering thinking and provides guidance on how to cultivate it. Engineering thinking is a systematic, problem-oriented approach that emphasizes fundamental analysis, design and evaluation. To illustrate the core elements of engineering thinking, we can look to Carver's design concept. Firstly, students should learn to decompose complex problems and transform them into manageable sub-problems. Secondly, logical reasoning and system analysis should be employed to identify the root cause of the problem. It is also important to focus on practical implementation and continuous improvement to ensure that processes are optimized. Ultimately, students are encouraged to engage actively in project work, reflect on lessons learned from setbacks, truly master engineering thinking, and establish a robust foundation for future innovation and growth.

第 7 章：Agile Development and User Stories（支撑教学目标 1-4、2-3、3-2、3-4、3-4、3-6）

【1】知识点：

(1) 用户故事（目的、指南、验收测试、评估、优先级、工作量估算、重要性）。

User stories(Purpose、Guidelines、Acceptance Tests、Estimation、Prioritization、Estimation of effort、Importance).

(2) 基于用户故事确定软件需求。

Discover how user stories can be used to specify software requirements.

(3) 基于用户故事的敏捷开发。

Agile Development with User Stories.

【2】学习目标：

了解：用户故事中的验收测试。

Recognize: Acceptance Tests in User Stories.

理解：评估用户故事及确定优先级。

Understand: Understand how user stories are estimated and prioritized..

掌握：基于用户故事确定软件需求。

Master: Discover how user stories can be used to specify software requirements.

【3】重点内容：

(1) 用户故事（目的、指南、验收测试、评估、优先级、工作量估算、重要性）。

User stories(Purpose、Guidelines、Acceptance Tests、Estimation、Prioritisation、Estimation of effort、Importance).

(2) 基于用户故事确定软件需求。

Discover how user stories can be used to specify software requirements.

(3) 基于用户故事的敏捷开发。

Agile Development with User Stories.

【4】难点内容：

(1) 评估用户故事及确定优先级。

Understand how user stories are estimated and prioritised.

(2) 故事独立性与关联性平衡。

User story independence and relevance balance.

(3) 工作量估算与进度跟踪。

Workload estimation and progress tracking.

【5】思政案例：

简要介绍一些主流的开发框架、热门技术，如 java 语言常用的 Spring Boot 框架、Redis 中间件的作用、python 开发者常用的 Django 框架等，介绍其发展和更迭历程，让同学们意识到开发技术迭代的速度，帮助其养成不断学习前沿知识的习惯。

This chapter provides an overview of some of the most widely used development frameworks and technologies, including the Spring Boot framework, which is commonly employed in Java, the role of Redis middleware, and the Django framework, which is frequently utilized by Python developers. It also outlines the development and evolution process for these frameworks, enabling students to comprehend the rapid pace of technological advancement. Encourage them to develop a commitment to continuously acquiring the latest knowledge and expertise.

第 8 章：Object-Oriented Models with UML- Use Case Modelling（支撑教学目标 1-5、1-6、1-7、2-4、3-2、3-3、3-6）

【1】知识点：

(1) 结构化分析与面向对象分析。

Structured Analysis and Object Oriented Analysis.

(2) 统一建模语言(UML)。

Unified Modelling Language (UML).

(3) 用例建模。

Use Case Modelling.

【2】学习目标：

了解：面向对象 (OO) 建模对理解业务系统的作用。

Recognize: Appreciate how Object Oriented (OO) modelling techniques can help to understand the working of business systems.

理解：系统规范的重要性，以及面向对象技术对特性系统和用户需求建模。

Understand: Discover why system specifications are important and how OO modeling can be used to specify systems and user requirements.

掌握：使用面向对象分析技术进行用例建模。

Master: Use object-oriented system analysis techniques to develop a system model (Use Case Model).

【3】重点内容：

(1) 结构化分析。

Structured Analysis.

(2) 面向对象分析。

Object Oriented Analysis.

(3) 统一建模语言(UML)。

Unified Modelling Language (UML).

(4) 用例建模与描述。

Use Case Modelling and Narrative.

【4】难点内容：

(1) 复杂的对象识别与抽象、对象关系的梳理与建模、与现实世界的映射和更新。

Complex object recognition and abstraction, object relationship combing and modelling, mapping and updating with the real world.

(2) 多种图的理解与应用。

Understanding and application of various modelling diagrams.

(3) 识别复杂用例、确定参与者与用例的关系。

Identify complex use cases and determine the relationship between actors and use cases.

【5】思政案例：

讲述业务需求建模时如何找到重点。在建模过程中，我们也可能遇到一些“弱点”，比如需求描述模糊、目标不明确、问题过于复杂无从下手等。这时，通过系统分析和逻辑推理，将复杂的业务需求分解成一个个可管理的子问题，找到需求背后的核心诉求，这就是“主要矛盾”。次要矛盾则是围绕着主要矛盾的衍生问题，例如技术实现方案、数据接口设计等。建模过程中，我们要学会将精力集中在解决核心问题上，避免被次要矛盾所困扰，才能最终实现高效的系统设计。随后引申到其他领域的主要矛盾与次要矛盾，在面对生活中其他的复杂问题时，也要学会抓主次。

Outlines the steps for achieving focus when modelling business requirements. During the modelling process, it is possible to encounter certain challenges, such as vague requirements, unclear goals and problems that are too complex to start with. At this stage, through system analysis and logical reasoning, the complex business requirements are broken down into manageable sub-problems and the core demands behind the requirements are identified, which represents the "main contradiction". Secondary contradictions are the derivative problems surrounding the main contradictions, such as technical implementation schemes and data interface design. In the modelling process, it is important to focus on solving the core problems and avoid being distracted by secondary contradictions in order to achieve efficient system design. This approach can then be extended to primary and secondary contradictions in other areas, and to other complex problems in life.

第 9 章：Object-Oriented Models with UML – Class Modelling（支撑教学目标 1-5、2-4、3-1、3-2、3-3、3-6）

【1】知识点：

(1) 类图组件。

Components of a Class Diagram.

(2) 类之间的关系(关联、聚合、组成、泛化)。

Relationship between Classes(Associations、Aggregation、Composition、 Generalizations).

(3) 类图规则。

Rules for Class Diagram.

【2】学习目标：

了解：面向对象 (OO) 建模对理解业务系统的作用。

Recognize: Appreciate how Object Oriented (OO) modelling techniques can help to understand the working of business systems.

理解：系统规范的重要性，以及面向对象技术对特性系统和用户需求建模。

Understand: Discover why system specifications are important and how OO modeling can be used to specify systems and user requirements.

掌握：使用面向对象分析技术构建类图。

Master: Use object-oriented system analysis techniques to develop a system model (Class Diagram/Model).

【3】重点内容：

(1) 类图组件。

Components of a Class Diagram.

(2) 类之间的关系(关联、聚合、组成、泛化)。

Relationship between Classes(Associations、Aggregation、Composition、 Generalisations).

(3) 类图规则。

Rules for Class Diagram.

【4】难点内容：

(1) 类的识别与抽象。

Class identification and abstraction.

(2) 类之间关系的建模。

Modelling relationships between classes.

(3) 类图的维护和更新。

Class diagram maintenance and update.

【5】思政案例：

介绍一些软件开发过程中遇到困难的例子，像著名的程序员 Linus Torvalds 开发 Linux 操作系统时，遇到了无数的技术难题，但他没有放弃，而是锲而不舍地攻克每一个难题，最终成功开发了 Linux 操作系统。像微信、QQ 这种如今已是家喻户晓的软件，在开发初期也是频频遭遇挫折和失败，但后来经过不断的迭代和更新，才发展成为我们今天所知的拥有海量用户和功能的超级应用。通过这节课，目的是培养同学们不惧困难、不惧失败、锲而不舍、敢于尝试、迎难而上的精神，遇到困难和挫折不退缩，而是去解决问题。

Provide examples of software development challenges, such as the case of Linus Torvalds, a renowned programmer who developed the Linux operating system. Despite encountering numerous technical difficulties, he demonstrated resilience and perseverance in overcoming these challenges and ultimately succeeded in developing the Linux operating system. Many of today's well-known apps, such as WeChat and QQ, initially encountered setbacks and failures in the early stages of development. However, through a process of continuous improvement and updates, they evolved into highly successful applications with a large user base and a wide range of features. The objective of this course is to instill in students a mindset that is not afraid of challenges, failures and setbacks. It encourages them to persevere, tackle difficulties head-on and view these challenges as opportunities for growth and improvement.

第 10 章：Object-Oriented Models with UML – Interaction Modelling（支撑教学目标 1-6、2-4、3-2、3-3、3-4）

【1】知识点：

(1) 时序图。

Sequence diagram.

(2) 类图和时序图之间的关系。

Relationship between Class Diagram and Sequence Diagram.

(3) 基于时序图的交互模型。

Interaction Modelling with Sequence Diagrams.

【2】学习目标：

了解：时序图的应用场景及分类。

Recognize: Interactive graph application scenarios and their classification.

理解：类图和时序图之间的关系。

Understand: Relationship between Class Diagram and Sequence Diagram.

掌握：基于时序图的交互模型。

Master: Interaction Modelling with Sequence Diagrams.

【3】重点内容：

(1) 时序图的概念、目的、组件、消息。

Notations、purpose、components、messages of sequence diagrams.

(2) 类图和时序图之间的关系。

Relationship between Class Diagram and Sequence Diagram.

(3) 基于时序图的交互模型。

Interaction Modelling with Sequence Diagrams.

【4】难点内容：

(1) 时序图的组件、消息。

Components、messages of sequence diagrams.

(2) 时序图与类图的整合。

Integration of sequence diagram and class diagram.

(3) 对象和生命线的确定，消息顺序和并发处理，消息内容和参数传递的表示。

Determination of objects and lifelines, message order and concurrent processing, representation of message content and parameter passing.

【5】思政案例：

讲述团队合作的重要性。介绍一些比较著名或具有代表性的软件的开发过程，一个软件项目需要很多开发人员甚至是不同专业背景的人紧密协作才能完成。比如一款多人在线游戏，需要有人负责游戏引擎的开发，有人负责人物模型和场景设计，有人负责游戏逻辑和，还有人负责服务器端的搭建和维护。他们之间需要不断沟通，分享代码，解决问题，才能最终完成一个令人满意的游戏。或者像开源软件项目，Linux 操作系统，就由全球各地数以千计的程序员们共同开发。只有每个人都能够发挥自己的优势，互相支持，共同努力，才能完成更复杂、更优秀的作品。所以我们要学习程序员们团队合作的精神，在学习和生活中，多与同学合作，互相帮助，共同进步。

Describe the importance of teamwork. Introduce the development process of some famous or representative software. A software project requires many developers, often from different professional backgrounds, to work closely together to complete it. For example, a multiplayer online game requires someone to develop the game engine, someone to design character models and scenes, another person to handle game logic, and someone to manage the construction and maintenance of the server side. They need to communicate with each other, share code, and solve problems in order to finalize a satisfactory game. Similarly, in open-source software projects like the Linux operating system, development is carried out by thousands of programmers from around the world. Only when everyone is able to utilize their strengths, support each other and work together, can more complex and better work be completed. So we should learn the programmers' spirit of teamwork and cooperate more with our classmates in our study and life to help each other and make progress together.

第 11 章：Object-Oriented Models with UML - State and Event Modelling（支撑教学目标 1-7、2-4、3-1、3-2、3-3、3-4、3-5、3-6）

【1】知识点：

(1) 类和对象。

Classes and Objects.

(2) 状态与事件模型。

State and Event Modelling.

(3) 使用状态转换图对状态和事件建模。

State and Event Modelling with State Transition Diagrams.

(4) 状态转换图的 UML 语法。

UML Syntax for State Transition Diagram.

【2】学习目标：

了解：状态和事件的定义。

Recognize: Understand the definition of states and events.

理解：状态和事件模型（状态转换图）。

Understand: State and Event Modelling (State Transition Diagrams).

掌握：使用 UML 建立状态转换图。

Master: UML Syntax for State Transition Diagram.

【3】重点内容：

(1) 状态的定义与表示。

Definition and representation of states.

(2) 转换的描述。

A description of the conversion.

(3) 状态与事件模型。

State and Event Modelling.

【4】难点内容：

(1) 复杂状态转换的建模。

Modelling complex state transitions.

(2) 使用状态转换图构建状态和事件模型。

State and Event Modelling with State Transition Diagrams use UML.

(3) 状态的抽象与细化平衡。

A balance between abstraction and refinement of states.

【5】思政案例：

讨论专业环境中团队合作的重要性。介绍一些最著名的软件开发流程，因为一个软件项目的成功需要众多开发人员和具有不同专业背景的个人的参与。Linux 操作系统是一个开源软件项目团队协作的例子，它是由世界各地成千上万的程序员共同开发的。只有团队中的每个成员都能发挥自己的长处，为同事提供支持，并齐心协力，才能取得更复杂、更卓越的成果。因此，学会在团队中有效工作，在学习和工作中与同事相互合作、相互支持，对于实现集体进步非常重要。

Discuss the importance of teamwork in a professional setting. It is crucial to introduce some of the most renowned software development processes, given that a software project necessitates the involvement of numerous developers and individuals with diverse professional backgrounds to achieve success. The Linux operating system is another example of an open source software project, developed by thousands of programmers around the world. Only when each member of the team is able to utilize their strengths, provide support to their colleagues and work together can they deliver more complex and superior results. Therefore, it is important to learn to work effectively in a team, to cooperate with colleagues and support each other in study and work, in order to achieve collective progress.

五、教学安排与学时分配

本课程主要在传统课堂环境中进行，旨在全面介绍与课程内容相关的基本概念、理论、原则和实际应用。本课程采用综合教学方法，将线下课堂学习、在线教育资源和案例研究相结合，以促进有效的学习和发展。这种方法使我们能够传授理论知识，提供实践经验，并提供额外的指导。此外，本课程还将培养学生卓越的国际发展技能，洞察全球趋势和国际关系的演变，全面了解中国的国际战略思想和行动。学时分配表详见表 2。

This course is primarily conducted in a traditional classroom environment and is designed to provide a comprehensive introduction to the fundamental concepts, theories, principles and practical applications relevant to the course content. This course employs an integrated teaching methodology that combines offline classroom learning, online educational resources and case studies to facilitate effective learning and development. This approach enables us to transfer theoretical knowledge, provide practical experience and offer guidance on added value. Furthermore, this course will enable students to develop excellent international development skills, insight into global trends and the evolution of international relations, and a comprehensive understanding of China's international strategic ideas and actions. Please refer to Table 2 for details of the offline class time.

表 2 学时分配表

讲　　课　　内　　容		学时				
		讲课	实验	上机	设计	课外
第 1 章	学科大纲和业务需求建模简介 Subject Outline and Introduction to Business Requirements Modelling	4	0	0	0	0
第 2 章	需求过程 Requirements Process	4	0	0	0	0
第 3 章	需求启发 Requirements Elicitation	4	0	0	0	0
第 4 章	需求分析-业务流程建模 Requirements Analysis - Business Process Modelling	4	0	0	0	0
第 5 章	需求分析-数据建模 Requirements Analysis - Data Modelling	4	0	0	0	0
第 6 章	软件需求规范和敏捷开发 Software Requirement Specification (SRS) and Agile Development	6	0	0	0	0
第 7 章	敏捷开发和用户案例 Agile Development and User Stories	6	0	0	0	0
第 8 章	面向对象建模和统一建模语言 Object-Oriented Modelling and Unified Modelling Language	6	0	0	0	0
第 9 章	基于 UML 的面向对象模型-用例建模 Object-Oriented Models with UML-Use Case Modelling	6	0	0	0	0
第 10 章	基于 UML 的面向对象模型-交互建模 Object-Oriented Models with UML – Interaction Modelling	6	0	0	0	0
第 11 章	基于 UML 的面向对象模型-状态和事件建模 Object-Oriented Models with UML - State and Event Modelling	6	0	0	0	0
小计		56	0	0	0	0
总计	56					

六、教学方法

1、多媒体授课：采用视频、音频、动画等多种媒体进行教学，增强课堂互动性，帮助学生更直观地理解复杂概念。

Multi-media-based lecturing: Teaching using a variety of media such as video, audio and animation enhances classroom interactivity and helps students understand complex concepts more intuitively.

2、案例分析法：选取实际网络案例，引导学生分析问题原因，讨论解决方案，培养学生对课程相关实际科研工作环境的理解、解决实际问题的能力。

Case analysis method: Select actual failure cases, guide students to analyze the causes of the problems, discuss solutions, and cultivate their ability to solve practical problems.

3、互动式教学：课堂上采用提问、小组讨论等形式，激发学习兴趣，加深对知识点的理解；

结合线上平台活动、资源与课堂讨论、实践，提升学习灵活性，促进课程内容的全面理解。

Interactive T&L: Engage students through question-asking and group discussions, utilizing both online platforms and offline classes to promote a comprehensive understanding of the subject matter.

4、课程思政融入：融入课程思政元素、定期更新教学内容，引入最新的网络技术和发展趋势，让学生紧跟行业步伐、关心社会需求与人民需要，拓宽学科视野。

Incorporate ideological elements, allow students to keep up with industry trends, care about social needs and people's needs, and broaden their disciplinary horizons.

5、引进一流国际资源：丰富学生的学习资源，同时帮助学生提升计算机网络领域的英语专业能力，拓宽国际视野，紧跟国际网络技术发展前沿。

Introduce global resources: Import materials to helps students access international advancements in network technology, fostering a global mindset of the latest developments in the industry.

七、成绩评定

1、本课程结合平时作业、课堂提问、课堂交流、短测试、期中报告和期末报告综合评定成绩。

This course combines a combination of regular assignments, class questions, class communication, short quizzes, midterm reports, and a final report to assess the grade.

（1）平时成绩占 40%，主要包括作业、短测试，报告展示，课堂表现等综合评定。

Regular grades account for 40% of the grade, which includes a combination of assignments, short tests, report presentations, and classroom performance.

（2）期中报告成绩占 20%，主要包括报告“Assignment3-Requirement Analysis Report”。

The midterm report accounts for 20%, which consists mainly of the report ‘Assignment 3 - Requirement Analysis Report’.

（3）期末报告成绩占 40%，主要包括报告“Assignment4 – Object-Oriented Requirements Analysis and Specification”。

The final report accounts for 40% and consists mainly of the report ‘Assignment 4 - Object-Oriented Requirements Analysis and Specification’.

2、所缺作业等超过应完成量 1/3 者，或缺课学时超过计划学时 1/3 者，取消该课程考核资格。

Those who have missed more than one-third of the required homework or missed more than one-third of the planned class hours will have their course assessment qualifications cancelled.

八、评价及持续改进

1、科目教学大纲

Subject Syllabus

考核周期：4 年，修订周期：4 年

Check Period: 4 years; Revise Period: 4 years.

改进措施：课程负责人组织课程团队所有教师讨论后提出改进意见，经教研室主任审核后由教学院长批准。

Improvement Measures: 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.

2、成绩评定考核

Performance Evaluation and Assessment

考核周期：1 学年，评价依据：学生最终成绩综合分析

Assessment Cycle: 1 academic year; Evaluation Basis: comprehensive analysis of students' final

grades.

改进措施：根据学生最终成绩的分布，进行相应的内容调整和优化，并改进教学方法

Improvement measures: Based on the distribution of students' final grades, adjust and optimize the content accordingly, and improve teaching methods.

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