北京郵電大學

国际学院

2017 年版本科课程教学大纲

国际学院

编印

教　务　处

2017 年 11 月

目　　录

< Introductory Java Programming > Course Syllabus

I. Basic Information

Module Name	Chinese: JAVA高级语言程序设计 English: Introductory Java Programming		**Module Code**	EBU4201/3512142111
Credits / Hours	4/64	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	1. Telecommunications Engineering with Management. 2. E-commerce Engineering with law 3. Internet of Things Engineering.	
Prerequisites	BBC3502: Computer Fundamentals and Programming for IoT students and BBU4161: Programming Fundamentals for all other students.			

II. Teaching Objectives

The module aims to give students unfamiliar with programming: knowledge of the basic concepts of programming in an object-oriented language, knowledge of the basic features of the Java programming language, practice in developing simple object-oriented programs.

By the end of the module the student will be able to:

Describe the basic aspects of an object-oriented language.

Describe the basic features of the Java language, write, debug and execute programs in the Java language, which fulfill specifications.

Manage their time effectively to prepare and finish the lab exercises.

Write effective maintenance and user documentation.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.

	and solution of engineering problems.	
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Exam + MCQs + Mini-Project. Written feedback is given to students on the Mini-Project.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EP3p	Ability to apply relevant practical and laboratory skills.	Lab Exercises + MCQsStudents demonstrate work from 3 of the labs to TAs and are given feedback during the labs. In the labs which are marked, each student is asked a random question from the list of questions in the lab sheet. This involves the student demonstrating to a TA whether his/her proposed solution code compiles and runs this is followed by another question being asked about the code (e.g. if you modify this bit of the code, what happens). The student is graded and given feedback by the TA.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction (Java basics, history, etc), Plagiarism, Java Basics (syntax, variables, class structure, etc), Intro to Object Oriented Programming, Basics of Object Oriented programming	10
2	Arrays, Objects & Inheritance, A detailed example of OO programming, Introduction to collection classes and other Java provided classes. More Inheritance, abstract classes and interfaces.	10
3	Garbage Collection (including Heap and Stack, Life of an Object, Null References, super() and this() calls); OO Data Structures & Collections Framework (including Vectors, Enumerations, Lists, Stacks, Generic Types);	10

	Numbers & Strings (Math class/methods, Wrapper classes and Autoboxing, String related classes, Formatting Numbers and Dates, Recursion); Basic GUI.	
4	Exception Handling (including try/catch/finally blocks, throw *versus* throws, Catching multiple Exceptions, Assertions); GUI: buttons and event handling, Swing components, layout managers, inner classes; File I/O: Java I/O streams, readers, writers, buffers, file objects, binary files, looking beyond files; Packaging; Java Collections and Sorting. Course Revision.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs; Writing development techniques.

VI. Assessment Methods

Exam: 60%

Question Demonstration from “Java Basics” lab: 2.0%

Question Demonstration from “OO Programming”: 2.0%

Question Demonstration from “Advanced OO” lab: 2.0%

MCQ1: Teaching Weeks 1+2 & Labs 1-4: 12.0%

MCQ2: Teaching Weeks 3+4 & Labs 5-8: 12.0%

Mini-Project: 10.0%

VII. Module Resources

None.

Authors: Dr Paula Fonseca

Reviewer: Dr Ling Ma

< Software Engineering > Course Syllabus

I. Basic Information

Module Name	Chinese: 软件工程		**Module Code**	EBU6304/3512163041
	English: Software Engineering			
Credits / Hours	4 /64	**Compulsory (√) / Elective ( )**	**Semester**	6

Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management E-commerce Engineering with law Internet of Things Engineering
Prerequisites	Programming Fundamentals; Computer Fundamentals and Programming; Introductory Java Programming		

II. Teaching Objectives

The course aims to give each participant: an idea of the necessity of good software engineering practice when developing complex software systems, knowledge of suitable software engineering techniques, practice in applying these techniques and experience of working in teams to develop a product to a specification within strict deadlines.

Devise a requirements specification. Build a system using the modern software development techniques. Test the system using automated testing methods.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	Scientific principles and methodology are covered throughout the lectures. Assessed in exam and group project. Written feedback is given to students on the group project.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Covered in the lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modeling techniques.	
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	System approach is essential in Software Engineering. This is covered in the Software Process lectures and assessed in the group coursework and exam.
D6i	Communicate their work to technical and non-technical audiences.	Covered in the Requirements lecture and in the case study. Assessed in exam and group project. Written feedback is given to students on the group project.

D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Covered in the Requirements and Design lecture. Assessed in the group coursework.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Covered in the lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Covered in the "Project Management" lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Covered in the Requirements, Analysis and Design lecture. Assessed in the group coursework.
ET6i	Awareness of risk issues, including health & safety, environmental and commercial risk.	Covered in the lecture and written feedback is given to students on the group project.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Covered in project management part of the lecture and assessed in exam and group coursework.
ET3p	Knowledge and understanding of management techniques, including project management that may be used to achieve engineering objectives.	Applying quantitative techniques is covered in the Testing lecture and assessed in the coursework and exam..
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Covered in the Project Management and Risk Assessment lectures.
EP5p	Knowledge of relevant legal and contractual issues.	Covered in the Project Management and Software Quality part lectures.
EP6p	Understanding of appropriate codes of practice and industry standards.	Covered in the Project Management lecture and assessed through group project.
EP8p	Ability to work with technical uncertainty.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Overview of software; Introduce software engineering and its needs; The importance of software engineering; Software process; Traditional models ;Modern models; Agile	10

No.	Teaching Content	Hours
	overview; Requirement Theory and Techniques; Functional and non-functional requirements; Requirements capture techniques; Requirements in Agile process; Prioritisation of stories; Estimating.	
2	Analysis: Purpose of Analysis; Stereotypes of classes; Class relationships. Design: Purpose of Design; Design principles; Design quality; Class design. Implementation: build; Mapping design to code. Testing: Techniques; Regression Testing; White Box Testing; Black Box Testing; Partition Testing; Object-oriented Testing. Test Driven Development; Using JUnit; Project management: Activities; Planning; Scheduling; Managing People; Agile project management.	10
3	Risk Management; Agile Risk Management; Quality Management; Design principles: overview; Single Responsibility Principle; Open-Closed Principle; Abstraction and Generalisation; Dependency Inversion Principle; Interface Segregation Principle; Liskov Substitution Principle.	10
4	Design Patterns: Decorator; Adapter; Composite; Immutable View; Observer; Factory method; Factory object; Singleton; Object Pool; Strategy; State; Bridge; Flyweight. Open Source Software; Software Craftsmanship and Clean Code.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials

VI. Assessment Methods

Exam: 65%;

Lab Exercises Demonstration: 5%;

Group Project: Report & Software: 30%

VII. Module Resources

" Software Engineering" by Ian Sommerville (9th edition); Pearson 2011; ISBN 0137053460

1. "Introduction to Agile Methods" by Sondra Ashmore, ISBN-10: 032192956X1

2."Head First Software Development" by Dan Pilone and Russ Miles; O'Reilly; 2007; ISBN 0596527357

3. "Head First Object Oriented Analysis and Design" by Brett McLaughin et al; O'Reilly; 2006; ISBN 0596008678

4. "Head First Design Patterns" by Elisabeth Freeman et al; O'Reilly; 2004; 0596007124

5. "Software Engineering: Theory and Practice" by Pfleeger and Atlee (4th edition); Pearson 2010; ISBN 0138141819

6 "Agile Software Development, Principles, Patterns, and Practices" by Robert C. Martin, ISBN-10: 0132760584

7 "Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin, ISBN-10: 0132350882

Authors: Dr Paula Fonseca

Reviewer: Dr Michael Chai

< Databases > Course Syllabus

I. Basic Information

Module Name	Chinese: 数据库 English: Database		**Module Code**	EBU5602/3512156021
Credits / Hours	3.5/56	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	1. E-commerce Engineering with law 2. Internet of Things Engineering	
Prerequisites	None.			

II. Teaching Objectives

This course provides a practical introduction to the skills and knowledge needed to create, integrate and maintain database systems over local networks and the Internet, to link them together over the Internet and to extract data and information from structured and semi-structured data-spaces.

By the end of the module the student will be able to:

- Describe the concept of database and database management systems.
- Design database models from informal descriptions, and translate between such models.
- Implement, manipulate and query relational databases.
- Describe the issues in transaction management.
- Understand other types of data representation including XML, NoSQL
- Be aware of advanced database technologies.
- Be aware of related ethics issues.
- Team work
- Problem solving

- Written and oral communication

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Covered in relational model, relational algebra, database development history and current development of NoSQL, assessed in exam
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Covered in database systems implementation using Java and JDBC, assessed in coursework
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Covered throughout lectures (Apply relational database design methodologies to database design) and assessed in coursework and exam
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Relational database implementation using SQL and JDBC, assessed in coursework and exam
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Design relational database using the design methodoligies, implenting database systems. Assessed in coursework and partially in exam
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Relational database design methodologies are covered in the lectures, including information finding techniques like questionnaires, interviews etc for understanding/evaluation of business and user's database need. Where requirement information cannot be provided by business/users, informed assumptions will be made. This is assessed in coursework and partially in exam.

ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Partially covered in ethics lecture of database related issues, however it is not assessed.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Covered throughout lectures and assessed in exam
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Database design process, MySQL, JDBC. Assessed in coursework and exam
EP9p	Understanding of, and the ability to work in, different roles within an engineering team.	Covered in relational database design and NoSQL development, assessed in exam

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Database fundamental concepts, Relational model, Relational Algebra, Entity-relationship(ER) modelling	10
2	Logical Database design, Normalisation, Advanced Normalisation, SQL	10
3	JDBC, Transaction management, Distributed DBMS, XML for semi-structured data	10
4	Data warehouse, Data mining, NoSQL	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Labs; Writing development techniques.

VI. Assessment Methods

Exam: 80%

Class test: 5%

Group project: Design and implement a database: 15%

VII. Module Resources

None

Authors: Dr Na Yao

Reviewer: Dr Michael Chai

《信号与系统》课程教学大纲

一、课程基本信息

课程名称	中文：信号与系统		**课程编号**	3512143742
	英文：Signals and Systems Theory			
学分/学时	3/48	**必修（√）/ 选修（）**	**开课学期**	3
课程类别	学科基础课程	**适用专业**	电信工程及管理、电子商务及法律	
先修课程	高等数学、工程数学、电子系统基础			

二、课程教学目标

本课程以讲授信号和线性时不变系统的基本原理及分析方法为主要内容。通过本课程的学习，学生将掌握信号和系统的基本性质、分类方法，线性时不变系统的时域分析方法（卷积和与卷积积分），周期信号的傅里叶级数展开方法，信号的各种变换（傅里叶，拉普拉斯和 z 变换），连续和离散混合信号的傅里叶表示方法及采样定理等。学生还可以通过本课程了解信号与系统的基本原理和方法在通信系统和自动控制系统中的应用。

三、课程与支撑的毕业要求

本课程能够支撑工程教育专业认证标准规定的以下毕业要求；

1. 具有从事通信工程、多媒体通信等领域所需的数学、自然科学知识，具有电子电路、信号与信息处理、电磁场与电磁波、计算机技术与应用、信息与通信系统、多媒体技术等专业基础知识，能够将这些知识用于解决信息通信与多媒体系统等领域复杂工程问题。

2. 能够应用数学、自然科学和工程科学的基本原理，识别、表达和分析信息通信与多媒体通信领域复杂工程问题。能通过文献检索与资料查询获取相关信息，分析信息通信与多媒体系统的工程问题，以提供有效结论。

5. 针对信息通信与多媒体系统中复杂工程问题，能够合理地选择开发工具，恰当地使用资源，运用于复杂工程问题的预测与模拟，并能够理解其局限性。

四、教学内容及学时安排

序号	**教学内容**	**学时分配**
1	信号与系统的基本概念、分类方法、系统的基本性质	8
2	线性时不变（LTI）系统的时域分析（冲激响应，卷积和与卷积积分，LTI 系	8

序号	教学内容	学时分配
	统的性质等）	
3	信号与 LTI 系统的傅里叶表示（傅里叶级数，傅里叶变换，LTI 系统的频域分析）	12
4	连续与离散混合信号的傅里叶表示与采样定理	6
5	拉普拉斯变换及其应用	4
6	z 变换及其应用	4
7	答疑与习题课	4
8	期末考试	2

五、教学方法

1. 课堂教学：本课教学以教师课堂讲授为主，授课过程应能灵活运用板书和多媒体教学、加强师生互动、注重启发式教学、根据教学内容适时引入通信及其他应用领域中的工程案例。
2. 研讨教学：根据具体教学内容以及学生学习情况，适当开展研讨活动。由教师提供扩展学习资料、提出研讨问题，学生自主探索，在此基础上展开以小组为单位的研讨式教学。

六、考核方式

本课程为考试课程，闭卷。课程总评成绩包括：

1. 平时成绩（20%）：由任课教师综合作业、课堂表现、小组活动等做出评定；
2. 期末考试（80%）：全年级统一执行闭卷书面考试。

七、课程资源

教材：Signals and Systems (2nd Edition) by Simon Haykin and Barry Van Veen, 电子工业出版社影印版，2012 年。

参考书：Signals and Systems (2nd Edition) by Alan V. Oppenheim, Alan S. Willsky and S. Hamid, ISBN: 978-0138147570, Prentice Hall, 1997

执笔人：刘丹谱

审核人：尹长川

< Signals and Systems > Course Syllabus

I. Basic Information

Module	Chinese: 信号与系统	**Module**	EBU4375/3512143741

Name	English: Signals and Systems		**Code**	
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	3
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering	
Prerequisites	BBC4911: Advanced Mathmatics 1 BBC4913: Linear Algebra BBC4921: Advanced Mathmatics 2 BBC4102: Introduction to Electronic Systems.			

II. Teaching Objectives

The course aims to give participants an understanding of the fundamentals of signal theory. It further aims to give a working understanding of the use of frequency analysis.

By the end of the module the student will be able to:

Explain fundamental signal analysis concepts. Characterise and manipulate signals in the time domain. Calculate convolutions and use convolutions to obtain the output of a linear time-invariant system. Characterise signals in the frequency domain by using Fourier methods. Calculate the frequency response of a linear time-invariant system and obtain the output in the frequency domain. Sample continuous time signals and reconstruct continuous time signals from their samples. Model communication systems by using Signal Theory. Learn to use numerical computing software. Analyse numerical results produced by the software. Present a coherent report.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	The mathematical approach followed by Signals and Systems Theory provides a rigorous framework to develop a scientific and engineering methodology for modelling and analysing practical systems. The mathematical notions of signal and system are crucial to modeling and understanding any natural or human-made system. Assessed in exam, class-test and lab coursework.

SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Signals and Systems Theory is a branch of applied mathematics. As such, in this course we present the mathematical formulation of signals and systems, which includes the mathematical definition, classification and properties of signals and systems. This formulation allows us to develop the main mathematical tools, notably linear systems theory and Fourier theory. Assessed in exam, class-test and lab coursework.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Signals and Systems Theory underpin a wide range of engineering areas, including communications technologies, data processing, and data science. This course provides the mathematical foundations for these areas by discussing in detail how Signal Theory is applied (for instance, sampling, modulations, speech processing). Assessed in exam.
SM5m	A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitations.	Mathematical and computing approaches are developed in parallel. The mathematical principles of Signals and Systems Theory are supported by computer-based approaches, which in turn serve as an illustration of their application in digital systems. Assessed in lab coursework.
EA2i	Ability to apply quantitative methods in order to understand the performance of systems and components.	By formulating mathematically the notion of system, the properties of natural and human-made systems and their effects on signals can be best assessed in order to compensate their effects and optimize their performance. Noise filtering, inverse filters, interpolators are examples of systems designed based on a sound mathematical modelling and analysis. Assessed in exam and lab coursework.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Sampling and digital signal processing techniques are discussed and rigorously analysed by using the concepts and approaches of Signals and Systems Theory. Assessed in exam and class-test.

EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	The notion of system, its mathematical properties and its effects on signals, both in the time domain and in the frequency domain are studied. Assessed in exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Digital signal processing tools are used both to illustrate fundamental mathematical concepts and to present how signal processing is used nowadays for solving communications and data science problems. Assessed in exam.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Applications of Signals and Systems Theory are to engineering areas such as communications technologies and data science are discussed in detail and explored in mathematical and computer based exercises. Assessed In exam and lab coursework.
EP3p	Ability to apply relevant practical and laboratory skills.	Digital signal processing environments are used both in the classroom and in the lab.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Signals and systems in the time domain. Notion of signals, basic signals, classification, operations and properties. Definition of systems, classification and properties. Linear time-invariant systems in DT and CT. Interconnection of systems.	10
2	Continuous-time signals in the frequency domain. The notion of frequency domain, Fourier series of CT signals, Fourier transform of CT signals, CT systems in the frequency domain.	10
3	Discrete-time signals in the frequency domain. Fourier series of DT signals, Fourier transform of CT signals, DT systems in the frequency domain.	10
4	Sampling theory and communication systems. Applications of Signals and Systems to IoT Engineering, Digitisation and Sampling Theory, Digital Signal Processing, Communication Systems.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs; In lab-teaching.

VI. Assessment Methods

Exam: 75%

Introduction to Matlab: 3.0%

Fourier Series: 3.0%

Fourier Transform: 3.0%

Sampling: 3.5%

Class test covering weeks 1 and 2: 9.0%

Material from teaching weeks 3 and 4: 3.5%

VII. Module Resources

None

Authors: Mr Andy Watson

Reviewer: Dr Yasir Alfadhl

《数字电路与逻辑设计》课程教学大纲

一、课程基本信息

课程名称	中文：数字电路与逻辑设计 英文：Digital Circuits and Logic Design		**课程编号**	BBU4202/3512152022
学分/学时	3/48	**必修（√）/ 选修（）**	**开课学期**	4
课程类别	专业基础课程	**适用专业**	电信工程及管理	
先修课程	电子电路基础			

二、课程教学目标

通过本课程的学习，使学生熟悉并掌握数字逻辑电路的基本概念、描述以及中小规模逻辑器件的工作原理等数字电路的基础理论知识，了解现代数字电路新技术的发展及应用，掌握数字逻辑电路的基本分析和设计方法。结合实验教学，使学生掌握用逻辑思维方法分析常用数字电路逻辑功能的能力和使用可编程逻辑器件、硬件编程语言以及其它中小规模器件进行逻辑设计的能力，为今后深入学习电子信息领域中的其他专业课准备必要的知识，并为从事有关实际工作奠定基础。

三、课程与支撑的毕业要求

课程能够支撑毕业要求的 1.工程知识，2.问题分析，4.研究，5.使用现代工具几个方面。

四、教学内容及学时安排

序号	教学内容	学时分配	支撑毕业要求
1	**数字技术基础** 1.1 数字信号、数字电路与数字系统介绍；数制与编码。 1.2 逻辑代数中的三种基本运算及逻辑函数的表示方法；逻辑代数的基本公式、定理。 1.3 逻辑函数的化简。	8	1.工程知识
2	**门电路** 2.1 二极管、三极管及场效应管的开关特性。 2.2 基本电路结构、工作原理、逻辑功能分析、输入特性、输出特性、主要参数。	2	1.工程知识
3	**组合逻辑电路的分析与设计** 3.1 组合逻辑电路的特点和组合逻辑电路的功能分析。 3.2 两级门、三级门的逻辑函数电路设计。多输出函数的组合逻辑电路设计。 3.3 组合逻辑电路中的逻辑冒险和功能冒险的概念、判断方法和消除方法。 3.4 中规模组合逻辑芯片的内部结构、工作原理和功能。 3.5 中规模组合逻辑器件的级联扩展、功能电路分析，使用中规模组合逻辑器件设计各种组合逻辑功能电路。 3.6 组合电路实验设计。	14	1.工程知识 2.问题分析
4	**触发器** 4.1 触发器的基本特性。 4.2 基本 RS 触发器的工作原理、逻辑功能 4.3 和状态方程、状态图、时序图的表示方式。 4.4 钟控触发器（RS、D、JK、T、主从）的工作原理、逻辑功能和时序波形的画法。 负边沿 JK 触发器和维持阻塞 D 触发器的工作原理和逻辑功能。D 触发器的工组原理、使用 D 触发器构成其他种类触发器的方法。 4.5D、JK、T 触发器之间的转换方法。	4	1.工程知识
5	**时序逻辑电路** 5.1 计数器、移存器等同步时序电路的分析。 5.2 常用计数器、移存器等同步时序电路的设计方法和步骤。 5.3 一般时序逻辑电路状态描述、状态简化和状态编码。异步计数器的设计。 5.4 中规模时序逻辑电路的工作原理和级联扩展。中规模同步、异步计数器、移位寄存器电路的分析。 5.5 用中规模时序逻辑电路实现任意模值计数器、移位型计数器等。 5.6 时序逻辑电路实验设计。	14	1.工程知识 2.问题分析
6	**可编程逻辑器件及硬件描述语言应用** 6.1 可编程逻辑器件的结构及应用简介。 6.2 利用 VHDL 语言结合 ISE 等工具进行 FPGA 的设计。	6	3.研究 4.使用现代工具

五、教学方法

1. 课堂讲授

在课堂讲授中，从宏观上引导学生对课程内容的总体把握，在掌握课程基本理论和教学方法的基础上，是学生能够触类旁通；从微观上启发学生能够从基本原理、集成电路特性及系统工程角度去分析问题、解决问题和评估问题，提高学生的自主学习与探究能力。

2.专题研讨（含课内实验）

将理论教学与实验教学紧密结合，以面向工程实际问题为载体，以小组为单位，围绕大学生电子电路竞赛和创新项目，设计系列化的研究专题内容，循序渐进地引导学生开展专题研究与讨论，从而激发学生的学习兴趣，提高学生理论联系实际的能力，培养学生的探索精神和创新意识。

六、考核方式

考试成绩比例：平时成绩（20%）+实验成绩（20%）+期末考试（60%）。

七、课程资源

教材：

刘培值编，数字电路与逻辑设计，北京邮电大学出版社，2009。

参考书目：

John F. Wakerly. Digital Design: Principles and Practices. 4th Edition; Prentice Hall 2006; ISBN 0131863894

执笔人：王强

审核人：顾仁涛

< Digital Circuit Design > Course Syllabus

I. Basic Information

<table>
<tr><td rowspan="2">Module Name</td><td colspan="2">Chinese: 数字电路与逻辑设计</td><td rowspan="2">Module Code</td><td rowspan="2">EBU4202/3512142021</td></tr>
<tr><td colspan="2">English: Digital Circuit Design</td></tr>
<tr><td>Credits / Hours</td><td>3/48</td><td>Compulsory (√) / Elective ( )</td><td>Semester</td><td>4</td></tr>
<tr><td>Module Type</td><td colspan="2">General Courses</td><td>Applicable Programm</td><td>1. E-commerce Engineering with law
2. Internet of Things Engineering.</td></tr>
</table>

Prerequisites	BBC4913 (Linear Algebra), BBC4102 (Introduction to Electronic Systems).

II. Teaching Objectives

To introduce the basic theorems of digital logic and to present basic techniques for analyzing and designing combinational and sequential digital circuits.

By the end of the module the student will be able to:

• Manipulate and perform arithmetic operations on numbers expressed to different bases

• Apply parity checks for simple error detection

• Express logic functions using Boolean algebra and use Boolean algebra and Karnaugh maps to manipulate the functions

• Design combinational logic circuits and use SSI and MSI devices to implement logic functions

• Use bistables to design and implement sequential logic circuits

• Describe memory technologies and addressing techniques

• Use integrated circuit logic chips to build combinational and sequential logic circuits in the lab.

Read and interpret technical literature

• Select appropriate devices and techniques as a result of interpreting technical literature

• Apply the design cycle

• Be aware of the limitations of test equipment

• Appreciate that a theoretical design can have several practical implementations depending on user requirements

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Use of appropriate analysis and design tools for digital circuit design. Covered in lectures and assessed in exam and labs.

EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Use of appropriate techniques to realise a design specification. Assessed in exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Apply systematic analysis techniques to sequential and combination logic circuits. Assessed in exam.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Use of Karnaugh maps and state-tables, etc, to describe circuit behaviour. Assessed in labs and exam.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	techniques and test the resulting practical realisation for conformance to specification. Assessed in labs.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	assembly techniques and use of test equipment.assessed in the lab.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Use of device data sheets. Assessed in the lab and exam.
EP7p	Awareness of quality issues and their application to continuous improvement.	Function and use of digital logic devices. Covered in lectures and assessed in labs.

IV. Teaching Content and Course Schedules

No.	Teaching Content: Schedule EBU4202 Digital Circuit Design	Hours
1	Number system conversions and arithmetic; binary codes; error codes/parity checking; basic logic functions/gates; Boolean algebra; POS/SOP	10
2	Karnaugh Maps; Combinational Logic; minimization; all-NAND –NOR implementation	10
3	SequentialLogic; latches and flip-flops; counters; state machine analysis and design	10
4	MSI functions (Mux, decoders, encoders); ROM, SRAM, DRAM; ALU; Microcomputer block diagram	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Labs.

VI. Assessment Methods

Exam: 75%

Intro to Digital Logic: 5.0%

MSI: 7.0%

Sequential Logic: 9.0%

Class Test 1: 2.0%

Class Test 2： 2.0%

VII. Module Resources

None.

Authors: Mr Andy Watson

Reviewer: Dr Yasir Alfadhl

< Intellectual Property Law > Course Syllabus

I. Basic Information

Module Name	Chinese: 知识产权基础法 English: Intellectual Property Law		**Module Code**	EBU6016/3512150161
Credits / Hours	2.5 /40	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	E-Commerce Engineering with Law	
Prerequisites	Fundamentals of Law; Engineering Environment			

II. Teaching Objectives

The course will:

- enable students to understand the policies underlying intellectual property laws
- provide students with knowledge and understanding of the basic principles of patent, copyright, trademark, database and trade secret law
- acquaint students with the challenges of new technologies to the legal regime for intellectual property.

By the end of the module the student will be able to demonstrate knowledge and understanding of:

- the rationale for the protection of intellectual property rights (IPRs)

- the scope of the various IPRs as well the limitations of such rights
- the various practical applications of intellectual property law

the impact of IPRs on technology and vice-versa and the current trends and developments in IPRs

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	
D6i	Communicate their work to technical and non-technical audiences.	Where applicable within the syllabus, students are made aware of customer and user needs. Assessed through coursework.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Opportunity given through constant discussion and presentations in class, not formally assessed.
ET6i	Awareness of risk issues, including health & safety, environmental and commercial risk.	Informs discussions with students where applicable within the syllabus. Not formally assessed
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	This is an integral aspect of all law modules. Assessed through coursework and exams.
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	Informs discussions with students where applicable within the syllabus. Assessed through coursework as applicable.
EP4p	Understanding of the use of technical literature and other information sources.	This is an integral aspect of all law modules. Assessed through coursework and exams.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	**Explaining the basic principles of Copyright, Trademark and Patent law, such as** 1. Criteria for protection of each type of IP Right 2. Extent and scope of the rights for each type of IP Right 3. Limitations for each type of IP Right 4. Ownership issues 5. Remedies for breach of each type of IP Right	10
2	Copyright for computer software and databases Liability of Internet Service Providers for Copyright infringements Digital Rights Management and Technical Copyright Control Measures	10
3	Patenting of computer software Trade Secret protection under Unfair Competition laws	10
4	Internet Trademark infringements and the law, such as use of a trademark as a ‘metatag’ or ‘key words’ etc	10

No.	Teaching Content	Hours
	Domain names legal protection	
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Writing development technique.

VI. Assessment Methods

Exam: 50%;

Long Essay: 50%.

VII. Module Resources

None

Authors: Ms Bindu Chib

Reviewer: Dr Ling Ma

< Fundamentals of Law > Course Syllabus

I. Basic Information

Module Name	Chinese: 西方法律基础 English: Fundamentals of Law		**Module Code**	EBU4001/3512140011
Credits / Hours	1/16	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	E-commerce (Engineering) with law	
Prerequisites				

II. Teaching Objectives

The key aim of this short course is to prepare students for the law modules which they will take later in the course. The lecture sessions introduce them to legal thinking, how laws are made, and the basics of several areas of law which underpin all the law modules on their course. These include contract law, property law, law of torts, and criminal law.

By the end of the module the student will be able to:

1] To understand the purpose of law in a society. What do laws represent? Why are they necessary? How might they be enforced?

2] To understand how laws are made (primarily in systems which will be considered throughout all modules but which may be unfamiliar to the students – England, EU, etc). This will include an analysis of key concepts such as public and private law, civil and criminal law, statute and common law, legal precedent.

3] To understand the issues involved in making agreements – contract law – and how this will underline much of their later study of Ecommerce Law.

4] To understand the key issues and concepts of the Law of Torts, and how that underlies such obligations as provision of gods and services which are fit for purpose, issues of liability for third party provided content online, privacy, and so on.

5] To understand the key concepts and themes involved in property law, including notions of ownership and a basic introduction to the concept of intellectual property in preparation for the Intellectual Property Law module.

6] Understanding the core concepts of mens rea and actus reus in criminal law, a key underpinning of the Computer Crime module.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
D6p	Communicate their work to technical and non-technical audiences.	Students are given the opportunity to do so through group discussions as appropriate in both lecture sessions and tutorial classes. There is no formal assessment of this part of the module.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Informs discussions with students where applicable within the syllabus. (e.g. in discussion on the need for the rule of law, and tutorial session in which students consider the sorts of laws they think would be necessary in a new society). Not formally assessed.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.	The key thrust of this module is to give the students an underlying knowledge of core legal principles which affect engineering. This course givens them the grounding to understand legal issues, which will then be expanded on in all other law modules in context. Fundamentals of Law is

		assessed by MCQ, ensuring that the students understand the key legal issues raised in the course.
ET5m	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues, and an awareness that these may differ internationally.	The key thrust of this module is to give the students an underlying knowledge of core legal principles which affect engineering. This course givens them the grounding to understand legal issues, which will then be expanded on in all other law modules in context. One of the key issues explored during the first two sessions is the issue of jurisdiction, alongside considering why the laws of different jurisdictions may vary, as well as drivers for international legal harmonization through initiatives such as APEC or the European Union. Fundamental of Law is assessed by MCQ, ensuring that the students understand the key legal issues raised in the course.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Informs discussions with students where applicable within the syllabus. Not formally assessed in Fundamentals of Law.
EP5p	Knowledge of relevant legal and contractual issues.	This is an integral aspect of all law modules. Assessed via module MCQ.
EP5M	Knowledge of relevant legal and contractual issues.	This is an integral aspect of all law modules. Assessed via module MCQ.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours	Supplementary one-hour tutorial
1	**<u>Session 1</u>:** **2 Hour Lecture** • Overview of the course • Outline of the topics to be covered and explanation of their direct relevance to specific law modules. • Group and class discussion of key questions such as What is Law, How are laws made, why do we need to have laws, how do we ensure laws are obeyed.	2	Applies these concepts to a group discussion exercise where students are asked to consider a scenario in which they are stranded on an island without hope of rescue and must design the constitution and basic laws of their new state.
2	**<u>Session 2</u>:** **2 Hour Lecture** This session comprises a structured lecture on key legal concepts, including: • Different types of law - civil and criminal, public and private	2	Consolidates through group discussion students' understanding of common law judicial precedent, before moving on to a group and class discussion scenario examining statutory interpretation. This exercise considers the (fictional) Park

	• Different types of legal system – civil and common law • Statute law and common law judicial precedent • Statutory interpretation • How law (statute and caselaw) is made in England (case-study)		Surfaces Act and asks students to consider how the meaning and application of the Act might differ depending upon the way it is interpreted.
3	**<u>Session 3</u>:** **2 Hour lecture** • Introduction to English Contract Law • Using English contract law as a case-study, this session explores how and why the law regulates agreements (in particular, commercial agreements) between two parties. This includes: o Contract formation – when and how is a contract formed? o Contract disputes – what happens when one party to the contract does not perform their end of the bargain? o How may contracts be brought to an end? o How does the law deal with cases of genuine mistake, fraudulent misrepresentation, and so on? o Resolution and remedies o Understanding how this underpins much of the Ecommerce module to be taken later in the course.	2	Applies these concepts to a set of example scenarios, requiring group discussion and class discussion on such issues, including email negotiations etc. Students are require to consider whether and when contracts have been formed in a given set of circumstances, as well as whether a contract may have been breached and if so what the likely legal remedies would be.
4	**<u>Session 4</u>:** **2 Hour lecture** • Introduction to Tort Law o What is tort law? o Civil wrongs o Duty of care in the absence of a contractual agreement between parties o Different types of tort – including defamation (damage to reputation) • Introduction to Property Law o What is property? o Differing theories of property – capitalism, socialism,	2	This reviews, through group and class discussion, the key concepts covered in the session. The concept of defamation is discussed, with some example scenarios asking the students to consider whether a defamation has been published, and who might be responsible for it. The concept of ownership in property is reviewed, and the students are asked to consider a work involving intellectual property (again, a CD) and look at it to list all the different ownership rights attached to it, with an emphasis on the IP rights.

	communism o Ownership o Different interests in ownership over the same property o Introducing the concept of intellectual property o Multiplicity of IP interests in a single object – CD example		
5	**<u>Session 5</u>:** **2 Hour lecture** • Key criminal law concepts: mens rea and actus reus, coincidence of mens rea and actus reus • Strict liability crimes • Basic defences	2	This session requires students in both group and class discussion to review excerpts from the Computer Crime Act 1990, then consider given scenarios to determine whether a crime has been committed (identifying actus reus and mens rea).

V. Teaching Methodologies

Teaching:

10 hours of face-to-face lectures.

5 hours (two groups) of structured face to face tutorials.

1.5 hours of open office hours.

VI. Assessment Methods

Exam

VII. Module Resources

There is a customised course text and various reading material which has been made available to the student online.

Authors: Mr. Gavin Sutter

Reviewer: Dr Ling Ma

< Enterprise Management > Course Syllabus

I. Basic Information

Module Name	Chinese: 企业管理 English: Enterprise Management			**Module Code**	EBU5402/3512164021
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**		**Semester**	3
Module Type	General Courses		**Applicable Programm**	1. Telecommunications Engineering with Management. 2. E-commerce Engineering with law.	
Prerequisites	None.				

II. Teaching Objectives

This is a module aimed at giving students an initial understanding of key business concepts that will then be developed further both in this module and in subsequent modules. The syllabus will cover important themes in the field of enterprise management such as Business Environment, Financial Management and Accounting, Risk Management, Marketing, Operations Management, Economics, Human Resource Management, Corporate Governance, Globalisation and Business Strategy. Each of these concepts will be delivered to the students in the context of the technology industry, which includes electronic engineering, telecommunications, e-Commerce etc.

By the end of the module the student will be able to:

- Demonstrate relevant knowledge and understanding of organisations, the external environment in which they operate and how they are managed;

- Demonstrate relevant knowledge and skills that can be applied in an organisation to respond to change in both the internal and external environment;

- Explain each of the areas of business covered in the module and how they interact;

- Apply knowledge to practical and 'real-life' management situations;

- Apply knowledge of management to business scenarios in the International market.

- Research a topic

- Work as part of a team in organising time and sharing tasks

- Manage time effectively and produce written progress reports and a final report on time

- Write an essay that communicates a reasoned argument in a structured, clear, concise and well-presented manner

- Demonstrate skills of critical thinking, analysis and synthesis in class discussions and assessment

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Coursework and exam questions based on exteralinteral environmental scan, risk management, etc.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and knowledge of professional codes of conduct.	Coursework, exam, in-class exercises based on Corporate Social Responsibilities.
ET3p	Knowledge and understanding of management techniques, including project management that may be used to achieve engineering objectives.	Coursework, exam questions related to such management analytical tools (esp. Ch 4, strategic management, Ch 5, Marketing, and Ch 7, Operations Management).
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Coursework, exam, in-class exercises based on Corporate Social Responsibilities.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.	Coursework, exam, in-class exercises based on Ch. 1, 2, and 9, on external environment, risk management
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Coursework, exam, in-class exercises particularly those based on Ch. 1, 2, and 7, on external and interal environment analysis, as well as operations management.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Introduction and External Environment; Internal Environment and Firms' Structure; Economic Environment: Supply & Demand, Perfect Competition, Price Determination	10
2	Business Strategy, PESTEL, SWOT analysis and Porter's 5 Forces Marketing: Needs, Wants, and Demands, 4Ps, 7Ps, market segmentation; Financial Management: Balance Sheet, P&L, Cash Flow, annual report, financial ratios;	10
3	Operations Management: Operations, Design and Control, JIT, E-commerce; Globalisation & International Business: Global strategies, entry strategies; Risk Management: ETA, FTA, FMEA; Risk Assessment; MCDA;	10
4	Human Resource Management (HRM): Employment Cycle, Motivation, Negotiation; Corporate Social Responsibility: CSR and Shareholder analysis; Corporate	10

	Governance;	
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 70%

Group report: 30%

VII. Module Resources

None

Authors: Mr. James O' Connor

Reviewer: Dr Ling Ma

< Product Development and Marketing > Course Syllabus

I. Basic Information

Module Name	Chinese: 产品开发与营销 English: Product Development and Markerting		**Module Code**	EBU5606
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management.	
Prerequisites	EBU5402 Enterprise Management			

II. Teaching Objectives

This is an introductory module in New Product Development with focus on Marketing. During this module, student will have the opportunity to:

- Define the concept of innovation within the context of new product development,
- Learn how to analyse the customer needs and measure the market potential for a new technology or product,

- Translate these needs into technical product features,
- Set the right price and select the best distribution channel,
- Define a promotion strategy for launching a new product in the market place,
- Act as entrepreneur planning the start-up of a new business (entrepreneurship) in areas like telecommunications and e-commerce.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Product Development is one of the major applied areas for an engineer. All aspects of product development starting from innovation right up to launching of a new product are covered in this module. Student is assessed through a mid-semester coursework as well as an end of term exam.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Business plan part of the coursework
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Marketing research component of the coursework
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	e.g coursework and Final exam
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Coursework, in-class exercises on the process of New Product Development (topics 6-8, concept development to robust design to ramp-up)
D1m	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Marketing research component of the coursework

D4m	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Coursework, in-class exercises on the process of New Product Development (topics 6-8, concept development to robust design to ramp-up)
D5m	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Business plan in the coursework in-class exercises on the cost drivers. Coursework, in-class exercises on the process of New Product Development (topics 5-8, from product planning, concept development to robust design and ramp-up)
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Coursework, exam questions on the commercial and economic aspects of NPD (including, but not limited in topic 5-6, from product planning, to concept development).
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Students are required to deeply understand and apply qualitative and quantitative measures to develop products from concept to final marketable stages. Students are also required to assess the sustainability and viability of their designs as part of the process. Assessed in coursework.
ET2m	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Coursework, exam questions on the commercial and economic aspects of NPD (including, but not limited in topic 5-6, from product planning, to concept development).
ET3m	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately .	Coursework and in-class exercises.
ET6m	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk.	Business plan part of the coursework
ET7m	Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction.	
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	

EP5p	Knowledge of relevant legal and contractual issues.	
EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.	
EP5m	Knowledge of relevant legal and contractual issues.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to concept of innovation within the context of new product development,	10
2	Introductions on how to analyse the customer needs and measure the market potential for a new technology or product, Translate these needs into technical product features,	10
3	Principls for setting the right price and selecting the best distribution channels, Definitions of promotion strategies for launching new products in the market place,	10
4	Operating as entrepreneur, planning the start-up of a new business (entrepreneurship) in areas like telecommunications and e-commerce.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures and Practical classes (40 hours); Tutorials (4 hours) & Guided independent studies.

VI. Assessment Methods

Exam: 50%

Coursework report: 50%

VII. Module Resources

None

Authors: Dr David McKevitt, Dr Paul Davis

Reviewer: Dr Ling Ma

< Internet Protocols > Course Syllabus

I. Basic Information

Module Name	Chinese: 互联网协议 English: Internet Protocols		**Module Code**	EBU5403/3512154131
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	1. Telecommunications Engineering with Management. 2. E-commerce Engineering with law.	
Prerequisites	None.			

II. Teaching Objectives

The aim is to provide an in-depth knowledge of contemporary and widely-deployed Internet Protocols, providing the student with an insight into their functionality and inter-relationship. The material is sufficient to enable the student to design basic intranet and internet architectures, including both bridged and routed networks. Consideration is also given to different transport layer protocols to provide features not inherently present in the underlying network.

At the end of this module students will be able to:

• Explain the protocols that provide the Internet infrastructure, their role, how they operate and a number of implementation details.

• Design simple network architectures.

• Perform basic configuration and fault diagnosis in an Interior Gateway Routed environment using IOS-like scripts and utilities such as Ping and TraceRoute

• Undertake fault diagnosis based on observations (required for the lab experiment).

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Relevant scientific principles and methodologies related to access control, routing protcols and transport protocols in Internet will be covered in this module. Assessed in exam and in-class test.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Relevant basic mathematical principles will be discussed and revised to solve the engineering problem in network design (for example, boolean algebra for IP subnetting in network design). Mathematical principles will not be tested in the exam question, lab and in-class tests but students need to apply them correctly.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	The fundamental engineering principles and protocols of layer 2, 3 and 4 of OSI model will be covered. These principles will be assessed in exam questions and in-class tests.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	The module will have networking lab using network visual simulation tool (e.g. Cisco Packet Tracer) to create network topologies and imitate modern computer network. Assesed in lab coursework.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Different protocols and algorithms will be covered nd apllied in the lab experiments. For example, the performance of different routing protocols (RIP and OSPF) will evaluated in the lab exercises. These will be asessed in the exam questions, in-class tests and lab experiment.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Different protocols and algorithms will be covered nd apllied in the lab experiments. For example, the performance of different routing protocols (RIP and OSPF) will evaluated in the lab exercises. These will be asessed in the exam questions, in-class tests and lab experiment.
EP3p	Ability to apply relevant practical and laboratory skills.	Internetworking with different routing protocols covered in week 2. Assessed in lab experiment.
EP4p	Understanding of the use of technical literature and other information sources.	Some materials from the main reference book and internet will be referred to students as additional reading materials for further understanding but no assessment in this.

EP6p	Understanding of appropriate codes of practice and industry standards.	The importance of standards for Internet or any communication system is introduced in the first week of teaching. Advantages and disadvantages of having standards are also discussed. More specifically, some standards such as IEEE802.3 and 802.11 are covered in Ethernet and WLAN sections and assessed in the exam.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to IP Networks: Intro to Internet; Network edge; End systems, access networks, links; Network core; Network structure; Delay, loss and throughput in networks; Protocol layers; Service models Transport layer (Part I): transport-layer services; multiplexing and demultiplexing; connectionless transport: UDP	10
2	Transport layer (Part II): principles of reliable data transfer; Connection-oriented transport: TCP on segment structure, reliable data transfer, flow control and connection management; Principles of congestion control; TCP congestion control The Network layer (part I): Overview of Network layer on data plane and control plane; Inside a router; Internet Protocol on datagram format, fragmentation, IPv4 addressing, network address translationand IPv6; Generalized Forward and SDN on match, action and OpenFlow examples of match-plus-action in action.	10
3	The Network layer (part II): Routing protocols on link state and distance vector; intra-AS routing in the Internet: OSPF; Routing among the ISPs: BGP; The SDN control plane; ICMP: The Internet Control Message Protocol The Data link layer (part I): Intro to Data link and its services; Error detection and correction	10
4	The Data link layer (part II): multiple access protocols; LANs: addressing, ARP, Ethernet, switches and VLANS; Link virtualization: MPLS; Data center networking Network management and security: Securing wireless LANs; Operational security: firewalls and IDS; Network Management	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Labs; In lab-teaching.

VI. Assessment Methods

Exam: 75%

Lab experiment report: 15.0%

In class test 1: 5.0%

In class test 2: 5.0%

VII. Module Resources

None

Authors: Dr Michael Chai, Dr Jonathan Loo

Reviewer: Dr Yue Chen

< Telecoms Systems > Course Syllabus

I. Basic Information

<table>
<tr><td rowspan="2">Module Name</td><td colspan="3">Chinese: 电信系统</td><td rowspan="2">Module Code</td><td rowspan="2">EBU5302/3512153021</td></tr>
<tr><td colspan="3">English: Telecoms Systems</td></tr>
<tr><td>Credits / Hours</td><td>2.5/40</td><td colspan="2">Compulsory (√) / Elective ( )</td><td>Semester</td><td>5</td></tr>
<tr><td>Module Type</td><td colspan="2">General Courses</td><td>Applicable Programm</td><td colspan="2">1. Telecommunications Engineering with Management.
2. E-commerce Engineering with law.</td></tr>
<tr><td>Prerequisites</td><td colspan="5">BBU5374 (Signals and Systems Theory).</td></tr>
</table>

II. Teaching Objectives

To:

• equip participants with a basic understanding of modern digital communications;• show how communications networks are evolving;

• introduce important fundamental topics in telecommunications theory.

• introduce the latest technologies, e.g. 4G LTE and LTE-A.

At the end of this module students will be able to:

• Understand the fundamental principles of fundamental aspects of telecommunications

• Analyse and solve numerical problems on the topic areas introduced

• Apply the knowledge learnt to new application areas

• Synthesise designs in areas such as error coding

• Understand the information theory and able to quantify the quality of telecom systems

• Analyse the telecom system architecture to identify the potential problems

• Apply the knowledge to deploy future telecommunication systems, e.g. 4G LTE

• Lay out the theoretical foundation for further study on wireless communications

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Appreciation of engineering context is covered in the evaluation of the migration of mobile networks from 1G to now 4G and looking to the future with LTE-A. Reasons for the limitations at the time for each technology and the drivers for change are discussed - assessment may be by qualitative examination questions.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Applying auto and cross correlation, fourier transform, etc. for calculating power spectral density of various line codes. Examined in both coursework and assessment.
SM4m	Awareness of developing technologies related to own specialization.	Developing technologies are considered - for example moving from LTE- to LTE-A - assessment may be by qualitative examination questions.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Engineering principles in this case include aspects such as fundamental theorems like Shannon and Nyquist theorems. These can be applied to new design processes - examples like emerging mobile technologies - such as LTE and LTE-A. Assessment will be through parts of examination questions.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Analytical methods are a core part of this module - different aspects of modern communications systems are analysed and their performance identified - e.g. limitations of PCM telephony for broadband. These calculations are tested in examination questions.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to	Mathematical models are a core part of this module and are assessed in the examination questions as well as in both the coursework assessments.

	implement appropriate action.	
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	A systems approach is considered in two ways - looking at the overall systems approach to generic telecoms networks and in looking at how mobile networks are engineered as a system. Towards the end of the module, students are taught transceiver system design (OFDM based) where all the components needs to combined. Formative assessment in tutorial session/special split session as well as summative assessment is done in final examination
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Engineering principles in this case include aspects such as fundamental theorems like Shannon and Nyquist theorems. These can be applied to new situations - examples like emerging mobile technologies - such as LTE and LTE-A. Assessment will be through parts of examination questions.
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	To some extent customer needs in terms of technical aspects (e.g. requirements for 2G, 3G, 4G) are covered and can be assessed in a qualitative way - as can issues such as battery life. However, aesthetics is not considered.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Partially covered - technical constraints are considered (such as Shannon's theorem for limiting broadband) or spectral efficiency in terms of limiting mobile capacity. These are examined as questions in the examination paper. Issues such as environmental aspects are addressed briefly (such as mobile mast siting, impact of cabling fibre to the home) together with health and safety (safety of personnel in the working environment and radiation to the body) are covered briefly in the lectures but would only be assessed as a small part of a wider question.X
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	To some extent spectral efficiency is an important cost driver in mobile networks and the move from 2G-4G not only provides more capacity but reduces costsbit by improving spectral efficiency. Trade-offs between capacity and coverage in cell planning also discusses cost drivers as does fibre roll-out. These aspects might form part of an examination question, but only a small part.

D1m	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	To some extent customer needs in terms of technical aspects (e.g. requirements for 2G, 3G, 4G) are covered and can be assessed in a qualitative way - as can issues such as battery life. However, aesthetics is not considered.
D5m	Plan and manage the design process, including cost drivers, and evaluate outcomes.	To some extent spectral efficiency is an important cost driver in mobile networks and the move from 2G-4G not only provides more capacity but reduces costsbit by improving spectral efficiency. Trade-offs between capacity and coverage in cell planning also discusses cost drivers as does fibre roll-out. These aspects might form part of an examination question, but only a small part.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	To some extent The design processes in real telecommunication networks are very complex and beyond the level of an undergraduate degree. This module allows some aspects of applying design knowledge to unfamiliar situations, but only to the extent of examination questions that are framed in an unfamiliar context.
ET6p	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques.	Students are expected to analyse certain telecom system architectures and identify the potential performance problems (in terms of quality of service and resilience, such as errors during transmission and how to apply techniques to minimise them). Assessed in coursework and in the exam.
EP6p	Understanding of appropriate codes of practice and industry standards.	To some extent role of ITU and importance of standards in the telecoms industry is discussed but not assessed.
EP8p	Ability to work with technical uncertainty.	Error correction and signal coding.
EP6m	Understanding of appropriate codes of practice and industry standards.	To some extent role of ITU and importance of standards in the telecoms industry is discussed but not assessed.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.	Current practice in terms of wired and wireless networks is considered - the move from PCM to IP-based wired networks and development of mobile networks. This will be assessed to some extent by qualitative examination questions.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Modern networks, particularly mobile including architecture, high-level properties, mobility, authentication Source coding: sampling, quantising, non-linear quantising, PCM, Huffman coding, run	10

No.	Teaching Content	Hours
	length coding.	
2	Information theory: Entropy, Markov models, Shannon-Hartley theorem, Equivocation, implications for broadband Errors and impairments: impairments in cascade, probability of word error, forward error correction, linear block codes, sliding window, effective bit rate in presence of errors	10
3	Baseband digital signalling techniques including line codes and spectra, intersymbol interference and time division multiplexing.	10
4	Modulation techniques including BPSK, MFSK, QPSK, QAM. Spread spectrum such as HFSS and DSSS, and CDMA. Multiple access techniques, especially OFDMA. Radio prorogations and network architecture including multipath effects, cellular concept, diversity and handover.	10

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 88%

Class Test 1: 6%

Class Test 2: 6%

VII. Module Resources

None

Authors: Dr Michael Chai, Dr Frank Gao

Reviewer: Dr Yue Chen

< Advanced Network Programming > Course Syllabus

I. Basic Information

Module Name	Chinese: 高级网络程序设计		**Module Code**	EBU5042/3512150421
	English: Advanced Network Programming			
Credits / Hours	3.5/56	**Compulsory (√) / Elective ( )**	**Semester**	5

Module Type	General Courses	**Applicable Programm**	1. Telecommunications Engineering with Management 2. E-commerce Engineering with law
Prerequisites	BBU4161: Programming Fundamentals and EBU4201: Introductory Java Programming.		

II. Teaching Objectives

The module aims to provide the participants with:

• Understanding of the client-server model.

• Knowledge of the varied technologies used for developing internet platforms and the context in which they are applicable.

• Ability to decide on the appropriate technology to use for a given application.

• Practical experience of applying a selection of the technologies.

• Decompose a business process into an appropriate distributed system model.

• Determine an appropriate means to implement the model, separating the client-side and server side activities.

• Implement the model using a selection of technologies.

• Improve the ability to manage time so as to balance the allocation of time between repeated practice and theoretical understanding required to gain procedural skills.

• Recall factual knowledge and to be able to apply it in familiar and unfamiliar situations.

• Employ scientific, mathematical and software 'tools' to a familiar or unfamiliar situation.

• Interpret information presented in the form of technical high-level languages.

• Implement a piece of hardware or software.

• Verify the correct behaviour of a software system or component and identify faults in systems.

• Synthesise a design (in software) from a specification (including assessing the best option from a range of alternatives), implement the design and then be able to evaluate the design against the original specification.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Understanding of the various technologies and principles used to develop and web application. Assessment via Class Test and Exam.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	This course assumes a good understanding of the Java programming language. Different technologies and programming languages (HTTP, HTML, Servlets, JSPs, Java, JavaScript) are learnt and used together, to develop simple web applications.
SM4m	Awareness of developing technologies related to own specialisation.	Briefly covered in lectures, to highlight differences between the available technologies.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	This is assessed (and written feedback given) in the Class Test.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	This is assessed in the Labs and conceptually in the Exam.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Assessed in the Class Test (on which written feedback is given) and Exam.
EP3p	Ability to apply relevant practical and laboratory skills.	Lab Exercises. Students demonstrate work from 2 of the labs to TAs and are given feedback during the labs. In the labs which are marked, each student is asked a random question from the list of questions in the lab sheet. This involves the student demonstrating to a TA whether his/her proposed solution code compiles and runs this is followed by another question being asked about the code (e.g. if you modify this bit of the code, what happens). The student is graded and given feedback by the TA.
EP4p	Understanding of the use of technical literature and other information sources.	Students are required to be familiar with the parts of the Java and JavaScript APIs which are covered in the module.

EP6p	Understanding of appropriate codes of practice and industry standards.	Briefly covered in lectures, to highlight differences between the available technologies.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to module's context and scope; Client-server applications, including multithreaded clients and servers using sockets (using Threads and Sockets in Java).	10
2	RMI, HTTP, HTML (including forms and HTML5).	10
3	JavaScript (client side scripting) to add interactivity to web pages; *Servlets* (basic concepts) for server side functionality in dynamic web applications.	10
4	*Servlets* (advanced concepts including session handling and URL rewriting); JavaBeans to model the data on the server side of a web application; JSPs to separate presentation from content in web applications; MVC framework for web applications; Course Revision.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs.

VI. Assessment Methods

Exam: 75%

Class Test: 20.0%

Question Demonstration from Lab 1: 2.5%

Question Demonstration from Lab 3: 2.5%

VII. Module Resources

"An Introduction to Network Programming with Java" by Jan Graba, 3rd ed.2014, Springer London Ltd, ISBN-13 (9781447152538). Full list is also available at https://qmul.rl.talis.com/lists/E7A5E358-5DA2-9E05-0E2C-7315C691CD41.html.

"JavaScript and Ajax for the Web: Visual QuickStart Guide" by Tom Negrino, Dori Smith, 7th Revised edition, Pearson Education (US), ISBN-13 (9780321564085)

Installed versions must not be older than:

- Web Server (Tomcat 7), Java SDK 7

- JavaScript-enabled browser (e.g. Chrome, Mozilla)
- HTML5 compatible browser (e.g. Chrome, Mozilla)

Eclipse Luna SR2 (4.4.2), Java EE 7

PC (Operating System version should be recent, e.g. Windows Vista or Windows 7)

Authors: Dr Paula Fonseca, Dr Vindya Wijeratne

Reviewer: Dr Ling Ma, Dr Michael Chai

< Logistics and Supply Chain Management > Course Syllabus

I. Basic Information

Module Name	Chinese: 物流与供应链管理 English: Logistics and Supply Chain Management		**Module Code**	EBU6609/3512156091
Credits / Hours	2.5 /40	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	E-Commerce Engineering with Law	
Prerequisites	Enterprise Management			

II. Teaching Objectives

The aims of this module are:

- to make the students understand the fundamental theories and concepts of Logistics and Supply Chain Management in a global context;

- to introduce the functioning of Logistics and Supply Chain Management activities in e-Commerce;

- to make the students understand the technologies used in Logistics and Supply Chain Management;

- to train the students in grasping the approaches to analyse, evaluate and improve Logistics and Supply Chains.

The course will be assisted by multimedia teaching methods and the usage of several case studies. Tutorial sessions will be carried out in the form of seminars focusing on case studies to expand on the concepts and theories introduced in the lectures.

By the end of the module the student will be able to:

- Explain the key concepts of Logistics and Supply Chain Management;
- Explain how SCM functions have changed due to increasing globalisation;
- Explain how these functions are influenced by new technologies;
- Apply the key concepts to case studies given both in lectures, tutorials and in an assessment scenarios;
- Demonstrate how the effective use of logistics and supply chain management can assist organizations in gaining competitive advantage.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
D6i	Communicate their work to technical and non-technical audiences.	Exam, part of the coursework related to the needs of the customers
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Coursework on the analysis of an existing supply chain network exam questions on the environmental restraints
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Covered in the exam, uncertainties and risk management for supply chain networks.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Coursework, especially the second half - to find such a comprehensive solution.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Exam questions related to cost analysis, coursework Exam questions related to supply chain mapping and the related part in the coursework Exam questions related to supply chain mapping and the related part in the coursework
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Reflected in the coursework instruction, where the students are required to explore possible business improvement to the existing supply chain network based on technology and non-technology related opportunities.

ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Coursework - first half, required to examine the commercial and economic contexts of an existing supply chain network
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Exam questions, and coursework, as a whole, esp. the usage of various analytical tools, are used to assess the students' knowledge and understanding on such management techniques.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.	Risk assessment part of the coursework
ET6m	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk.	
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	Exam questions related to the application of technologies in SCM, related part of the coursework
EP6p	Understanding of appropriate codes of practice and industry standards.	Exam questions on quality issues, related part of the coursework

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to Logistics and Supply Chain Management Supply Chain Organisation – Process thinking vs. Functional thinking Technology in Logistics and Supply Chain: Product, Process, and Information Technologies in SCM, RFID, IT framework in SCM; Customer Fulfilment: Perato classification of customers	10
2	Order Fulfilment Cycle - SCOR model - Purchasing, Production and Logistics; Supply Chain Mapping; Core Competencies and Outsourcing; Environmental Scanning and Global Supply Chain;	10
3	Cost Management in SCM; Inventory Management; Managing Uncertainty in the Supply Chain; Operational issues in the Supply Chain;	10
4	Performance Measurement in the Supply Chain; People Management in SCM; Law and Ethics in SCM;	10

No.	Teaching Content	Hours
	Relationship Management in SCM	

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 75%;

SCM Analysis of a chosen company: 25%

VII. Module Resources

None

Authors: Ms. Bing Han

Reviewer: Dr Ling Ma

《信息网络法概论》课程教学大纲

一、课程基本信息

课程名称	中文：信息网络法概论 英文：Informational and Internet Law		**课程编号**	3512165216
学分/学时	2/32	**必修（）/ 选修（√）**	**开课学期**	5
课程类别	专业课程	**适用专业**	电子商务及法律、物联网工程	
先修课程	法律基础			

二、课程教学目标

通过本课程的学习，使学生掌握我国信息网络法制建设的现状及信息网络法律的基本制度，并能用信息网络法的基本原理分析现实中的信息网络法律问题。

三、课程与支撑的毕业要求

学生应了解我国包括网络安全、电子商务、互联网信息服务等领域的立法和执法现状，熟练掌握有关网络安全、互联网信息服务、个人信息保护和网络不正当竞争和垄断的等具体制度的内容和

基本原理，能够运用所学的法律条文和基本原理分析现实中存在问题。

四、教学内容及学时安排

序号	教学内容	学时分配	重点
1	信息网络法建设的意义与现状	4	1、信息网络法制建设的意义 2、主要国家信息网络法制建设的现状
2	信息网络法概述	8	1、信息网络法的含义及在法律体系中的地位 2、信息网络法律关系 3、信息网络法律与信息网络政策的比较 4、信息网络立法
3	国家信息网络安全法律规范	8	1、 网络主权 2、 等级保护法律 3、 关键信息基础设施保护法律 4、 态势感知法律
4	个人信息安全法律规范	6	1、 个人信息界定 2、 个人信息权利 3、 侵害个人信息的法律责任
5	互联网不正当竞争与垄断	6	1、 互联网不正当竞争及其规制 2、 互联网反垄断

五、教学方法

讲授、讨论

六、考核方式

考查/开卷

成绩构成：平时成绩 30%+期末成绩 70%

七、课程资源

教材:《信息法教程（第 2 版）》　朱庆华等著 高等教育出版社 2011 年版

参考书目:《信息法研究》 王建著|西南财经大学出版社 2011 年版

中国信息安全法律网 http://www.infseclaw.net/

执笔人：崔聪聪

审核人：罗楚湘

< Introductory Java Programming > Course Syllabus

I. Basic Information

Module Name	Chinese: JAVA高级语言程序设计 English: Introductory Java Programming		**Module Code**	EBU4201/3512142111
Credits / Hours	4/64	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	1. Telecommunications Engineering with Management. 2. E-commerce Engineering with law 3. Internet of Things Engineering.	
Prerequisites	BBC3502: Computer Fundamentals and Programming for IoT students and BBU4161: Programming Fundamentals for all other students.			

II. Teaching Objectives

The module aims to give students unfamiliar with programming: knowledge of the basic concepts of programming in an object-oriented language, knowledge of the basic features of the Java programming language, practice in developing simple object-oriented programs.

By the end of the module the student will be able to:

Describe the basic aspects of an object-oriented language.

Describe the basic features of the Java language, write, debug and execute programs in the Java language, which fulfill specifications.

Manage their time effectively to prepare and finish the lab exercises.

Write effective maintenance and user documentation.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.

EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Exam + MCQs + Mini-Project. Written feedback is given to students on the Mini-Project.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Exam + MCQs + Mini-ProjectWritten feedback is given to students on the Mini-Project.
EP3p	Ability to apply relevant practical and laboratory skills.	Lab Exercises + MCQsStudents demonstrate work from 3 of the labs to TAs and are given feedback during the labs. In the labs which are marked, each student is asked a random question from the list of questions in the lab sheet. This involves the student demonstrating to a TA whether his/her proposed solution code compiles and runs this is followed by another question being asked about the code (e.g. if you modify this bit of the code, what happens). The student is graded and given feedback by the TA.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Introduction (Java basics, history, etc), Plagiarism, Java Basics (syntax, variables, class structure, etc), Intro to Object Oriented Programming, Basics of Object Oriented programming	10
2	Arrays, Objects & Inheritance, A detailed example of OO programming, Introduction to collection classes and other Java provided classes. More Inheritance, abstract classes and interfaces.	10
3	Garbage Collection (including Heap and Stack, Life of an Object, Null References, super() and this() calls); OO Data Structures & Collections Framework (including Vectors, Enumerations, Lists, Stacks, Generic Types); Numbers & Strings (Math class/methods, Wrapper classes and Autoboxing, String related classes, Formatting Numbers and Dates, Recursion); Basic GUI.	10
4	Exception Handling (including try/catch/finally blocks, throw *versus* throws, Catching multiple Exceptions, Assertions); GUI: buttons and event handling, Swing components, layout managers, inner classes; File I/O: Java I/O streams, readers, writers, buffers, file objects, binary files, looking beyond files; Packaging; Java Collections and Sorting. Course Revision.	10

5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs; Writing development techniques.

VI. Assessment Methods

Exam: 60%

Question Demonstration from “Java Basics” lab: 2.0%

Question Demonstration from “OO Programming”: 2.0%

Question Demonstration from “Advanced OO” lab: 2.0%

MCQ1: Teaching Weeks 1+2 & Labs 1-4: 12.0%

MCQ2: Teaching Weeks 3+4 & Labs 5-8: 12.0%

Mini-Project: 10.0%

VII. Module Resources

None.

Authors: Dr Paula Fonseca

Reviewer: Dr Ling Ma

< Databases > Course Syllabus

I. Basic Information

Module Name	Chinese: 数据库 English: Database		**Module Code**	EBU5602/3512156021
Credits / Hours	3.5/56	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	1. E-commerce Engineering with law 2. Internet of Things Engineering	
Prerequisites	None.			

II. Teaching Objectives

This course provides a practical introduction to the skills and knowledge needed to create, integrate

and maintain database systems over local networks and the Internet, to link them together over the Internet and to extract data and information from structured and semi-structured data-spaces.

By the end of the module the student will be able to:

- Describe the concept of database and database management systems.
- Design database models from informal descriptions, and translate between such models.
- Implement, manipulate and query relational databases.
- Describe the issues in transaction management.
- Understand other types of data representation including XML, NoSQL
- Be aware of advanced database technologies.
- Be aware of related ethics issues.
- Team work
- Problem solving
- Written and oral communication

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Covered in relational model, relational algebra, database development history and current development of NoSQL, assessed in exam
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Covered in database systems implementation using Java and JDBC, assessed in coursework
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Covered throughout lectures (Apply relational database design methodologies to database design) and assessed in coursework and exam
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Relational database implementation using SQL and JDBC, assessed in coursework and exam

EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Design relational database using the design methodoligies, implenting database systems. Assessed in coursework and partially in exam
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Relational database design methodologies are covered in the lectures, including information finding techniques like questionnaires, interviews etc for understanding/evaluation of business and user's database need. Where requirement information cannot be provided by business/users, informed assumptions will be made. This is assessed in coursework and partially in exam.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Partially covered in ethics lecture of database related issues, however it is not assessed.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Covered throughout lectures and assessed in exam
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Database design process, MySQL, JDBC. Assessed in coursework and exam
EP9p	Understanding of, and the ability to work in, different roles within an engineering team.	Covered in relational database design and NoSQL development, assessed in exam

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Database fundamental concepts, Relational model, Relational Algebra, Entity-relationship(ER) modelling	10
2	Logical Database design, Normalisation, Advanced Normalisation, SQL	10
3	JDBC, Transaction management, Distributed DBMS, XML for semi-structured data	10
4	Data warehouse, Data mining, NoSQL	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Labs; Writing development techniques.

VI. Assessment Methods

Exam: 80%

Class test: 5%

Group project: Design and implement a database: 15%

VII. Module Resources

None

Authors: Dr Na Yao

Reviewer: Dr Michael Chai

< Control Theory > Course Syllabus

I. Basic Information

Module Name	Chinese: 控制理论		**Module Code**	EBU6503/3512165131
	English: Control Theory			
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering.	
Prerequisites	EBU5375: Signals and Systems.			

II. Teaching Objectives

This module aims to provide a knowledge and understanding of the principles, theory and applications of control theory, both classical and modern. It is limited to the analysis and design of linear systems.

Explain the principles of operation of system elements and sub-systems

• Mathematically model system elements and sub-systems

• Apply appropriate techniques to the analysis of system behaviour

• Design appropriate control strategies and evaluate their effectiveness

Apply relevant mathematical techniques to the solution of problems.

Use appropriate software to analyse and design systems.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Techniques and tools used in control system theory and practice. Assessed in exam and labs.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Different disciplines. Assessed in coursework and exam. Delivered in lectures by using examples from a variety of disciplines (electronic, electrical, mechanical, process, physiological, etc).
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Use of frequency response and root locus techniques to analyse system behaviour. Assessed in exam and in labs (labs are Matlab based open-ended problems).
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Use of mathematical models to describe system performance, both analytically and by software modelling. Assessed in exam and labs.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Use appropriate techniques to solve design problems and describe the limitations of the proposed solutions. Assessed in labs.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Use of block diagrams of systems to model systems and their behaviour. Assessed in exam and labs.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Use of appropriate techniques to design controllers to achieve optimum required performance for a given system. Assessed in labs by the use of simulation software.
EP3p	Ability to apply relevant practical and laboratory skills.	Use of appropriate software packages. Assessed in labs.

EP4p	Understanding of the use of technical literature and other information sources.	Literature for selecting appropriate sensors, etc, for particular applications. Assessed in exam.

IV. Teaching Content and Course Schedules

No.	Teaching Content: Schedule EBU6503 Control Theory	Hours
1	Open and closed loop control principles; Laplace Transform; mathematical modeling; stability; control system characteristics	10
2	Time domain analysis; root locus	10
3	Frequency domain analysis (Nichols); controllers (phase lead/lag, PID); relative stability; effects of controllers on both root locus and Nichols plot	10
4	Principles of operation of transducers/ typical applications; DDC/DCS/SCADA	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs.

VI. Assessment Methods

Exam: 75%

Lab 1: Introduction to Matlab Control System: 8.0%

Lab 2: Use of Matlab Control System Toolbox: 9.0%

Class Test 1: 2.0%

Class Test 2: 2.0%

Class Test 3: 2.0%

Class Test 4: 2.0%

VII. Module Resources

None

Authors: Andrew Richard Waston

Reviewer: Dr Michael Chai

< Networks and Protocols > Course Syllabus

I. Basic Information

Module Name	Chinese: 网络与协议 English: Networks and Protocols		**Module Code**	EBU5504/3512155141
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering	
Prerequisites	None.			

II. Teaching Objectives

This module provides basic communications theory and descriptions of protocols to allow students to understand, analyze and design communication systems, specifically those for communication between objects in an IoT scenario. To do this it will emphasise personal-area and local-area networks, rather than wide-area networks. Within that context it will:

• equip participants with a basic understanding of modern digital communications;

• show how communications networks are evolving;

• introduce important fundamental topics in telecommunications theory.

By the end of this module, you should be able to understand, analyse and design communication systems, specifically those for communication between objects for IoT scenarios. Understanding of the requirement for IoT engineering activities to promote sustainable development.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Relevant scientific principles and methodologies related to physical layer and data link layer of OSI model for IoT networks will be covered in this module. Assessed in exam and in-class test.

SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Relevant basic mathematical principles will be discussed and revised to solve the engineering problem in network design (for example, probability theory and statistical methods in information theory). Mathematical and statistical principles will not be tested in the exam question, lab and in-class tests but students need to apply them correctly.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	The fundamental engineering principles for communications networks, such as Shannon's theorem, Nyquist theorem, MAC will be covered in the lecture. These principles will be applied to new emerging networks such as IoT and wireless sensor networks. These will be assessed in exam questions and in-class tests.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	The fundamental engineering principles for communications networks, such as Shannon's theorem, Nyquist theorem, MAC will be covered in the lectures. These principles will be assessed in exam questions and in-class tests.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Analysis of different algorithms, techniques and protocols is is the major part in this module. For example, compare different modulation techniques for different IoT scenarios. These will be tested in the exam questions and in-class tests.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Quantitative methods such as algebra, probability distributions will be covered in the class to evaluation the performance as well as solving problems in a given particular IoT scenario. This will be assessed in exam questions and in-class tests.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	OSI Layer 1 and Layer 2 Internetworking protocols and techniques for wiseless sensor networks and Internet of things networks. Assessed in Exam and in-class test
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	The design processes will be covered in the lectures on how to apply the knowledge into designing and implementing IoT networks and protocols in a given scenario. This will be assessed in small part of exam questions.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Energy and spectra efficiency are the cost drivers for IoT personal area networks and local area networks. These aspects will be assessed in a small part in exam questions.

D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Energy and spectra efficiency are the cost drivers for IoT personal area networks and local area networks. These aspects will be assessed in a small part in exam questions.
EP4p	Understanding of the use of technical literature and other information sources.	Some additional readings on literacture on new Internet of thing services in the networks. No accessment in this but in-class tests or exams may use this as scenario.
EP6p	Understanding of appropriate codes of practice and industry standards.	Communication standards for IoT and sensor networks such as IEEE802.11x, IEE802.15.4, zigbee will be covered in the lectures. These topics will be assessed in exam questions and in-class tests.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Introduction to Networks: Intro to Internet; Network edge; End systems, access networks, links; Network core; Network structure; Delay, loss and throughput in networks; Protocol layers; Service models Introduction to IoT Technologies in Networks: Technologies enabling the Internet of Things; IoT Component: Sensors, Actuator; Factors driving adoption in the IoT; devices; Protocols; wireless technologies in IoT (Bluetooth, Lower power Bluetooth, WiFi, Low power Wifi, LTE, LTE-A, 5G, weightless); understand on Challenges on IoT Networks (energy, interconnection, security, network penetration); IoT Architecture	10
2	Data link layer attribute; Multiple access protocols: Ethernet, Gigabit, WiFi, Principles and challenges of MAC in WSNs and IoT; MAC schemes for WSNs and IoT Contention based protocols on S-MAC, T-MAC and WiseMAC; Zigbee/IEEE802.15.4; Low Power WiFi	10
3	Foundations of digital communications systems: sampling, quantization, Time Domain VS Frequency Domain, pulse-code modulation, delta modulation; the principles of Information Theory: entropy, source coding, Huffman coding	10
4	Pulse Amplitude Modulation, channel capacity, Shannon’s formula, channel coding, Hamming distance;	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 88%

Test 1: 6.0%

Test 2: 6.0%

VII. Module Resources

None

Authors: Dr Michael Chai

Reviewer: Dr Yue Chen

< Microprocessors for Embedded Computing > Course Syllabus

I. Basic Information

Module Name	Chinese: 微处理器系统设计 English: Microprocessors for Embedded Computing		**Module Code**	EBU5476/3512154761
Credits / Hours	3.5 /56	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering	
Prerequisites	Digital Circuit Design			

II. Teaching Objectives

To understand the architectures of classic and modern microprocessors and microcontrollers

To learn how to design and program systems using hardware features provided in the microprocessors and microcontrollers

To enable students to make an informed choice of devices for a particular application.

To discuss options in interfacing circuits or devices to use with microprocessors and microcontrollers

Understand the architecture of microprocessor and microcontroller devices

Understand the timing, memory and data transfer limitations of using these devices

Select the right device for a specific application

Learn and practise the developments for the devices

Identify interfacing issues for various devices

Write C code and assembly code for the devices

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	The principle of computation using a microcomputer (or microcontroller) is covered in great details in the first two teaching weeks. Such knowledge is very useful in any engineering solutions based on modern computers. Assessed in both coursework and exam.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	The basic construction of embedded system with microprocessors is explained clearly, with practical examples for IoT applications. Assessed in lab exercises.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	The factors affecting the execution speed and memory requirement in algorithms coded in assembly languages are studied carefully during lectures. In addition, different methods of interfacing techniques for microprocessors are compared to reveal the performance of the whole embedded system. Assessed in both coursework and exam.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Assembly and C programming for MCS-51 microcontrollers are taught in lectures and later practised in lab exercises. Assessed in coursework, lab exercises and exam.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Various hardware features of different microprocessors and how to choose a proper interfaces or connections for different applications are discussed. Assessed in lab exercises and exam.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Lab exercises provides practical experiences in construction and debugging of electronic circuits interfaced with microprocessors. Assessed in demonstrations and oral presentation during lab sessions.
EP3p	Ability to apply relevant practical and laboratory skills.	References to design user manual of common 8051 microprocessors and datasheets of electronic components or modules are required and assessed in labs.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to computer design; 8051/MCS-51 Architecture; Assembly Programming 1 – Addressing modes and arithmetic instructions; Assembly Programming 2 – Simple Branching and Basic Input/Output.	10
2	More about assembly programming – program ROM arrangement, structured programming; Software stack and subroutine call; Software library – example.	10

No.	Teaching Content	Hours
3	C programming skills for 8051 Microcontroller; Hardware timer; Interrupt; Serial Communication and hardware in 8051.	10
4	Advanced input and output – Keypad & Display; I^2C interface protocol; External Memory in 8051; Memory Organisation in modern computer (optional)	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 75%;

8051 Assembly Programming 1: 1.5%;

8051 Assembly Programming 2: 1.5%;

8051 C Programming 1: UART and I2C: 1.5%;

8051 C Programming 2: Advanced I/O: 1.5%;

Material from Teaching Week #1, Online: 1%;

Material from Teaching Week #2, Online: 1%;

Material from Teaching Week #3, Online: 1%;

Material from Teaching Week #4, Online: 1%;

Class activity #1: 1%;

Class activity #2: 1%;

Class activity #3: 1%;

Class activity #4: 1%;

Mid-term MCQ: 4 %;

Design project (Group-based): 7%.

VII. Module Resources

None

Authors: Chris Harte

Reviewer: Dr Yasir Alfadhl

< Software Engineering > Course Syllabus

I. Basic Information

Module Name	Chinese: 软件工程 English: Software Engineering		**Module Code**	EBU6304/3512163041
Credits / Hours	4 /64	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management E-commerce Engineering with law Internet of Things Engineering	
Prerequisites	Programming Fundamentals; Computer Fundamentals and Programming; Introductory Java Programming			

II. Teaching Objectives

The course aims to give each participant: an idea of the necessity of good software engineering practice when developing complex software systems, knowledge of suitable software engineering techniques, practice in applying these techniques and experience of working in teams to develop a product to a specification within strict deadlines.

Devise a requirements specification. Build a system using the modern software development techniques. Test the system using automated testing methods.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	Scientific principles and methodology are covered throughout the lectures. Assessed in exam and group project. Written feedback is given to students on the group project.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Covered in the lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modeling techniques.	

EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	System approach is essential in Software Engineering. This is covered in the Software Process lectures and assessed in the group coursework and exam.
D6i	Communicate their work to technical and non-technical audiences.	Covered in the Requirements lecture and in the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Covered in the Requirements and Design lecture. Assessed in the group coursework.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Covered in the lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Covered in the "Project Management" lectures and the case study. Assessed in exam and group project. Written feedback is given to students on the group project.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Covered in the Requirements, Analysis and Design lecture. Assessed in the group coursework.
ET6i	Awareness of risk issues, including health & safety, environmental and commercial risk.	Covered in the lecture and written feedback is given to students on the group project.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Covered in project management part of the lecture and assessed in exam and group coursework.
ET3p	Knowledge and understanding of management techniques, including project management that may be used to achieve engineering objectives.	Applying quantitative techniques is covered in the Testing lecture and assessed in the coursework and exam..
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Covered in the Project Management and Risk Assessment lectures.
EP5p	Knowledge of relevant legal and contractual issues.	Covered in the Project Management and Software Quality part lectures.
EP6p	Understanding of appropriate codes of practice and industry standards.	Covered in the Project Management lecture and assessed through group project.

EP8p	Ability to work with technical uncertainty.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Overview of software; Introduce software engineering and its needs; The importance of software engineering; Software process; Traditional models ;Modern models; Agile overview; Requirement Theory and Techniques; Functional and non-functional requirements; Requirements capture techniques; Requirements in Agile process; Prioritisation of stories; Estimating.	10
2	Analysis: Purpose of Analysis; Stereotypes of classes; Class relationships. Design: Purpose of Design; Design principles; Design quality; Class design. Implementation: build; Mapping design to code. Testing: Techniques; Regression Testing; White Box Testing; Black Box Testing; Partition Testing; Object-oriented Testing. Test Driven Development; Using JUnit; Project management: Activities; Planning; Scheduling; Managing People; Agile project management.	10
3	Risk Management; Agile Risk Management; Quality Management; Design principles: overview; Single Responsibility Principle; Open-Closed Principle; Abstraction and Generalisation; Dependency Inversion Principle; Interface Segregation Principle; Liskov Substitution Principle.	10
4	Design Patterns: Decorator; Adapter; Composite; Immutable View; Observer; Factory method; Factory object; Singleton; Object Pool; Strategy; State; Bridge; Flyweight. Open Source Software; Software Craftsmanship and Clean Code.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 65%;

Lab Exercises Demonstration: 5%;

Group Project: Report & Software: 30%

VII. Module Resources

" Software Engineering" by Ian Sommerville (9th edition); Pearson 2011; ISBN 0137053460

1. "Introduction to Agile Methods" by Sondra Ashmore, ISBN-10: 032192956X1

2."Head First Software Development" by Dan Pilone and Russ Miles; O'Reilly; 2007; ISBN 0596527357

3. "Head First Object Oriented Analysis and Design" by Brett McLaughin et al; O'Reilly; 2006; ISBN 0596008678

4. "Head First Design Patterns" by Elisabeth Freeman et al; O'Reilly; 2004; 0596007124

5. "Software Engineering: Theory and Practice" by Pfleeger and Atlee (4th edition); Pearson 2010; ISBN 0138141819

6 "Agile Software Development, Principles, Patterns, and Practices" by Robert C. Martin, ISBN-10: 0132760584

7 "Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin, ISBN-10: 0132350882

Authors: Dr Paula Fonseca

Reviewer: Dr Michael Chai

< Digital Systems Design > Course Syllabus

I. Basic Information

Module Name	Chinese: 数字系统设计 English: Digital Systems Design		**Module Code**	EBU6335/3512153351
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management.	
Prerequisites	BBU4202: Digital Circuit and Logic Design.			

II. Teaching Objectives

Students learn how to design and build large scale digital systems using hardware descriptive language (HDL) such as VHDL. They can also gain hands-on experience with programmable logic devices (e.g. CPLDs, FPGAs) through the course.

Understand the working of various types of programmable logic architectures

• Describe the operations of a range of combinational logic blocks like shifters and multipliers

• Analyse and select appropriate logic blocks for a digital system

• Analyse and design high-speed sequential circuits

• Recognise different types of memory and appreciate their applications

• Use hardware descriptive language and appropriate design tools to design and test complete digital

systems

Understand engineering principles and the ability to apply them to analyse key engineering processes, including

• Abstraction and hierarchical design.

• Circuit and component selection according to differing criteria.

• Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Boolean (Switching) algebra will be revised and applied in context of digital circuit design and optimisation. Assessed in both coursework and exam.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Principles in hierarchical methodology in digital design is introduced in lectures and practised in labs. These can further be applied to a general design process for many engineering systems.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Design metrics like area, speed and stability for digital systems are discussed and compared to give hints on the right choices of the components. Assessed in coursework and exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Examples of problem solving techniques using finite state machines (FSM) are explained in details. 1-2 examples will also be implemented by students in lab exercises.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	The design of digital systems to compute binary multiplications illustrate the concept of integrated approach with the support of various blocks introduced earlier in the course. This will be practised in labs and further assessed in exams.

D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	The lab exercises provide only the problem specification and some guidance. The students have to plan about the usage of proper modelling technique and estimate the cost in real implementation.
D5m	Plan and manage the design process, including cost drivers, and evaluate outcomes.	The lab exercises provide only the problem specification and some guidance. The students have to plan about the usage of proper modelling technique and estimate the cost in real implementation.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	Lectures on datapath-control style of system design for digital systems include a number of examples. The students will be asked to apply the concept for similar computation problem, in both coursework and exam.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	The characteristics of programmable logic devices (e.g. CPLD, FPGA) will be understood as the students tried out experiments using the lab board. Lectures will discuss the features of these common platforms for digital systems.
EP3p	Ability to apply relevant practical and laboratory skills.	VHDL languages are used by the students in modelling digital circuits or systems. In lab sessions they synthesise their circuits and download them to lab boards.
EP2m	Knowledge of characteristics of particular equipment, processes, or products, with extensive knowledge and understanding of a wide range of engineering materials and components.	The characteristics of programmable logic devices (e.g. CPLD, FPGA) will be understood as the students tried out experiments using the lab board. Lectures will discuss the features of these common platforms for digital systems.
EP3m	Ability to apply relevant practical and laboratory skills.	VHDL languages are used by the students in modelling digital circuits or systems. In lab sessions they synthesise their circuits and download them to lab boards.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Digital abstraction and hierarchical design methods; combinational logic circuits and components - gates, shifters, multiplexers, decoders, adders; VHDL: entity, architecture and concurrent statements	10
2	Sequential circuits - latches and flip flops; timing diagrams; sequential components - registers, shifter registers and counters; VHDL: processes & sequential statements, port maps and testbenches	10
3	Finite state machines; datapath control; FIFO & LIFO; memory technologies; programmable logic devices: PLA, CPLD & FPGA	10
4	Arithmetic circuits; low-level communication protocol; simple computer design	10

No.	Teaching Content	Hours
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials; Labs.

VI. Assessment Methods

Exam: 75%

Combinational logic design: Boolean equation and a simple ALU (VHDL and CPLD programming): 2%

Sequential logic blocks: counters, register and simple FSM (VHDL and simulation): 2%

Finite State Machine (FSM) implementation (CPLD programming): 2%

Arithmetic circuit implementation (CPLD programming): 2%

Materials from Teaching Week #1, Online: 2%

Materials from Teaching Week #2, Online: 2%

Materials from Teaching Week #3, Online: 2%

Materials from Teaching Week #4, Online: 2%

Practical Session 1: VHDL Structural Modelling: 1%

Practical Session 2: VHDL Testbench and using Xilinx ISM Simulator: 1%

Practical Session 3: FSM implementation with VHDL: 1%

Practical Session 4: Datapath and Control Design: 1%

Multiple Choice Questions (MCQ), mid-term: 5%

VII. Module Resources

None

Authors: Chris Harte

Reviewer: Dr Yasir Alfadhl

< Advanced Network Programming > Course Syllabus

I. Basic Information

Module Name	Chinese: 高级网络程序设计 English: Advanced Network Programming		**Module Code**	EBU5042/3512150421
Credits / Hours	3.5/56	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	1. Telecommunications Engineering with Management 2. E-commerce Engineering with law	
Prerequisites	BBU4161: Programming Fundamentals and EBU4201: Introductory Java Programming.			

II. Teaching Objectives

The module aims to provide the participants with:

• Understanding of the client-server model.

• Knowledge of the varied technologies used for developing internet platforms and the context in which they are applicable.

• Ability to decide on the appropriate technology to use for a given application.

• Practical experience of applying a selection of the technologies.

• Decompose a business process into an appropriate distributed system model.

• Determine an appropriate means to implement the model, separating the client-side and server side activities.

• Implement the model using a selection of technologies.

• Improve the ability to manage time so as to balance the allocation of time between repeated practice and theoretical understanding required to gain procedural skills.

• Recall factual knowledge and to be able to apply it in familiar and unfamiliar situations.

• Employ scientific, mathematical and software 'tools' to a familiar or unfamiliar situation.

• Interpret information presented in the form of technical high-level languages.

• Implement a piece of hardware or software.

• Verify the correct behaviour of a software system or component and identify faults in systems.

• Synthesise a design (in software) from a specification (including assessing the best option from a range of alternatives), implement the design and then be able to evaluate the design against the original specification.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Understanding of the various technologies and principles used to develop and web application. Assessment via Class Test and Exam.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	This course assumes a good understanding of the Java programming language. Different technologies and programming languages (HTTP, HTML, Servlets, JSPs, Java, JavaScript) are learnt and used together, to develop simple web applications.
SM4m	Awareness of developing technologies related to own specialisation.	Briefly covered in lectures, to highlight differences between the available technologies.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	This is assessed (and written feedback given) in the Class Test.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	This is assessed in the Labs and conceptually in the Exam.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Assessed in the Class Test (on which written feedback is given) and Exam.
EP3p	Ability to apply relevant practical and laboratory skills.	Lab Exercises. Students demonstrate work from 2 of the labs to TAs and are given feedback during the labs. In the labs which are marked, each student is asked a random question from the list of questions in the lab sheet. This involves the student demonstrating to a TA whether his/her proposed solution code compiles and runs this is followed by another question being asked about the code (e.g. if you modify this bit of the code, what happens). The student is graded and given feedback by the TA.
EP4p	Understanding of the use of technical literature and other information sources.	Students are required to be familiar with the parts of the Java and JavaScript APIs which

		are covered in the module.
EP6p	Understanding of appropriate codes of practice and industry standards.	Briefly covered in lectures, to highlight differences between the available technologies.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to module's context and scope; Client-server applications, including multithreaded clients and servers using sockets (using Threads and Sockets in Java).	10
2	RMI, HTTP, HTML (including forms and HTML5).	10
3	JavaScript (client side scripting) to add interactivity to web pages; *Servlets* (basic concepts) for server side functionality in dynamic web applications.	10
4	*Servlets* (advanced concepts including session handling and URL rewriting); JavaBeans to model the data on the server side of a web application; JSPs to separate presentation from content in web applications; MVC framework for web applications; Course Revision.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs.

VI. Assessment Methods

Exam: 75%

Class Test: 20.0%

Question Demonstration from Lab 1: 2.5%

Question Demonstration from Lab 3: 2.5%

VII. Module Resources

"An Introduction to Network Programming with Java" by Jan Graba, 3rd ed.2014, Springer London Ltd, ISBN-13 (9781447152538). Full list is also available at https://qmul.rl.talis.com/lists/E7A5E358-5DA2-9E05-0E2C-7315C691CD41.html.

"JavaScript and Ajax for the Web: Visual QuickStart Guide" by Tom Negrino, Dori Smith, 7th Revised edition, Pearson Education (US), ISBN-13 (9780321564085)

Installed versions must not be older than:

- Web Server (Tomcat 7), Java SDK 7
- JavaScript-enabled browser (e.g. Chrome, Mozilla)
- HTML5 compatible browser (e.g. Chrome, Mozilla)

Eclipse Luna SR2 (4.4.2), Java EE 7

PC (Operating System version should be recent, e.g. Windows Vista or Windows 7)

Authors: Dr Paula Fonseca, Dr Vindya Wijeratne

Reviewer: Dr Ling Ma, Dr Michael Chai

< Microprocessor Systems Design > Course Syllabus

I. Basic Information

Module Name	Chinese: 微处理器系统设计 English: Microprocessor Systems Design		**Module Code**	EBU6475/3512154751
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management	
Prerequisites	Digital Circuit Design			

II. Teaching Objectives

To understand the architectures of classic and modern microprocessors and microcontrollers

To learn how to design and program systems using hardware features provided in the microprocessors and microcontrollers

To enable students to make an informed choice of devices for a particular application.

To discuss options in interfacing circuits or devices to use with microprocessors and microcontrollers

Understand the architecture of microprocessor and microcontroller devices

Understand the timing, memory and data transfer limitations of using these devices

Select the right device for a specific application

Get familiar with the development cycle for the devices

Understand interfacing issues for the devices

Write efficient C codes and assembly codes for the devices

Use a microcontroller with an electronic circuit

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	The principles of computation using microcomputers and the notions of hardware and software are discussed in the context of modern computers and other embedded systems.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	The basic construction of microprocessor systems is explained clearly, with practical applications. Assessed in lab exercises.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Different methods of interfacing techniques for microprocessors are compared to reveal the performance of the related system. Assessed in final exam.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Assembly and C programming are practised in lab exercises. Assessed in lab questions and demonstrations.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Various features of different microprocessors and how to choose a proper interfaces or connections for different applications are discussed. Assessed in final exam.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Lab exercises provides practical experiences in construction and debugging of electronic circuits interfaced with microprocessors. Assessed in demonstrations and oral presentation in lab sessions.
EP3p	Ability to apply relevant practical and laboratory skills.	References to design user manual of common 8051 microprocessors are required in labs. Assessed in lab questions and final exam.
EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.	Various features of different microprocessors and how to choose a proper interfaces or connections for different applications are discussed. Assessed in final exam.

EP2m	Knowledge of characteristics of particular equipment, processes, or products, with extensive knowledge and understanding of a wide range of engineering materials and components.	Lab exercises provides practical experiences in construction and debugging of electronic circuits interfaced with microprocessors. Assessed in demonstrations and oral presentation in lab sessions.
EP3m	Ability to apply relevant practical and laboratory skills.	References to design user manual of common 8051 microprocessors are required in labs. Assessed in lab questions and final exam.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to computer design; 8051/MCS-51 Architecture; Assembly Programming 1 – Addressing modes and arithmetic instructions; Assembly Programming 2 – Simple Branching and Basic Input/Output.	10
2	More about assembly programming – program ROM arrangement, structured programming; Software stack and subroutine call	10
3	Hardware timer; Interrupt; Serial Communication and hardware in 8051.	10
4	Advanced input and output – Keypad & Display; I^2C interface protocol; External Memory in 8051; Memory Organisation in modern computer (optional)	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 75%;

8051 Assembly Programming 1: 2%;

8051 Assembly Programming 2: 2%;

8051 Hardware: Timer and Serial: 2%;

Controlling I2C slaves: 2%;

Material from Teaching Week #1, Online: 2%;

Material from Teaching Week #2, Online: 2%;

Material from Teaching Week #3, Online: 2%;

Material from Teaching Week #4, Online: 2%;

Class activity #1: 1%;

Class activity #2: 1%;

Class activity #3: 1%;

Class activity #4: 1%;

Mid-term MCQ: 5%.

VII. Module Resources

None

Authors: Chris Harte

Reviewer: Dr Yasir Alfadhl

< Wireless Networks > Course Syllabus

I. Basic Information

Module Name	Chinese: 无线网络 English: Wireless Networks		**Module Code**	EBU7250/3512172501
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	7
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management	
Prerequisites	BBU6366 Microwave and Optical Transmission			

II. Teaching Objectives

The module aims to provide students with the general knowledge of wireless communications and wireless networks, which will help to better understand the booming technologies in this area. The course also aims to discuss current industrial standards and related new technologies.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

- Understand the general concepts of wireless communications, such as cellular, multipath fading channel, modulation and demodulation technologies adopted in the wireless communication systems, CDMA, FDMA, TDMA, FDD, TDD and etc.
- Explain the fundamentals of wireless network, such as MSC, BS, MS, mobility management, radio resource management, Erlang capacity, blocking rate and etc.
- Explain the difference of wireless networks of GSM, IS-95, WiFi, Bluetooth and so on.
- Have the knowledge of the current industrial standards and evolution path.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to wireless communication systems: History of wireless communications, examples of wireless communication systems, modern wireless communication systems, radio propagation and channel model	10
2	Signal processing for wireless communications, modulation, equalization, coding, spread spectrum, multiple access technologies, FDMA, TDMA, CDMA, FDD, TDD, Random access	10
3	Wireless Networking, Cellular concepts, frequency reuse, channel assignment strategies, interferences, trunking and grade of service, improving coverage methods, Industrial standards, GSM, IS-95, IMT-2000	10
4	Other wireless networks, IEEE 802.11, Bluetooth, new trends and new technologies	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials

VI. Assessment Methods

Final Exam: 75%

Coursework: 25%

VII. Module Resources

William Stallings, Wireless Communications and Networks, Second Edition, Pearson Prentice Hall.

Theodore S. Rappaport, Wireless communications principles and practice, 2nd Edition, Prentice Hall .

Andrea Goldsmith, wireless communications, Cambridge University Press, 2005.

Authors: Dr Michael Chai

Reviewer: Dr Yue Chen

< Communication Systems Electronics > Course Syllabus

I. Basic Information

Module Name	Chinese: 通信系统电子学		**Module Code**	EBU6444/3512164441
	English: Communication Systems Electronics			
Credits /	2.5/40	**Compulsory (√)**	**Semester**	7

Hours		**/ Elective ( )**		
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management	
Prerequisites	Signal and Systems Theory; Digital System Design; Maths			

II. Teaching Objectives

This course is intended to equip participants with a basic understanding of the operation of modern radio communications systems, and includes the design and operation of amplifiers, oscillators, mixers, filters, modulators and demodulators for modern electronic communication systems.

By the end of the module the student will be able to:

- Explain radio frequency spectrum and the bands used for different types of radio systems.
- Describe the behaviour of basic electronic components at radio frequencies.
- Explain the basic principles of modulation and demodulation used in radio communication systems.
- Explain the basic electronic functions necessary to implement amplitude and frequency modulated radio transmitters and receivers.
- Explain the principles of coupling circuit design including L-C filter design.
- Design simple low-pass and high-pass filters to meet a given specification.
- Use transistor small-signal equivalent circuits in the analysis and design of radio system circuits.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Relevant basic signal and systems, and circuit theory will be discussed and revised to solve the engineering problem in radio transceivers. There are tested by Exam + Class Test. Feedback is given to students on the Class Test during Tutorials.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Engineering principles in this case include aspects such as fundamental theorems. These can be applied to new design processes - examples like emerging smart phone technologies . Assessment will be through parts of examination questions.

		Feedback is given to students on the Class Test and Tutorials.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Analytical methods are a core part of this module - different aspects of transceivers are analysed and their performance identified - e.g. high and low-level transmitters, mixers, filters, etc. These calculations are tested in examination questions. Feedback is given to students on the Class Test and Tutorials.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	A basic superheterodyne radio system is addressed in this module, which can be transferred to more advanced system such as the design of smart phones.
D6m	Communicate their work to technical and non-technical audiences.	To some extent The design processes in radio receivers are very complex and beyond the level of an undergraduate degree to complete it alone. This module allows some aspects of applying design knowledge to unfamiliar situations, but only to the extent of examination questions that are framed in an unfamiliar context and feedback is given to students on the Tutorials.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	To some extent The module will ask students to consider the cost of the radio receiver design and choice of components, and how to generate the potential new architecture through class discussions.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and knowledge of professional codes of conduct.	A brief introduction on cost and performance in the transceiver design has been given during the lectures. The balance between the cost and performance of the radio transceiver design and networks was also discussed during the tutorial time. These topics were listed as questions and students discussed among themselves, and a summary was given by lecturers in the end.
EP5p	Knowledge of relevant legal and contractual issues.	A range of design standards, e.g. interference required and ITU frequency harmonization among different countries and regions was introduced during the lectures.

EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.	A number of passive and active components, e.g. resistors, capacitors, inductors, diodes and transistors, are introduced. The effects on the circuits design on the higher RF frequencies are analysed. The assessment is carried out through class tests and exams.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	RF SPECTRUM: Revision of basic RF spectrum. Radio transmission bands. Regulatory considerations. And COUPLING NETWORKS; FILTERS: The design of RF coupling networks; design of basic Low Pass, High Pass, Band Pass and Band Stop filters.	10
2	MODULATION; DEMODULATION: AM; FM modulation principles; basic modulation; demodulation circuits. Digital modulation principles; basic digital modulation; demodulation circuits.	10
3	BEHAVIOUR OF ELECTRONIC COMPONENTS AT RF: Behaviour of R, L and C at RF; use of reactance plots and reactance charts. Transistor equivalent circuits for RF applications.	10
4	AMPLIFIERS: Revision of basic amplifier circuits. Multi-stage small-signal linear amplifiers. Class B and C amplifiers; switching amplifiers. R.F.; wideband amplifiers. Noise in amplifiers. Principles of feedback; feedforward. Frequency response.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 80%;

Class test 1: 10%;

Class test 2: 10%.

VII. Module Resources

Some recommended books:

- Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam by Bryan Basham and Kathy Sierra
- SCJP Sun Certified Programmer for Java 6 Study Guide: Exam (310-065): Exam 310-065 by Kathy Sierra

The software needed for labs and coursework are:

- Java (J2EE and J2SE) development paltform

- Putty, VNC and WINSCP
- JSP and Servlet
- Apache Tomcat, Apache Qpid and MySQL
- HTML, XML, JavaScript and JSON

Authors: Dr Yasir Alfadhl

Reviewer: Dr Yue Chen

< Multimedia Fundamentals > Course Syllabus

I. Basic Information

Module Name	Chinese: 多媒体基础 English: Multimedia Fundamentals		**Module Code**	EBU5303/3512153031
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management (Multimedia)	
Prerequisites	None			

II. Teaching Objectives

This module provides fundamentals of multimedia processing, including sound, graphics, images and videos. JavaScript and HTML5 are also introduced, including the new graphics, audio and video elements. Interactive multimedia content is developed in the labs and in mini-projects.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Binary system, bit-based encoding are covered in lectures and assessed in exam.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	The application of Fourier and Discrete Cosine Transforms to audio, image and video compression is covered in lectures and assessed in exam.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Principles of digitisation, and signal domain transforms covered in lectures and assessed in exam. The module also addresses concepts from human factors, which students must apply in their multimedia project. Assessed in exam, and mini projects.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Lectures cover fundamental principles of multimedia processing (digitisation, image, sound and video digital representations). Assessed in exam and coursework.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Students required to analyse and select media based on their properties, including making trade-offs between visual quality and size. Assessed in coursework.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Students required to apply adequate media compression methods in their mini projects to manage size.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Students required to demonstrate competencies in problem identification, analysis, design and development of interactive multimedia content. Assessed in coursework.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Students required to analyse task and identify constraints and issues. Assessed in coursework.

D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Students assess fitness for purpose of project against requirements. Assessed in coursework.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Students required to design interactive multimedia content to fulfil identified users' needs. Assessed in coursework.
ET3p	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives.	Project management is addressed in lectures and practiced during the mini projects. Assessed in coursework.
EP3p	Ability to apply relevant practical and laboratory skills.	Students are required to demonstrate knowledge of interactive media production (HTML5, JavaScript). Practiced in laboratory and assessed in coursework.
EP6p	Understanding of appropriate codes of practice and industry standards.	Lectures address current industry standards in image and video compression and formatting (JPEG, MPEG). Assessed in exam.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to digital media. Digitisation. Colour spaces. Introduction to JavaScript and HTML5.	10
2	2D Graphics and animation. Image representation and compression.	10
3	Video representation and compression.	10
4	Audio representation and compression. Revisions.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures, Tutorials and Labs.

VI. Assessment Methods

Close-book Examination 75%, Lab exercises 10%, Coursework assignment 15%.

VII. Module Resources

Recommended reading:

- The Science of Digital Media, by J. Burg

- Digital Multimedia, by Chapman & Chapman (3rd edition)
- The Principles and Processes of Interactive Design, by J. Steane

Author: Dr Marie-Luce Bourguet

Reviewer: Dr Yue Chen

< Advanced Transform Methods > Course Syllabus

I. Basic Information

Module Name	Chinese: 高级变换 English: Advanced Transform Methods		**Module Code**	EBU6018/3512171801
Credits / Hours	3/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management (Multimedia)	
Prerequisites	BBU6502: Digital Signal Processing.			

II. Teaching Objectives

The broad aims of this module are to introduce transform and sub-band techniques and how these may be applied to compression and other applications related to signal, image, video and audio processing.

By the end of the module the student will be able to:

- Recall a range of joint time-frequency transforms.
- Discuss the relative merits of different transforms.
- Employ the common mathematical framework underlying many transform methods.
- Derive various properties of different transforms.
- Use high performance mathematical visualization software (e.g. Matlab) to implement these transforms.
- Apply these transforms to signal and image processing problems, such as compression or denoising.
- Analyse the results of practical work and write technical reports
- Compare technical information and as a result select appropriate techniques for the solution of

technical problems

- Understand the practical implications of mathematical derivations
- Use and interpret the results of software simulations.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Development of frequency and time-frequency analysis from Fourier through to need to develop wavelet functions and other time-frequency techniques for particular applications. Overview assessed in exam.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	As applied to t-f analysis. Assessed in exam and lab.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Applications of time/frequency and spatial/rate-of-change transforms to a variety of applications such as signals and images. Assessed in exam and labs.
SM1m	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Underpinning mathematical basis of the Uncertainty Principle and time-frequency transforms and an overview of their applications.Assessed in exam.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Understand the different characteristics and applications of a variety of frequency and time-frequency transforms.Covered in lectures and assessed in exam and lab.
EP3p	Ability to apply relevant practical and laboratory skills.	Use of Matlab in the application of a variety of transforms to a range of signals and images.

IV. Teaching Content and Course Schedules

No.	Teaching Content: Schedule EBU6018 Advanced Transform Methods	Hours
1	Introduction/overview; Linear algebra; basis functions; Fourier Transform, DFT	10
2	FFT; Short-time Fourier Transform; Spectrogram; Discrete Cosine Transform	10
3	Introduction to Uncertainty Principle; Karhunen-Loeve Transform; Principal Component Analysis; Haar Functions; Wavelet Transform; Scalogram	10
4	Sub-band filtering; multiresolution analysis; wigner-ville distribution; revision	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Labs.

VI. Assessment Methods

Exam: 80%

Lab 1: DFT/FFT/STFT: 7.0%

Lab 2: Wavelet Transforms: 8.0%

Class test 1: 2.5%

Class test 2: 2.5%

VII. Module Resources

None

Authors: Andrew R Watson

Reviewer: Dr Marie-Luce Bourguet

< Image and Video Processing > Course Syllabus

I. Basic Information

Module Name	Chinese: 图形与视频处理 English: Image and Video Processing		**Module Code**	EBU6230/3512162301
Credits / Hours	3 /48	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management (Multimedia)	

Prerequisites	Digital Signal Processing

II. Teaching Objectives

- To give students an understanding of the theoretical base for image and video processing.
- To enable students to understand how image and video manipulation and enhancement operates.
- To impart understanding of image and video coding techniques.
- To give students experience of writing and testing software that manipulates and enhances images.

By the end of the module the student will be able to:

- [US1] The development of image coding and video coding as a series of historical developments (Exam)
- [US2] A typical example in this occurs is the analysis of motion in video from the motion equations and the assumptions that must be made to obtain a solution. (Exam and Assignment)
- [US3m] The use of edge and corner detectors are examples here. They have limitations that are described in the course. (Assignment)
- [E1] Image processing principles must be understood and applied to solve image improvement and image and video compression problems. (Exam and Assignment)
- [E2] The analysis of the image and video coding techniques covers this item. (Exam)
- [E2m] The lab work requires a mixture of using Matlab components and user software. This shows the limitations of both to solve the problems set. (Exam and Assignment)
- [E3] The use of Matlab and the exercises using convolution kernels to process images. (Assignment)
- [E3m] The labwork where tasks are set and students have to decide on Matlab tools to use. (Assignment)
- [E4] Understanding of the series of processes used in video coding is a systems approach as is the lab work where tools are assembled for a complete processing system. (Exam and Assignment)
- [D4] The lab requires creativity to solve the problems set. (Assignmen)

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	The development of image coding and video coding as a series of historical developments. Evaluated by exam and MCQ.

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	A typical example in this course is the analysis of motion in video from the motion equations and the assumptions that must be made to obtain a solution. Assessed by exam.
SM1m	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	The use of edge and corner detectors are examples here. They have limitations that are described in the course and students are tested on the knowledge in the exam and second MCQ.
SM4m	Awareness of developing technologies related to own specialisation.	
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Image processing principles must be understood and applied to solve image improvement and image and video compression problems. Evaluated by exam and MCQs
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	The analysis of the image and video coding techniques covers this item Assessed by MCQ and exam.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	The use of Matlab and the exercises using convolution kernels to process images. This is assessed by MCQ, lab and exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Understanding of the series of processes used in video coding is a systems approach as is the lab work where tools are assembled for a complete processing system. Evaluated by exam and lab report.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Various scenarios related to SFN and other standards are provided. In the class test and tutorial session students are asked to use standard description to analyse the scenario and then find the appropriate solution.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Image representation, colour theory, histograms	10

No.	Teaching Content	Hours
2	Image transformations, filtering.	10
3	Image edge detection, interest point detection, image morphology	10
4	Colour processing, JPEG	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 80%;

MCQ1: 2%;

MCQ2: 2%;

Lab report: 16%.

VII. Module Resources

None

Authors: Dr Alan Pearmain, Dr Miles Hansard

Reviewer: Dr Marie-Luce Bourguet

< Interactive Media Design and Production > Course Syllabus

I. Basic Information

<table>
<tr><td rowspan="2">Module Name</td><td colspan="3">Chinese: 交互式媒体设计</td><td rowspan="2">Module Code</td><td rowspan="2">EBU6305/3512153051</td></tr>
<tr><td colspan="3">English: Interactive Media Design and Production</td></tr>
<tr><td>Credits / Hours</td><td>3 /48</td><td colspan="2">Compulsory (√) / Elective ( )</td><td>Semester</td><td>6</td></tr>
<tr><td>Module Type</td><td colspan="2">General Courses</td><td>Applicable Programm</td><td colspan="2">Telecommunications Engineering with Management (Multimedia)</td></tr>
<tr><td>Prerequisites</td><td colspan="5">None</td></tr>
</table>

II. Teaching Objectives

To study human aspects and interaction in the creation of informative media structures using

commercial tools

To practice presentation and design using interactive media tools

To discuss usability principles and evaluation for interactive media.

Demonstrate the skills needed for interaction in the creation of artistic and informative media structures.

Demonstrate skills in presentation design according to human thinking, action and creative dimensions.

Explain different aspects of interactive media dimensions including combinations of media production and information sciences, arts subjects and education.

Explain how interactive multimedia is produced.

Demonstrate skill in producing interactive multimedia.

Explain how interactive multimedia is processed and managed.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	Binary system, bit-based encoding will be revised in lectures.
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	The application of Fourier and Discrete Cosine Transforms to audio, image and video compression is revised in lectures and applied in coursework.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	The module addresses concepts from ergonomics, cognitive psychology and human factors, which students must apply in their multimedia project. Assessed in exam, during project demonstration and by peer evaluation.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Lectures cover aspects of human computer interaction. This is then applied to the multimedia design process. Assessed in exam and coursework.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Groups required to analyse and select media based on their properties, including making trade-offs between visual quality and size. Assessed during project demonstration.

EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Students required to apply adequate media compression methods in their group projects to manage size. Assessed during project demonstration.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Groups required to demonstrate competencies in problem identification, analysis, design and development of an interactive media application. Assessed during project demonstration.
D6i	Communicate their work to technical and non-technical audiences.	Teams required to define and analyse needs of their application's target audience. Assessed in Project portfolio.
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Project teams required to analyse task and identify constraints and issues. Assessed in Project portfolio.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Project teams required to make design decision based on estimated target audience's needs and to evaluate their decisions using heuristic evaluation.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Teams assess fitness for purpose of project against requirements. Assessed in Project portfolio, demonstration and by peer evaluation.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Lectures address the multimedia design process, and design evaluation using heuristics. Teams required to design a multimedia application to fulfil identified users' needs. Assessed in exam, project portfolio, demonstration and by peer evaluation.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Project portfolios are made public and demonstrations are conducted for peers.
ET6i	Awareness of risk issues, including health & safety, environmental and commercial risk.	Multimedia projects professional codes of conduct exposed during talk from alumnus.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Project management is addressed in lectures and practiced during the group project. Assessed in the project portfolio.
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Legal requirements related to multimedia projects (intellectual property rights and product safety) addressed in lectures, applied during group project.
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	Students are required to demonstrate working knowledge of project planning and time control, and oral communication. Assessed in

		project portfolio and demonstration.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Students are required to demonstrate knowledge of interactive media production tools and multimedia design process. Practiced in laboratory and assessed in group project demonstration.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Students are required to demonstrate knowledge of interactive media production tools (Flash, H5P, HTML5, JavaScript). Practiced in laboratory and assessed in group project demonstration.
EP3p	Ability to apply relevant practical and laboratory skills.	Students referred to literature on user profiling and usability evaluation. Assessed in exam. Students also required to use technical literature and online information sources related to multimedia programming to perform coursework assignment.
EP5p	Knowledge of relevant legal and contractual issues.	Lectures revise current industry standards in image and video compression and formatting (JPEG, MPEG).
EP6p	Understanding of appropriate codes of practice and industry standards.	Students are required to demonstrate practical knowledge of designing a method to evaluate and assess the performance of their software system against its design requirements. Assessed in project portfolio and during project demonstration.
EP8p	Ability to work with technical uncertainty.	Students are required to work in self-selected teams for their multimedia project and to distribute roles. Monitored during regular meetings with teaching assistants and in group project portfolio.

IV. Teaching Content and Course Schedules

Teaching schedule of EBU6305: Interactive Media Design and Production

No.	Teaching Content	Hours
1	Introduction to module's context and scope; Introduction to the Design Process; The Information phase of the Design Process.	10
2	The Interaction phase of the Design Process; Cognitive psychology; Use of the media; Structure and navigation.	10
3	The Presentation phase of the Design Process.	10
4	Heuristic evaluation; Coursework presentations; Revisions.	10

No.	Teaching Content	Hours
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 75%;

Lab 7: coursework (evaluation and submission): 25%

VII. Module Resources

None

Authors: Dr Marie-Luce Bourguet

Reviewer: Dr Yue Chen

< 3D Graphics Programming Tools > Course Syllabus

I. Basic Information

Module Name	Chinese: 3D图形程序设计 English: 3D Graphics Programming Tools		**Module Code**	EBU7405/3512154051
Credits / Hours	3 /48	**Compulsory (√) / Elective ( )**	**Semester**	7
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management (Multimedia)	
Prerequisites	Programming Fundamentals			

II. Teaching Objectives

The aim of the course is to give the students fundamental knowledge about techniques for programming 3D graphics, computer driven animation and virtual reality applications. At the end of the course the students will be able to understand the basic transformations and rendering techniques for the creation of virtual reality and understand the most relevant programming tools for 3D graphics. Moreover, students will be able to implement computer generated animations and to implement 3D graphics using

OpenGL.

- Understanding of the most relevant programming tools for 3D graphics.
- Ability to implement 3D graphics using OpenGL.
- Understand basic transformations and rendering techniques for the creation of virtual Reality.
- Ability to implement computer generated animations.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	Geometric primitives, Linear algebra, vectors and matrice representation and composition, trigonometry, are addressed in lectures and used throughout. Assessed in exam.
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Matrix methods are used throughout for modelling, viewing and projection transformations. Assessed in exam.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Principles of modelling, camera, as well as lighting, illumination and reflection are covered in lectures, assessed in exam and coursework assignment.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Lectures cover fundamental principles of 3D Graphics (modeling and rendering), which are applied in coursework. Assessed in exam and coursework assignment.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Students required to create abstract 3D models using primitive components. Assessed in coursework assignment.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Students required to apply adequate 3D rendering methods and algorithms. Assessed in coursework assignment.
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Students required to analyse task and identify constraints and issues. Assessed in coursework assignment.

D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	Students required to apply modelling techniques to produce "realistic" 3D Graphics. Assessed in coursework assignment.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Students required to apply problem-solving skills and 3D modelling and rendering technical knowledge to create unique graphics according to fuzzy requirements. Assessed in coursework assignment.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Students required to plan and manage 3D modelling design to create unique graphics according to fuzzy requirements. Assessed in coursework assignment.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Creative 3D projects management addressed in lecture, practiced and assessed in coursework.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Students are required to demonstrate knowledge of 3D programming tools (OpenGL). Assessed in exam and coursework assignment.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Students are practicing 3D programming in laboratory and applying their skills in coursework assignment.
EP3p	Ability to apply relevant practical and laboratory skills.	Students required to use technical literature and online information sources related to openGL to perform coursework assignment.
EP5p	Knowledge of relevant legal and contractual issues.	Students understand and use one of the main 3D programming industry standard (OpenGL).

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to module’s context and scope; 3D Computer Graphics softwares; Introduction to OpenGL (2D).	10
2	Object modelling; OpenGL (3D); Modelling transformations; OpenGL transformations; Hierarchical modelling.	10
3	Colours; Lighting calculations; Projection.	10
4	The Rendering pipeline; The OpenGL camera; Rasterisation; Revisions.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 75%;

Lab 8. coursework (Light sources and submiss): 25%

VII. Module Resources

None

Authors: Dr Marie-Luce Bourguet

Reviewer: Dr Yue Chen

< Computer Vision > Course Syllabus

I. Basic Information

Module Name	Chinese: 计算机视觉 English: Computer Vision		**Module Code**	EBU7240/3512172401
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	7
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management Multimedia	
Prerequisites	Image and Video Processing			

II. Teaching Objectives

To give an updated account of both established and ongoing research in computer vision, statistical learning theories, data mining and clustering in multivariate space. Applications in human face, gesture and visual behaviour recognition are used to illustrate the workings in some of the state-of-the-art machine vision and imaging systems.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Probability and information theory will be revised and applied in more complex machine learning algorithms. Assessed in both coursework and exam.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Machine learning principles will be applied to the analysis of key computer vision problems and processes. Introduced in lectures and practiced in labs.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Analytical methods and modelling techniques used in the description of the performance of machine learning algorithms for computer vision problems. Assessed in coursework and exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Machine learning algorithms used to solve computer vision problems. Assessed in coursework and exam.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	The lab exercises provide only the problem specification and some guidance. The students have to plan about the usage of proper modelling technique and estimate the cost in real implementation.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	The students will be asked to apply the principles of machine learning to solve unfamiliar computer vision problems, in both coursework and exam.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Lectures will discuss the features of common machine learning processes and platforms.
EP3p	Ability to apply relevant practical and laboratory skills.	In lab sessions students will apply learnt techniques to solving computer vision problems.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Relevant probability and information theory; Experimental set-up of machine learning.	10
2	Hidden Markov modeling	10
3	Clustering and classification	10
4	Neural Networks	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures, Tutorials and Labs.

VI. Assessment Methods

Close-book Examination 80%, Coursework assignment 20%.

VII. Module Resources

Recommended reading:

- Pattern Classification by Duda Hart and Stork; 2nd Edition
- Pattern Recognition and Machine Learning by C. M. Bishop
- Probability Random Variables and Stochastic Processes by A. Papoulis
- Neural Networks for Pattern Recognition by C. M. Bishop

Author: Dr Marie-Luce Bourguet

Reviewer: Dr Yue Chen

< e-Commerce Law > Course Syllabus

I. Basic Information

Module Name	Chinese: 电子商务法 English: e-Commerce Law		**Module Code**	EBU5027/3512150271
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	E-commerce Engineering with law.	
Prerequisites	Fundamentals of Law, a constituent part of EBC6001: Engineering Environment (H6NF).			

II. Teaching Objectives

The overall aim is for the students to acquire basic knowledge and understanding of the laws and the regulatory environment for electronic commerce transactionsheighten their awareness of legal obligations, risks and proportionate legal liability in the complex and frequently ambiguous legal environment in which electronic commerce businesses operate develop their ability to navigate the risks competently by taking

appropriate action including seeking expert legal support where necessary.

By the end of the module the student will be able to: Understand and apply the law in relation to: Formation of valid online contractsThe regulation of the new types of online commercial activities made possible by technology, such as electronic payments, file sharing and others The risk of being subject to jurisdiction in more than one country and how businesses respond to cross border issuesThe liability of internet service providers for the acts of their subscribers The basic principles of consumer protection law and their application to B2C relationshipsSome of the regulatory issues ancillary to online contracting.

By the end of the module the student will be able to: Retrieve, evaluate, analyze and synthesize information to solve problemsImprove written and communication skills

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Where applicable within the syllabus, students are made aware of customer and user needs. Assessed through coursework.
D6p	Communicate their work to technical and non-technical audiences.	Opportunity given through constant discussion and presentations in class, not formally assessed.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Informs discussions with students where applicable within the syllabus. Not formally assessed.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.	This is an integral aspect of all law modules. Assessed through coursework and exams.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Informs discussions with students where applicable within the syllabus. Assessed through coursework as applicable.
EP5p	Knowledge of relevant legal and contractual issues.	This is an integral aspect of all law modules. Assessed through coursework and exams.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Contract law as applied to online transactions Enforceability of electronic transactions and electronic signatures	10

2	ISP liability and Regulation of the Internet	10
3	Jurisdiction issues in online transactions Advertising law & Consumer Protection Law as applied to online transactions	10
4	Regulation of electronic payments and cryptocurrencies	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 50%

Problem Solving Question: 50.0%

Facts Based Problem Question: 50.0%

VII. Module Resources

None

Authors: Ms Bindu Chib

Reviewer: Dr Ling Ma

< Information Security and Privacy Law > Course Syllabus

I. Basic Information

Module Name	Chinese: 信息及隐私保护法 English: Information Security and Privacy Law		**Module Code**	EBU6008/3512160081
Credits / Hours	2.5 /40	**Compulsory (√) / Elective ( )**	**Semester**	6
Module Type	General Courses	**Applicable Programm**	E-Commerce Engineering with Law	
Prerequisites	None			

II. Teaching Objectives

The core aims of the module are:

- To instill in the students a clear understanding of the importance of information security and the key legal obligations upon business in the ecommerce sector with regards to protecting the security of third party information in particular

- To give the students a clear understanding of the importance of privacy at the individual level, as well as the reasonable limits thereof (e.g. national security, crime prevention). Building on this, a good working understanding of both Chinese and EU information privacy laws and their implications for the ecommerce sector.

Students who engage fully with the module will take away from this a knowledge and understanding of the importance of these issues, the key legal obligations, and be able, when working in an ecommerce context, to design websites and processes in a manner which ensures that they are compliant with the relevant laws. Further, they should also be able to spot any legal problems which may arise and know either how to solve them or when to consult company lawyers.

On completion of the module, students will:

1. Demonstrate a comprehensive, detailed and critical knowledge of the concepts, values, principles and rules of Information Security and Privacy Law

2. Demonstrate understanding of the social and political contexts in which Information Security and Privacy Law operates

3. Critically evaluate challenges posed by the transnational implications of Information Security and Privacy Law.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	e.g Teams required to analyse task and identify constraints and issues. Assessed in Project Specification document.
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Knowledge and understanding of the laws and regulations that impact privacy and information security and application of web engineering principles to manage such risks and compliance. Assessed through coursework and end of term written examination.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to Information Security law, US and EU sources of legal obligations	10
2	Chinese sources of legal obligations, HIPPA, risk analysis and risk management	10
3	Introduction to Privacy & Privacy laws, European data protection law	10
4	Chinese data protection laws, Hong Kong, The APEC Privacy Framework.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 50%;

Facts Based Problem Question or Essay Question – Privacy Law: 25%;

Facts Based Problem Question or Essay Question – Information Security Law: 25%.

VII. Module Resources

COSO Internal Controls

Data Security and Cybercrime in China – Lexology

Developing Security Program (Smedinghoff)

Liability of Technology Companies for Data Breaches

New Era Compliance

Protecting Personal Information Business Guide

State of IS Law

Alan Westin Privacy & Freedom

Roger Clarke Privacy Introduction and Definitions

Samuel D Warren & Lous D Brandeis The right to privacy

EU Data Protection Law UK Information Commissioner’s Office Overview of the EU General Data Pr otection Regulation

Chinese Privacy Law DLA Piper Data Protection Laws of the World: Overview of Chinese Data Prote ction Laws

Hong Kong SAR Data Protection Laws Privacy Commissioner for Personal Data Hong Kong, official website

2014 Overview of Hong Kong’s Personal Data (Privacy) Ordinance by law firm Hogan Lovells APEC “Updates to the APEC Privacy System” November 2016

Authors: Bindu Chib and Anne Flanagan

Reviewer: Dr Ling Ma

< Information Systems Management > Course Syllabus

I. Basic Information

Module Name	Chinese: 信息系统管理 English: Information Systems Management		**Module Code**	EBU6610/3512166101
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	7
Module Type	General Courses	**Applicable Programm**	E-Commerce Engineering with Law	
Prerequisites	None			

II. Teaching Objectives

The objective is to understand the key challenges in e-commerce systems, including information management, distributed systems, application security.

Understand how information is defined, managed and protected in e-commerce environments

Understand the challenges of real-world e-commerce/m-commerce/distributed systems.

Understand novel distributed applications built on middleware technologies.

Relate data to information and its uses in large-scale e-commerce systems

Understand the importance of security in complex environments

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Covered throughout the module (data management and security), assessed both in coursework and exam

EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Security lectures, assessed in coursework and exam
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Looking at Java Enterprise Edition ecosystem and how its components can add together to form a complete service based architecture for a complex problem. Taught in lectures and tested in exam and coursework.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Covered in the security lectures and lectures about JEE systems, assessed in coursework and exam
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	Covered in web services lectures assessed in exam
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Information flows covered in XML, JSOn Ajax, info format, web services security lectures, assessed in exam
EP5p	Knowledge of relevant legal and contractual issues.	Privacy lectures, assessed in the coursework
EP6p	Understanding of appropriate codes of practice and industry standards.	Assessed in the formative assessments and in the exam

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Distributed systems basics, Symmetric and asymmetric crytography	10
2	Digital signing, Web security, cloud computing basics	10
3	Information, Data & Metadata; XML; XML Schemas; JSON; CSV	10
4	HTTP for Information Systems; RESTful Web APIs; AJAX; AJAX & Security	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials; Writing development techniques.

VI. Assessment Methods

Exam: 80%;

Class Test (Richard): 10%;

Class Test (Karen): 10%.

VII. Module Resources

XML: A Beginner's Guide: Go Beyond the Basics with Ajax, XHTML, XPath 2.0, XSLT 2.0 and XQuery; Steven Holzner; McGraw-Hill Osborne, 2009; 0071606262

DISTRIBUTED SYSTEMS Concepts and Design Fifth Edition; George Coulouris,Jean Dollimore, Tim Kindberg, Gordon Blair, 2012;

Authors: Dr Karen Shoop and Dr John Bigham

Reviewer: Dr Ling Ma

< Security and Authentication > Course Syllabus

I. Basic Information

Module Name	Chinese: 安全与认证 English: Security and Authentication		**Module Code**	EBU7140/3512171401
Credits / Hours	2.5 /40	**Compulsory (√) / Elective ( )**	**Semester**	7
Module Type	General Courses	**Applicable Programm**	E-Commerce Engineering with Law Internet of Things Engineering	
Prerequisites	None			

II. Teaching Objectives

To explain the principles and practice of network security,

To enable the student to understand the functionality, strengths and vulnerabilities of the existing network security features.

To cover different encryption/decryption and security protocols.

The material is sufficient to enable the student to understand the functionality, strengths and vulnerabilities of the existing network security features. Consideration is also given to different encryption/decryption and security protocols.

At the end of this module students will have an in-depth knowledge on encryption methods, potential threats and the characteristics of defences in the Internet environment:

• The strengths and weaknesses of the present state of security and authentication on the Internet

together with the opportunities and threats to e-commerce over the World-Wide Web.

- Security protocols and methods used,
- Principles of Cryptography and public/private- key encryption
- Message and author authentication

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	The concept of binary encryption, fundamentally based on XOR functions together with permutation and substitution methods. Assessed in the calss-tests, coursework and in exam.
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Statistical analysis of data to demonstrate weaknesses of certain encryption algorithms (e.g. cryptoanalysis) to find the encrytpion key of Caesar cipehers. Assessed in the exam.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Understanding of human factors to improve the design of security mechanisms (e.g. to minimise the effect of social engineering etc). Assessed in the exam.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Deep understanding of the concept of public-Key encryption algorithms, based on discrete algorithms. Assessed in the calss-tests, coursework and in exam.
SM1m	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Higher-level of statistical analysis of data to demonstrate weaknesses of certain encryption and authentication algorithms (e.g. birthday paradox attack). Assessed in the exam.

EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	Understanding the user requirements and applying various solutions of the authentication or encryption processes. Assessed in the coursework and in the exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Providing approperiate choices of solutions based on a range of parameters, such as speed vs thouroughness. Examples of methos are DES AES and RSA. Assessed in the coursework and in the exam.
D6i	Communicate their work to technical and non-technical audiences.	Understanding the user requirements and applying various solutions of the authentication or encryption processes. Assessed in the exam.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	The choice of Public or conventional encryption based on the computational power. Also the choice of Public Key type based on cost (week 2). Assessed in the exam.
D6p	Communicate their work to technical and non-technical audiences.	Understanding the user requirements and applying various solutions of the authentication or encryption processes. Assessed in the exam.
D4m	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	The choice of Public or conventional encryption based on the computational power. Also the choice of Public Key type based on cost (week 2). Assessed in the exam.
D6m	Communicate their work to technical and non-technical audiences.	Understanding the user requirements and applying various solutions of the authentication or encryption processes. Assessed in the exam.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	Understanding the user requirements and applying various solutions of the authentication or encryption processes. Assessed in the exam.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.	Contents relating to data security assessment.
EP3p	Ability to apply relevant practical and laboratory skills.	Research abiligies to provide solutions on data security is demonstrated and assessed in the coursework.
EP4p	Understanding of the use of technical literature and other information sources.	Highlightedcontrasted in RSA, PGP assessed in the exam.

EP5p	Knowledge of relevant legal and contractual issues.	various standards, e.g. DES, AES, assessed in the exam.
EP3m	Ability to apply relevant practical and laboratory skills.	Research abiligies on data security mechanisms and services. Demonstrated and assessed in the coursework.
EP4m	Understanding of the use of technical literature and other information sources.	Association of certification authorities with patented methods such as RSA. Coverage of legal impllications of new developments with discussing PGP as an example. Assessed in the exam.
EP5m	Knowledge of relevant legal and contractual issues.	Lectures covering detailed technical information on various encryption and authentication standards, e.g. DES, AES, Hash algorithms. Assessed in the exam.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.	The choice of security mechanism (or algorithms) is based on a number of factors, such as computational cost, time constraints, and exportability of certain techologies (an example is HMAC design for various commercial applications). Discussed in lectures, assessed in the coursework and in the exam where these factors need to be taken into consideration to select the approperiate choice of solution.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction (Basic concepts of security and cryptography). Highlights: Network security architectures, attack types and mechanisms. Classification of cryptography, Caesar, Vigenère, Rotor, Grille, Playfair, and one time pad methods. Key exchange processes. Cryptanalysis Cryptoanalysis. Conventional encryption including detailed description of (Feistel Algorithm, DES, double DES and TDEA, Rijndale cipher and AES.), modes of operation and key distribution.	10
2	Public-Key encryption, methods, Euler's totient function, RSA, Diffie-Hellman, Discrete Algorithms and other Public Keys. Authentication, Man-in-the-middle attack example, and how to prevent it. Message authentication, MAC and hash/MAC functions, HMAC, the birthday attack.	10
3	Authentication applications Kerberos, threats, approach, authentication process, types of services, sessions, versions and environments. X.509. IPSEC Architecture, services, authentication header, ESP, DOI, SA, ESP, security associations, Oakley, ISAKMP Firewalls, Trusted systems.	10
4	Web Security, threats, SSL & TLS, architecture, handshake protocol, change cipher spec protocol, alert protocol	10

No.	Teaching Content	Hours
	Secure Electronic Transactions (SET), dual signature, payment getaway. Email Security, requirements, detached signature, mechanisms, PGP, S/MIME, PGP/MIME, enveloped data. DDoS types and network security.	
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 75%;

Submitted CW report (based on a Quiz and min): 20%;

Class test 1: 1.25%;

Class test 2: 1.25%;

Class test 3: 1.25%;

Class test 4: 1.25%.

VII. Module Resources

None

Authors: Dr Yasir Alfadhl

Reviewer: Dr Michael Chai, Dr Ling Ma

< Ad hoc Networks > Course Syllabus

I. Basic Information

Module Name	Chinese: 自组织网络 English: Ad hoc Networks		**Module Code**	EBU5211
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering.	
Prerequisites	None.			

II. Teaching Objectives

This module provides a theoretical base for broadband wireless networks and ad hoc networks explaining core features, protocols and routing algorithms. These types of networks will be the key to the Internet of Things.

At the end of this module students will be able to:

• Understand engineering principles and the ability to apply them to analyse key engineering processes.

• Learning identifying scientific problems in telecom networks

• To apply quantitative methods and computer software relevant to the engineering discipline, in order to solve engineering problems.

• Understand a systems approach to engineering problems and to work with uncertainty.

• To identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.

Weekly in-class open question test will help students develop the following skills:

• practicing searching for, reading and understanding scientific articles.

• being able to compare various approaches to solve a scientific problem.

• proposing systematic solution based on materials

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	the 1st topic in this module is introduction about the modern mobile networks, including technique evolution, system infrastructure, basic functionalities, etc. Not in accessment

SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	from teaching week 2, a in-class test is carried out on the last teaching day. The test consists of two questions, one close ending and one open ending. The open ending question aims to train the students' skills to apply relevant knowledge together to work out the solutions. Not in accessment
SM4m	Awareness of developing technologies related to own specialisation.	some of the topics (ad hoc routing, ad hoc reliable transmissio, ad hoc multicsting, etc) are research based topics.The corresponding technologies are still under developping. Not in accessment
EA3i	Ability to use the results of engineering analysis to solve engineering problems and to recommend appropriate action.	open ending question in class test requests an detailed analysis of how to tackle the problems before providing solutions. for example, the desgin of new ad hoc application scenario requries general requiements of communiation system, such as functionality, fesibility, security, scalibility, etc. Assessed in coursework and exams
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	in-class test open ending question requests systematic analytical skill to work out the possible solution. For iinstance, design an routing algorithm for ad hoc routing protocl. The algorithm itself depends on what information each node can obtain via the corresponding protocol and aproperiate design analysis requrest system level understanding. Assessed in coursework and exams
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	open ending question in class test requests an detailed analysis of how to tackle the problems before providing solutions. for example, the desgin of new ad hoc application scenario requries general requiements of communiation system, such as functionality, fesibility, security, scalibility, etc. Assessed in coursework and exams
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	in-class test open ending question requests systematic analytical skill to work out the possible solution. For iinstance, design an routing algorithm for ad hoc routing protocl. The algorithm itself depends on what information each node can obtain via the corresponding protocol and aproperiate design analysis requrest system level understanding. Assessed in coursework and exams
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	in-class test open ending question requests systematic analytical skill to work out the possible solution. For instance, the design of routing table contents for ad hoc multi-cast routing protocol requests a through analysis of the functionality of the corresponding protocol, including route establish and maintanance. Assessed in coursework

EP4p	Understanding of the use of technical literature and other information sources.	recommended books are highly related to course materials and beyond. Additioanl research papers are provided via QM+ for stuents' self-learning. Assessed in coursework

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Wireless Broadband Access, Mobile Network (technology evolution, basic network infrastructure, fundamental concept of cell coverage, uplink/downlink interferences, frequency reuse, etc), Mobile Ad Hoc Network Application, challenges of Mobile ad hoc (technique wise)	10
2	Transport layer: Classic TCP operation in wired TCP/IP network (end-to-end connection, reliable transmission, flow control, congestion control,) and Mobile Ad hoc Network TCP (TCP-F, TCP-Bus),	10
3	Network Layer (Unicasting): Internet Protocol, classic routing algorithm (Distance-Vector, Dijkstra), classic routing protocols (RIP, OSPF), Mobile Ad hoc Network Routing protocol (ABR, AODV),	10
4	Network Layer (Multicasting): Classful IP Addressing, Subnets, Multicasting IP address group, Mobile Ad hoc Network Multicast Routing protocols (ODMRP, LBM, ABAM), and address resolution protocol	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Exam: 70%

Class test 1: 10.0%

Class test 2: 10.0%

Class test 3: 10.0%

VII. Module Resources

None

Authors: Dr Yan Sun

Reviewer: Dr Michael Chai

< Middleware > Course Syllabus

I. Basic Information

Module Name	Chinese: 中间件技术 English: Middleware		**Module Code**	EBU6501/3512165111
Credits / Hours	3.0/48	**Compulsory (√) / Elective ( )**	**Semester**	5
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering	
Prerequisites	Intro Java Programming; Networks and Protocols; Software Engineering; Database			

II. Teaching Objectives

The aim of this module is to introduce the concept of middlware and how it is used to enable heterogeneous systems to work together within a distributed cloud system. At the end of this module, students will be able to know the different types of middleware available, design and implement web-based applications using EJB, JSP, Servlets and JavaScript. The main aims of the module can be summarised as:

- To be aware of the importance of middleware solutions in connecting distributed heterogeneous systems
- To understand how currently important middleware components work
- To develop software and security skills to be able to implement the concepts and services that middleware provide, across local area, wide area and mobile networks and across enterprise, cloud, mobile and sensor environments.

The learning objectives/outcomes at the end of this module are for students to:

- Know the different types of middleware and be able to use them
- Develop web-based applications using EJB, JSP, Servlets and JavaScript
- Understand IoT protocols and implement middleware security policies
- Know the architecture of open services gateway initiative (OSGi) and implement component applications

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	A full understanding of how the software components work and interact with heterogenous and remote network systems. Assessment may be through exam and coursework.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	This course draws heavily on the understanding of protocols, LANs, wireless network, different computer programming languages, databases, messaging services, web applications and security. Different application level protocols are also used (e.g. HTTP, AMQP). Assessment may be through exam and coursework.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	The course will make sure key concepts for programming client server, P2P , web and many to many interactions are covered, allowing them to understand how they could (if they had enough time and resources) to develop the middleware described, and hence to develop these ideas in the context of new technologies. Assessment exam and coursework.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.	Partially. Middleware often form central components of a software system and also link systems (e.g. message oriented middleware) to get systems of systems. The understanding of the functioning of such components and technologies that they can used to develop such components supports an understanding of the interactions. Assessment exam and coursework.
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Partially, e.g. in mobile phone programming the use of asynchronous tasks interacting with the UI thread for usability in mobile user interfaces, and the use technologies for presentation across, mobile, ipads, laptops and desktops. Assessment coursework.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Partially. The rationale for using middleware is the requirement for fitness of purpose of commonly arising but complex functions, such as web interaction, security, distribution,concurrency, resilience, transparent failover, transaction management,dynamic redeployment, clean shut down, caching, resource pooling, security, logging and auditing, systems management, and deployment in VMs. Assessment exam and coursework.

D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	One of the rationales of using middleware is the cost, as the complex issues of security, resilience, scale require large resources. It is the ubiquity and complexity of certain tasks that has given rise to middleware. Assessment exam.
D6p	Communicate their work to technical and non-technical audiences.	The development of home networks, smart metering, smart cities using Internet of Things (IoT) are all driving the development of new middleware components to support the rapid development and deployment of new systems. Assessment may be through exam.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Partially, e.g. in mobile phone programming uses middleware from commercial vendors througth the use of asynchronous tasks interacting with the UI thread for usability in mobile user interfaces, and the use technologies for presentation across, mobile, ipads, laptops, desktops. and social medial. Assessment coursework.
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	One of the rationales of using middleware is the cost, as the complex issues of security, resilience, scale require large resources to sustain the trust in the technologies that use middleware. It is the ubiquity and complexity of certain tasks that has given rise to middleware. Assessment exam.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	There are many areas where the middleware can be applied and the previous taught courses will underpin their understanding of how middleware fits into IoT, (e.g. in smart cities, disaster monitoring, home networks) and how it allows a system to be developed and deployed. Assessment exam and coursework.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	While there are many tools possible, specific tools such as development of concurrency in Java, web development in Java, EJBs as an exemplar of distribution using stubs, MOMS for publish and subscribe, Android for mobile development and control will be used, to clarify the concepts. Assessment coursework. The components labelled are Middleware is by its nature diverse and the components investigated illustrate fundamental techniques and also different approaches because of different requirements. Assessment exam and coursework.
EP3p	Ability to apply relevant practical and laboratory skills.	There are lab exercises that will be used to give practice in key concepts. These include practical installations, configurations and many programming projects involving Jva (J2EE & J2SE), Message-Oriented Middleware (MOM) programming, Putty and WinSCP.

		Assessment coursework.
EP4p	Understanding of the use of technical literature and other information sources.	They will be required to read prescribed articles and collect information from disparate sources as there are few books that cover the scope of this course are the level of understanding required. Not assess.
EP6p	Understanding of appropriate codes of practice and industry standards.	The different modes of communication addressed during the course, e.g. synchronous, asynchronous, push, pull, client server, P2P, Web, Web2, publish subscribe (topic basedcontent based), transaction based, are driven by different industry design standards and requirements.for heterogeneous systems developed as open source or proprietary commercial middleware to interact and interoperate. Assessment is by exam.
EP7p	Awareness of quality issues and their application to continuous improvement.	Not in the sense of manufacturing, but in the need to apply their Software Engineering knowledge to meet all the key non functional attributes mentioned above.
EP8p	Ability to work with technical uncertainty.	Partially. Resilience is an aspect that is covered. Assessment exam and coursework.
EP9p	Understanding of, and the ability to work in, different roles within an engineering team.	There are many areas where the middleware can be applied and the previous taught courses will underpin their understanding of how middleware fits into IoT, (e.g. in smart cities, disaster monitoring, home networks) and how it allows a system to be developed and deployed. Assessment exam and coursework.

IV. Teaching Content and Course Schedules

No.	**Teaching Content**	**Hours**
1	Middleware and Message-Oriented Middleware (MOM); Middleware concepts; Why we need middleware; Types of middleware; Messaging and cloud messaging services; JMS API; Messaging domains; Introduction to JSP and Servlets; JSP and Servlets programming; Apache Tomcat container; JavaBeans;	10
2	Further Programming in JSP and Servlet; Threads and concurrency; Computer threads and processes; Life cycle of threads; JVM as a process; Java Thread class; Interrupt;	10
3	Security Concepts for Middleware and Web Vulnerabilities; Security Concepts for Middleware; Authentication, authorisation, integrity and confidentiality; Web security mitigation strategies; Middleware case studies (Globus, gLite); Internet of Things Protocols; JavaScript Programming; Advanced JavaScript Programming with JSON;	10
4	Enterprise JavaBeans (EJB); Architecture of EJB; Benefits of using EJB technology; Client/Server network communication and programming; Creating a ServerSocket; Server and Client codes; Standards for communicating with remote objects (RMI, CORBA, DCOM); Heterogeneous issues in enterprise computing; OSGi Architecture;	10

No.	Teaching Content	Hours
	Benefits of using OSGi	
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 85%;

Lab Exercise: 15%

VII. Module Resources

Some recommended books:

- Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam by Bryan Basham and Kathy Sierra
- SCJP Sun Certified Programmer for Java 6 Study Guide: Exam (310-065): Exam 310-065 by Kathy Sierra

The software needed for labs and coursework are:

- Java (J2EE and J2SE) development paltform
- Putty, VNC and WINSCP
- JSP and Servlet
- Apache Tomcat, Apache Qpid and MySQL
- HTML, XML, JavaScript and JSON

Authors: Karen Shoop, John Bigham

Reviewer: Dr Michael Chai

< Cloud Computing > Course Syllabus

I. Basic Information

Module Name	Chinese: 云计算		**Module Code**	EBU7501/3512175001
	English: Cloud Computing			
Credits / Hours	3 /48	**Compulsory (√) / Elective ( )**	**Semester**	7

Module Type	General Courses	Applicable Programm	Internet of Things Engineering
Prerequisites	Intro Java Programming; Networks and Protocols; Software Engineering; Database		

II. Teaching Objectives

The aim of this module is to provide students conceptual understanding of cloud computing and practical skills of developing applications on the emerging cloud. It also aims to introduce the new trends, experiments and products of cloud computing.

At the end of this module, students should be able to:

- Design and implement cloud computing resources as services
- Design and implement big data centres
- Understand cloud computing issues such as scalability, security and privacy
- Have practical skills in Hadoop (Map Reduce) and GPU programming using CUDA model

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	Appreciation of engineering context is covered in the evaluation of distributed systems, parallel systems, client server architectures and the cloud computing migration. Reasons for the limitations and the drivers for change will be discussed. Assessement exam.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.	Cloud computing is now at the forefront of innovations in application of Big Data in e-commerce, data analytics, virtualisation technologies, machine learning algorithms, connected autonomous vehicles (CAVs), virtual reality technologies and Internet of Things (IoT) controllers. Assessment through lab, exam and coursework.
SM3m	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and the ability to evaluate them critically and to apply them effectively.	Students will be able to develop cloud applications that take advantage of the latest innovations in data storage frameworks, and data processing. Assessment exam and coursework.

EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	cover throughout the lecture (cloud infrastructures, service oriented architectures and theirs protocols data storage techniques). Assessment exam
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Different cloud infrastructure (Platform as a Service , Software as a Service , and Software plus Services) will be analysed and their performance identified. The implementations are further classified as public, private, community or hybrid clouds. Assessment exam.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	Students will be able to model the demand for cloud resources depending on the expected workload from users. Assessment exam.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Students will learn about the computing infrastructure for cloud applications (data centers, CDNs), and will be able to integrate the technology to build systems that can operate at a Internet-scale level. Assessment exam.
EA4m	Understanding of, and the ability to apply, an integrated or systems approach to solving complex engineering problems.	Students will learn to assess the benefits of emerging technologies such as IaaS, PaaS, SaaS platforms, and decide about their application. Assessment exam.
D6i	Communicate their work to technical and non-technical audiences.	Students will have to implement user requirements when developing cloud applications. Assessment exam and coursework.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Students will learn about cloud application development, deployment and management. Assessment exam and coursework.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Students will learn about the utility computing model offered by cloud computing platforms, and the decision of having public vs private clouds. Assessment exam and coursework.
D6p	Communicate their work to technical and non-technical audiences.	Students will have to implement user requirements when developing cloud applications. Assessment exam and coursework.

D3m	Work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies.	Students will learn about cloud application development, deployment and management. Assessment exam and coursework.
D4m	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Students will learn about the utility computing model offered by cloud computing platforms, and the decision of having public vs private clouds. Assessment exam and coursework.
D6m	Communicate their work to technical and non-technical audiences.	Students will learn how cloud computing allows applications to cope with scalability and reliability requirements. Assessement exam and coursework
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	Students will design their cloud application and data centre usinglarge scale enterprise design patterns such as MVC, Front Controller and Objects Transfer. Assessment coursework.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	The design and implement processes for cloud computing application under cost and time constraints will be covered in the lectures. The economics of cloud computing using Amazon Web Services model is taught to students. Assessment exam and coursework.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	covered partially in term of economic and social impacts on managing and exploiting cloud computing application. Assessment exam and coursework.
ET3p	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives.	Covered by discussing the energy efficiency aspects of cloud infrastructure and data centers. Assessment exam.
ET1m	Understanding of the need for a high level of professional and ethical conduct in engineering, a knowledge of professional codes of conduct and how ethical dilemmas can arise.	The design and implement processes for cloud computing application under cost and time constraints will be covered in the lectures. The economic and commercial value of cloud services and future forecast is taught to students. Assessment exam and coursework.

ET3m	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately .	Covered by discussing the energy efficiency aspects of cloud infrastructure and data centers. Assessment exam.
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	The understanding of how cloud computing fits into IoT and how it allows a system to be developed and deployed will be covered in the lectures. Assessment exam.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Students will become familiar with IaaS and PaaS APIs for managing cloud applications. Assessment exam. Partially in term of the component requirements for cloud infrastructure. Assessment exam and coursework.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	There are lab exercises that will be used to give practice in key concepts of cloud application. The labs consist of practical hands on cloud infrastructure deployment, web services programming using JSP and Servlet/Tomcat, Amazon Web Services (AWS) Elastic Compute Cloud and Hadoop/MapReduce programming. Assessment coursework.
EP4p	Understanding of the use of technical literature and other information sources.	Students will learn about the security and privacy restrictions that cloud computing applications need to comply with. Assessment exam.
EP5p	Knowledge of relevant legal and contractual issues.	covered throughout the lectures on the communication protocols, security, programming languages, platforms and dataservices for cloud computing. Assessment exam.
EP9p	Understanding of, and the ability to work in, different roles within an engineering team.	The understanding of how cloud computing fits into IoT and how it allows a system to be developed and deployed will be covered in the lectures. Assessment exam.
EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.	Students will become familiar with IaaS and PaaS APIs for managing cloud applications. Assessment exam. Partially in term of the component requirements for cloud infrastructure. Assessment exam and coursework.

EP2m	Knowledge of characteristics of particular equipment, processes, or products, with extensive knowledge and understanding of a wide range of engineering materials and components.	There are lab exercises that will be used to give practice in key concepts of cloud application. Assessment coursework.
EP4m	Understanding of the use of technical literature and other information sources.	Students will learn about the security and privacy restrictions that cloud computing applications need to comply with. Assessment exam.
EP5m	Knowledge of relevant legal and contractual issues.	covered throughout the lectures on the communication protocols, security, programming languages, platforms and dataservices for cloud computing. Assessment exam.
EP8m	Ability to work with technical uncertainty.	Students will learn about the current practice for developing cloud services, and the limitations offered by the existing platforms. Assessment exam and coursework.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.	Student will be able to apply their compute unified device architecture (CUDA) programming skills they acquired in cloud computing lectures to programme commercial graphics processing units (GPUs) in game programming simulations. In addition, we have partnered with Amazon Web Services (AWS) which allow our students to register and use AWS Elastic Compute Cloud (EC2) as a public commercial cloud infrastructure. Assessment is through exam and coursework.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Cloud computing fundamentals; Distributed systems; Parallel and distributed computing/programming; Computer clusters; Cloud computing architectures; Service level agreement; Virtualisation; Economics of cloud computing; Cloud scalability; Cloud security and trust	10
2	Web Services; Creating and Managing Amazon Web Services (AWS) Elastic Compute Cloud (EC2) instances; Introduction to GPU computing; GPU architecture; Advanced GPU programming using CUDA architecture; Enterprise design patterns; Cloud monitoring systems	10
3	Introduction to MapReduce; MapReduce programming; Hadoop; Anatomy of MapReduce job; Hadoop job; MapReduce algorithms; MapReduce reliability and performance; Amdahl's law on MapReduce; Load balancing	10
4	Beyond MapReduce; Resilient distributed dataset (RDDS); Spark project; Content Delivery Network (CDN); DNS; CDN/DNS Case studies (Google, Netflix, etc); Traditional databases; Cloud databases; ACID database properties; NoSQL; CAP Theorem; CAP Consistency; Data replication; Cloud DB services; Amazon DynamoDB; Casandra data model; Data centre and data centre design	10

No.	Teaching Content	Hours
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials.

VI. Assessment Methods

Exam: 75%;

Lab Exercise: 25%

VII. Module Resources

Some recommended books are:

- Cloud Computing: Concepts, Technology & Architecture and Cloud Computing Design Patterns by Thomas Erl
- CUDA by Example: An Introduction to General-Purpose GPU Programming by Jason Sandsers and Edward Kandrot

The hardware requirements for the labs and coursework are:

- At least 60 Windows PCs in a lab session
- Windows PCs with at least 2GB RAMS and 120GB hard disks
- Amazon AWS EC2
- VMWare and VirtualBox

Authors: Dr Ling Ma

Reviewer: Dr Michael Chai

《信息网络法概论》课程教学大纲

一、课程基本信息

课程名称	中文：信息网络法概论 英文：Informational and Internet Law		**课程编号**	3512165216
学分/学时	2/32	**必修（）/ 选修（√）**	**开课学期**	5

课程类别	专业课程	适用专业	电子商务及法律、物联网工程
先修课程	法律基础		

二、课程教学目标

通过本课程的学习，使学生掌握我国信息网络法制建设的现状及信息网络法律的基本制度，并能用信息网络法的基本原理分析现实中的信息网络法律问题。

三、课程与支撑的毕业要求

学生应了解我国包括网络安全、电子商务、互联网信息服务等领域的立法和执法现状，熟练掌握有关网络安全、互联网信息服务、个人信息保护和网络不正当竞争和垄断的等具体制度的内容和基本原理，能够运用所学的法律条文和基本原理分析现实中存在问题。

四、教学内容及学时安排

序号	教学内容	学时分配	重点
1	信息网络法建设的意义与现状	4	1、信息网络法制建设的意义 2、主要国家信息网络法制建设的现状
2	信息网络法概述	8	1、信息网络法的含义及在法律体系中的地位 2、信息网络法律关系 3、信息网络法律与信息网络政策的比较 4、信息网络立法
3	国家信息网络安全法律规范	8	5、 网络主权 6、 等级保护法律 7、 关键信息基础设施保护法律 8、 态势感知法律
4	个人信息安全法律规范	6	4、 个人信息界定 5、 个人信息权利 6、 侵害个人信息的法律责任
5	互联网不正当竞争与垄断	6	3、 互联网不正当竞争及其规制 4、 互联网反垄断

五、教学方法

讲授、讨论

六、考核方式

考查/开卷

成绩构成：平时成绩 30%+期末成绩 70%

七、课程资源

教材:《信息法教程（第 2 版）》　朱庆华等著 高等教育出版社 2011 年版

参考书目:《信息法研究》 王建著|西南财经大学出版社 2011 年版

中国信息安全法律网 http://www.infseclaw.net/

执笔人：崔聪聪

审核人：罗楚湘

《Design & Build 实训》实验教学大纲

一、课程基本信息

课程名称	中文：Design & Build 实训 英文：Design & Build Pratical Training		**课程编号**	3512100621
学分/学时	2/2周	**必修（√）/ 选修（）**	**开课学期**	4/5
适用专业	电信工程及管理，电子商务及法律，物联网工程			
先修课程	产品开发、数字电路与逻辑设计、数据库系统等			

二、课程教学目标

《Design & Build 实训》由三个联合培养项目同学共同组成，按每组 10 人组成团队，分配相同的课程任务，在相同的产品预算和开发周期下，进行自主产品设计及开发、公司网站设计与开发、产品宣传等。具体而言：

- 设计、调测、组装和发布一款电子产品；
- 电信工程及管理专业完成产品原型样机的设计、调试、组装，及产品说明书的撰写；
- 电子商务及法律专业完成公司网站的前端设计与开发，以及产品视频宣传片的制作；
- 物联网工程专业完成公司网站的后端数据库的设计与开发；同时面向特定领域，开发具有一定功能的数据库应用（原型）系统，并提交完整的设计与开发文档；
- 各组将在一个“风险投资展览会”上展示他们的产品，包括产品原型和相关的营销材料，以吸引投资；
- 各组将对自己的产品进行一系列的宣讲，介绍投资人所关心的问题，如可持续发展和风险评估等。

因此，因分工划分，该实训对三个专业有不同的教学目标。

电信工程及管理：加强基础专业知识、提高动手能力和激发创新意识。该实训采用讲解、演示和实践相结合的教学模式，指导学生独立完成一个电子产品的设计、组装和调试。通过本门实践课程的训练，使学生初步了解电子产品的生产实际，掌握基础的电子工艺理论和技能，培养初步的工程设计能力、创新意识和团队合作意识，以及严谨踏实科学的工作作风和良好的学风，提高解决实际问题的能力和素质，为后续的课程设计、毕业设计以及从事有关的电子技术工作打下坚实的基础。

电子商务及法律：加强基础专业知识、提高动手能力和激发创新意识的重要途径。该实训采用讲解、演示和实践相结合的教学模式，指导学生独立完成一个新产品的网站设计、视频广告和产品发布。通过本门实践课程的训练，使学生初步了解新产品开发设计流程，掌握公司网站规划及设计方法，熟悉产品宣传及发布的过程，培养初步的电子商务能力、创新意识和团队合作意识，以及严谨踏实科学的工作作风和良好的学风，提高解决实际问题的能力和素质，为后续的课程设计、毕业设计以及从事有关的电子商务工作打下坚实的基础。

物联网工程：数据库系统是重要的计算机基础软件，需要理论联系实际，注重培养学生实践能力。该实训辅助学生掌握数据库应用系统基本概念、原理、关键技术、系统设计与开发方法，培养学生在主流商用数据库管理系统平台下、面向具体应用领域的数据库应用系统开发能力、创新意识和团队合作意识，以及严谨踏实科学的工作作风和良好的学风，提高解决实际问题的能力和素质，为后续的课程设计、毕业设计以及从事相关工作打下坚实的基础。

三、课程与支撑的毕业要求

1、在项目中培养学生独立思考、研究、技术分析、项目设计和制定方案的习惯；

2、建立团队意识，注重团队配合，学会在项目执行中善于沟通与表达；

3、使学生体会到理论与实践相结合，培养其在项目中解决复杂工程的能力；

四、教学内容及学时安排

序号	理论内容	学时分配	实践内容	学时分配
1	1）介绍新产品开发程序，包括产品设计与验证、过程设计与验证、制造过程验证等； 2）讲授电子产品系统设计方法、焊接及组装方法、故障分析与调测方法等； 讲授单片机系统的基本原理，及其开发过程及编程方法； 3）提出产品的设计、焊接、调测、组装方法及要求。	8	产品设计 原型样机焊接、组装 原型样机调测、外观设计 产品用户手册撰写	12 12 12 4
2	1）介绍新产品开发程序，包括产品设计与验证、过程设计与验证、制造过程验	8	产品设计及规划 公司网站设计及开发	12 12

序号	理论内容	学时分配	实践内容	学时分配
	证等； 2）讲授公司网站及相关数据库的设计及开发过程； 3）讲授电子商务中产品宣传的方式和技巧等。		产品宣传视频制作 产品营销方案设计	12 4
3	数据库应用系统的组成、生命周期、开发过程和所采用的各项关键技术，讲解领域背景知识和具体实验数据，为学生开展课程设计做准备； 1）DB2、Sybase、SQL Server、Oracle等主流商用关系数据库管理系统； 2）通过业务逻辑软件模块实现面向特定应用领域的业务分析。 3）系统开发过程中的需求分析、概念数据库设计、逻辑数据库设计、物理数据库设计、数据库应用程序事务设计、系统实现等步骤。	8	应用系统需求分析 系统及数据库设计 原型系统开发与测试 技术文档撰写	12 12 12 4

五、教学方法

理论、实践

六、考核方式

考查课；

平时实验和验收答辩各占50%，考核评定学生成绩。

七、课程资源

自编讲义

执笔人:

审核人:

《专业实习》实验教学大纲

一、课程基本信息

课程名称	中文：专业实习	课程编号	3512190003

	英文：Engineering Fieldwork			
学分/学时	2/2周	**必修（ √ ）/ 选修（）**	**开课学期**	6/7
适用专业	电信工程及管理，电子商务及法律，物联网工程			
先修课程	通信原理、计算机网络技术、光纤通信、传输原理、软交换技术			

二、课程教学目标

本实习方案是为本科生开设的偏重于工程实验性教学课程，在工程项目再现的条件下，让学生了解理论知识在通讯系统中的应用场景和位置。结合实验课题，自主设计实验流程，并以项目小组的方式得出实验结果、验证内容。

三、课程与支撑的毕业要求

1、熟悉通讯系统常用设备与工具，训练专业实践技能；

2、了解现代通讯行业规范；

3、了解一定的项目管理知识；

4、了解工程项目过程与生活中相关技术融合性问题；

5、在项目中培养学生独立思考、研究、技术分析、项目设计和制定方案的习惯；

6、建立团队意识，注重团队配合，学会在项目执行中善于沟通与表达；

7、使学生体会到理论与实践相结合，培养其在项目中解决复杂工程的能力；

四、教学内容及学时安排

序号	教学内容	学时分配	设备方向	实习方式
1	LTE 调测项目实验	12	4G 无线调测	理论+实操
2	无线优化项目演练	6	无线优化	理论+实操
3	PTN 传输系统模拟项目实验	6	传输	理论+实操
4	光传输系统（SDH）项目实验	12	传输	理论+实操
5	数据通信项目实验	6	数通	理论+实操
6	云计算产品介绍	6	云计算	理论+实操
7	通信行业标准与企业文化	6	行业标准与企业文化	理论
8	工程项目模拟训练及报告展示	6	综合	实操

五、教学方法

理论、实操

六、考核方式

个人实习成绩 = 实习总结报告*30% + 项目小组实验成绩*40%

+ 复杂工程项目实验成绩*20% + 个人考勤*10%

七、课程资源

设备：中兴路由器、交换机、路由交换机、中兴 M820 OTN 设备、电脑终端、网管系统等。

指导书：WCDMA 设计与优化手册[美]. Christophe Chevallier/Christopher brunner 等编著，人民邮电出版社，2008 年。

执笔人：王亚迪

审核人：马宇光

< Personal Development Plan 1 > Course Syllabus

I. Basic Information

<table>
<tr><td rowspan="2">Module Name</td><td colspan="3">Chinese: 个人发展计划 I</td><td rowspan="2">Module Code</td><td rowspan="2">EBC3001/3512130001</td></tr>
<tr><td colspan="3">English: Personal Development Plan 1</td></tr>
<tr><td>Credits / Hours</td><td>0.4 /10</td><td colspan="2">Compulsory (√) / Elective ( )</td><td>Semester</td><td>1-2</td></tr>
<tr><td>Module Type</td><td colspan="2">General Courses</td><td>Applicable Programm</td><td colspan="2">Telecommunications Engineering with Management
E-Commerce Engineering with Law
Internet of Things Engineering</td></tr>
<tr><td>Prerequisites</td><td colspan="5"></td></tr>
</table>

II. Teaching Objectives

This module focuses on transferable skills, communication techniques and personal development. It is a practical introduction to the principles of teamwork, presentation and communication, as well as to the principles and processes in developing a small-scale research project. This module is taken by all Year 1 students and its design draws on understanding of the particular challenges faced by JP students.

On successful completion of this module, student will be able to:

- Develop team working skills such as communicating, cooperating effectively with other team members, finding the right role in the team.
- Acquire public speaking skills, presentation skills and the ability to make good slides.
- Design and carry out simple research investigations
- Demonstrate the ability of summarising information and presenting that information in a

compelling form.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Understand the principles of teamwork, presentation and communication.	The module consists of two group coursework projects, one in each semester: 1) The first semester project is to carry out an investigation for a Computing science topic and based on the findings a) to prepare a report and b) to deliver a Power Point presentation in the class. 2) The second semester project is to carry out a research for a chosen topic; particularly a) to produce a survey questionnaire to gather data related to the chosen topic, b) to prepare a report and c) give a Power Point presentation in the class.
2	Understand the use of technical literature and other information sources.	
3	Understand the principles and processes in developing a small-scale research project and critically assess research findings.	
4	Use computer tools (like Power Point, Excel, Word) to the development, instigation and presentation of results of a small-scale research project.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Students are briefed on set tasks, which require researching and presenting on given topics involving application of various technologies. Students work in small groups and have to present their findings to complete the task.	4-5
2	Students are required to find a survey topic, design a survey questionnaire, carry out and collate survey results and present their findings. Students work in small groups.	4-5

V. Teaching Methodologies

Lectures; Group presentation.

VI. Assessment Methods

Group report and Presentation: 50%;

Group Survey Research and Presentation: 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Nickos Paltalidis

Reviewer: Dr Michael Chai

< Personal Development Plan 2 > Course Syllabus

I. Basic Information

Module Name	Chinese: 个人发展计划 II English: Personal Development Plan 2		**Module Code**	EBC4001/3512140001
Credits / Hours	0.3 /7	**Compulsory (√) / Elective ( )**	**Semester**	3-4
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management E-Commerce Engineering with Law Internet of Things Engineering	
Prerequisites				

II. Teaching Objectives

This module is taken by all Year 2 students, consisting of one learning activity each semester, designed to help students to:

- Organizational and time management skills
- The ability to articulate arguments and be persuasive in communications
- The need for a high level of professional and ethical conduct in engineering

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Learn to set personal goals and deploy time management strategies for achieving them.	Semester 1 task: Defining goals and priorities and learning to schedule and manage time for personal effectiveness. Semester 2 task: Consideration of and discussion of engineering ethical issues through case studies and the importance of communications with stakeholders.
2	Develop and maintain a personal, flexible schedule, prioritize tasks and deal with distractions	
3	Understand the concepts, theory and practice of engineering ethics and the importance of effective written and oral communications to stakeholder.	
4	Recognize engineering ethical quandaries and respond in accordance with the professional code of conduct.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	A Workshop to brief students on how to set SMART goals and schedule activities to meet their goals in the 3-2-1 year time frames.	2-3
2	Workshop to introduce students to ethics generally and to Engineering Code of Ethics. Followed by students being facilitated to reflect upon and respond to sets of ethical dilemmas.	2-3

V. Teaching Methodologies

Lectures + Online quiz; Assignment

VI. Assessment Methods

Time Management: 50%;

Engineering Ethics: 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Brinder Saigal, Mr Andy Watson

Reviewer: Dr Michael Chai

< Personal Development Plan 3 > Course Syllabus

I. Basic Information

Module Name	Chinese: 个人发展计划 III English: Personal Development Plan 3		**Module Code**	EBC5001/3512150001
Credits / Hours	0.3 /7	**Compulsory (√) / Elective ( )**	**Semester**	5-6
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management E-Commerce Engineering with Law Internet of Things Engineering	
Prerequisites				

II. Teaching Objectives

These tasks aim to provide students with the opportunity to acquire a level of professional and communication skills in an engineering environment.

By the end of the module the student will learn how to:

- Communication skills
- Listening and reflection skills

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Present and communicate their unique strengths.	Semester 1 task: Developing a CV. Semester 2 task: Undertaking 'Appreciative Inquiry' exercises and case study evaluation.
2	Use a collaborative and positive approach to generating solutions and managing personal and organizational change.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Workshop to introduce students and on current best practices in CV writing, such as use of active verbs to describe their skills, how to write CVs to target specific jobs and how to identify and match their capabilities and competencies to their job searches. Students are facilitated to start crafting their CVs at the workshop	2-3
2	Workshop to introduce students to a method drawn from the school of positive psychology which is a strength based approach to personal and organizational change and development. Students work on applying the method to self or to a team or class	2-3

V. Teaching Methodologies

Lectures & online quiz; Assignment

VI. Assessment Methods

Engineering Ethics (Assignment + Workshop Attendance): 50%;

Personal CV (Assignment + Workshop Attendance): 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Bindu Chib, Dr Brinder Saigal,

Reviewer: Dr Michael Chai

< Project > Course Syllabus

I. Basic Information

Module Name	Chinese: 毕业设计 English: Project		**Module Code**	BBC6521/3512165214
Credits / Hours	10 /16周	**Compulsory (√) / Elective ( )**	**Semester**	7,8
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering; Telecommunications Engineering with Management; E-Commerce Engineering with Law	
Prerequisites	None			

II. Teaching Objectives

To give students experience of managing their own time to complete a project in engineering design, development, or research which is initially specified in terms of the final desired outcome(s). To teach students to develop a professional approach in their project work and to develop their communication skills, both written and oral, to a standard expected by industry of a new graduate.

By the end of the module the student will be able to:

• Apply scientific and/or engineering principles to the solution of a practical problem of engineering design, development, or research.

• Demonstrate the project.

• Write a project final report that completely describes the project work and critically.

• Relate the work to current technical practice.

• Defend the project work in an oral examination.

• Express an adequate knowledge of all related technical fields.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment

SM2i	Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.	All projects are expected to apply knowledge and understanding of scientific principles and methodology. This is assessed via the final report and viva.
SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.	Mathematical and statistical methods are used in the analysis and evaluation parts of most projects.
EA4i	Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.	All projects are expected to follow engineering principles, the rigorousness of which is assessed via the final report and viva.
EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	Assessed primarily via the final report.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	All projects are expected to produce at least one tangible outcome such as a working piece of software, hardware or simulation results in solving the defined problem. Assessed mainly via the final report and viva.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.	Assessed via progress reports, final report and viva.
EA4m	Understanding of, and the ability to apply, an integrated or systems approach to solving complex engineering problems.	Covered in some projects. Assessed via progress reports, final report and viva (which normally includes a demonstration).
D6i	Communicate their work to technical and non-technical audiences.	User and/or customer needs are established by carrying out a requirement analysis and/or literature survey depending on the nature of the project. Directly assessed via the final report and indirectly assessed by the success of the project as a whole.
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	A problem and its scope are defined in the Project Specification. Environmental and risk assessment issues are covered during lectures. Environmental and Risk Assessment reports are submitted along with the project final report.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property;	Guided by individual supervisor. Assessed via final report and viva.

	codes of practice and standards.	
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.	Required by all projects. Assessed via final report and viva.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Covered in the Project Management Lecture and closer guidance given by individual Supervisors. Mid-term outcomes and final outcomes (both of which are listed in the Specification) are assessed at the mid-term viva and final viva respectively.
D5p	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Communicate to technical and non-technical audiences is required throughout the project. Assessed via final report and viva.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.	Covered in some projects. The design, implementation and evaluation of a system is carried out by the student either in the form of software, hardware, simulation or any combination of these. They are assessed via progress reports, final report and viva (which normally includes a demonstration).
ET6i	Awareness of risk issues, including health & safety, environmental and commercial risk.	Covered during lectures. Assessed via the final report and viva.
ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.	Covered during lectures. Assessed via the final report and viva.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Project management is covered during lectures. Assessed via progress reports and mid-term viva.
ET3p	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives.	Students are required to apply qualitative and quantitative assessments on the project requirements and methodologies to attain the best possible outcome for their projects. Cost, time and quality of design are examples of considerations.
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Covered during lectures. Assessed via the final report and Risk Assessment report.
ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights,	Students are required to understand and assess environmental and health and safety risk issues submit a Risk Assessment.

	product safety and liability issues.	
EP7i	Awareness of team roles and the ability to work as a member of an engineering team.	Guidance is given by individual Supervisors. Assessed via final report. and viva.
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	Gained through a literature survey and assessed primarily via the final report.
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.	Covered in some projects, e.g. hardware-related ones. Directly assessed via the final report and indirectly assessed by the success of the project as a whole.
EP3p	Ability to apply relevant practical and laboratory skills.	Directly assessed via the final report and indirectly assessed by the success of the project as a whole.
EP6p	Understanding of appropriate codes of practice and industry standards.	Guided by individual supervisor. Assessed via the final report.
EP7p	Awareness of quality issues and their application to continuous improvement.	Assessed via the final report and Risk Assessment report.

IV. Teaching Content and Course Schedules

Not Applicable.

V. Teaching Methodologies

Lectures; Tutorials.

VI. Assessment Methods

Early-term Progress Check: 5%;

Final Report, supporting documents: 30%;

Mid-term Oral: 5%;

Late-term Progress Check (“mock-viva”): 5%;

Final viva: 55%.

VII. Module Resources

As directed by Supervisor.

Authors: Dr Vindya Wijeratne

Reviewer: Dr Yue Chen

< Personal Development Plan 1 > Course Syllabus

I. Basic Information

Module Name	Chinese: 个人发展计划 I English: Personal Development Plan 1		**Module Code**	EBC3001/3512130001
Credits / Hours	0.4 /10	**Compulsory (√) / Elective ( )**	**Semester**	1-2
Module Type	General Courses	**Applicable Programm**	Telecommunications Engineering with Management E-Commerce Engineering with Law Internet of Things Engineering	
Prerequisites				

II. Teaching Objectives

This module focuses on transferable skills, communication techniques and personal development. It is a practical introduction to the principles of teamwork, presentation and communication, as well as to the principles and processes in developing a small-scale research project. This module is taken by all Year 1 students and its design draws on understanding of the particular challenges faced by JP students.

On successful completion of this module, student will be able to:

- Develop team working skills such as communicating, cooperating effectively with other team members, finding the right role in the team.
- Acquire public speaking skills, presentation skills and the ability to make good slides.
- Design and carry out simple research investigations
- Demonstrate the ability of summarising information and presenting that information in a compelling form.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Understand the principles of teamwork, presentation and communication.	The module consists of two group coursework projects, one in each semester:
2	Understand the use of technical literature	1) The first semester project is to carry out an

	and other information sources.	investigation for a Computing science topic and based on the findings a) to prepare a report and b) to deliver a Power Point presentation in the class. 2) The second semester project is to carry out a research for a chosen topic; particularly a) to produce a survey questionnaire to gather data related to the chosen topic, b) to prepare a report and c) give a Power Point presentation in the class.
3	Understand the principles and processes in developing a small-scale research project and critically assess research findings.	
4	Use computer tools (like Power Point, Excel, Word) to the development, instigation and presentation of results of a small-scale research project.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Students are briefed on set tasks, which require researching and presenting on given topics involving application of various technologies. Students work in small groups and have to present their findings to complete the task.	4-5
2	Students are required to find a survey topic, design a survey questionnaire, carry out and collate survey results and present their findings. Students work in small groups.	4-5

V. Teaching Methodologies

Lectures; Group presentation.

VI. Assessment Methods

Group report and Presentation: 50%;

Group Survey Research and Presentation: 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Nickos Paltalidis

Reviewer: Dr Michael Chai

< Personal Development Plan 2 > Course Syllabus

I. Basic Information

Module Name	Chinese: 个人发展计划 II	**Module Code**	EBC4001/3512140001
	English: Personal Development Plan 2		

Credits / Hours	0.3 /7	Compulsory (√) / Elective ( )	Semester	3-4
Module Type	General Courses	Applicable Programm	Telecommunications Engineering with Management E-Commerce Engineering with Law Internet of Things Engineering	
Prerequisites				

II. Teaching Objectives

This module is taken by all Year 2 students, consisting of one learning activity each semester, designed to help students to:

- Organizational and time management skills
- The ability to articulate arguments and be persuasive in communications
- The need for a high level of professional and ethical conduct in engineering

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Learn to set personal goals and deploy time management strategies for achieving them.	Semester 1 task: Defining goals and priorities and learning to schedule and manage time for personal effectiveness. Semester 2 task: Consideration of and discussion of engineering ethical issues through case studies and the importance of communications with stakeholders.
2	Develop and maintain a personal, flexible schedule, prioritize tasks and deal with distractions	
3	Understand the concepts, theory and practice of engineering ethics and the importance of effective written and oral communications to stakeholder.	
4	Recognize engineering ethical quandaries and respond in accordance with the professional code of conduct.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	A Workshop to brief students on how to set SMART goals and schedule activities to meet their goals in the 3-2-1 year time frames.	2-3
2	Workshop to introduce students to ethics generally and to Engineering Code of Ethics. Followed by students being facilitated to reflect upon and respond to sets of ethical dilemmas.	2-3

V. Teaching Methodologies

Lectures + Online quiz; Assignment

VI. Assessment Methods

Time Management: 50%;

Engineering Ethics: 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Brinder Saigal, Mr Andy Watson

Reviewer: Dr Michael Chai

< Personal Development Plan 3 > Course Syllabus

I. Basic Information

<table>
<tr><td rowspan="2">Module Name</td><td colspan="3">Chinese: 个人发展计划 III</td><td rowspan="2">Module Code</td><td rowspan="2">EBC5001/3512150001</td></tr>
<tr><td colspan="3">English: Personal Development Plan 3</td></tr>
<tr><td>Credits / Hours</td><td>0.3 /7</td><td colspan="2">Compulsory (√) / Elective ( )</td><td>Semester</td><td>5-6</td></tr>
<tr><td>Module Type</td><td colspan="2">General Courses</td><td>Applicable Programm</td><td colspan="2">Telecommunications Engineering with Management
E-Commerce Engineering with Law
Internet of Things Engineering</td></tr>
<tr><td>Prerequisites</td><td colspan="5"></td></tr>
</table>

II. Teaching Objectives

These tasks aim to provide students with the opportunity to acquire a level of professional and communication skills in an engineering environment.

By the end of the module the student will learn how to:

- Communication skills
- Listening and reflection skills

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
1	Present and communicate their unique strengths.	Semester 1 task: Developing a CV. Semester 2 task: Undertaking 'Appreciative Inquiry' exercises and case study evaluation.
2	Use a collaborative and positive approach to generating solutions and managing personal and organizational change.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Workshop to introduce students and on current best practices in CV writing, such as use of active verbs to describe their skills, how to write CVs to target specific jobs and how to identify and match their capabilities and competencies to their job searches. Students are facilitated to start crafting their CVs at the workshop	2-3
2	Workshop to introduce students to a method drawn from the school of positive psychology which is a strength based approach to personal and organizational change and development. Students work on applying the method to self or to a team or class	2-3

V. Teaching Methodologies

Lectures & online quiz; Assignment

VI. Assessment Methods

Engineering Ethics (Assignment + Workshop Attendance): 50%;

Personal CV (Assignment + Workshop Attendance): 50%

VII. Module Resources

There is no textbook for this module.

Authors: Dr Bindu Chib, Dr Brinder Saigal,

Reviewer: Dr Michael Chai

< Product Development and Marketing > Course Syllabus

I. Basic Information

Module Name	Chinese: 产品开发与营销	**Module Code**	EBU5606/
	English: Product Development and Marketing		

Credits / Hours	2.5/40	Compulsory (√) / Elective ( )	Semester	4
Module Type	General Courses	Applicable Programm	E-Commerce Engineering with Law	
Prerequisites	EBU5402 Enterprise Management			

II. Teaching Objectives

This is an introductory module in New Product Development with focus on Marketing. During this module, student will have the opportunity to:

- Define the concept of innovation within the context of new product development,
- Learn how to analyse the customer needs and measure the market potential for a new technology or product,
- Translate these needs into technical product features,
- Set the right price and select the best distribution channel,
- Define a promotion strategy for launching a new product in the market place,
- Act as entrepreneur planning the start-up of a new business (entrepreneurship) in areas like telecommunications and e-commerce.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

Learning Outcome	Description	Give details of coverage and assessment
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	Product Development is one of the major applied areas for an engineer. All aspects of product development starting from innovation right up to launching of a new product are covered in this module. Student is assessed through a mid-semester coursework as well as an end of term exam.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.	Business plan part of the coursework
D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Marketing research component of the coursework

D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.	e.g coursework and Final exam
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Coursework, in-class exercises on the process of New Product Development (topics 6-8, concept development to robust design to ramp-up)
D1m	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.	Marketing research component of the coursework
D4m	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.	Coursework, in-class exercises on the process of New Product Development (topics 6-8, concept development to robust design to ramp-up)
D5m	Plan and manage the design process, including cost drivers, and evaluate outcomes.	Business plan in the coursework in-class exercises on the cost drivers. Coursework, in-class exercises on the process of New Product Development (topics 5-8, from product planning, concept development to robust design and ramp-up)
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Coursework, exam questions on the commercial and economic aspects of NPD (including, but not limited in topic 5-6, from product planning, to concept development).
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.	Students are required to deeply understand and apply qualitative and quantitative measures to develop products from concept to final marketable stages. Students are also required to assess the sustainability and viability of their designs as part of the process. Assessed in coursework.
ET2m	Knowledge and understanding of the commercial, economic and social context of engineering processes.	Coursework, exam questions on the commercial and economic aspects of NPD (including, but not limited in topic 5-6, from product planning, to concept development).

ET3m	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately .	Coursework and in-class exercises.
ET6m	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk.	Business plan part of the coursework
ET7m	Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction.	
EP1p	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).	
EP5p	Knowledge of relevant legal and contractual issues.	
EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.	
EP5m	Knowledge of relevant legal and contractual issues.	

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to concept of innovation within the context of new product development,	10
2	Introductions on how to analyse the customer needs and measure the market potential for a new technology or product, Translate these needs into technical product features,	10
3	Principls for setting the right price and selecting the best distribution channels, Definitions of promotion strategies for launching new products in the market place,	10
4	Operating as entrepreneur, planning the start-up of a new business (entrepreneurship) in areas like telecommunications and e-commerce.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures and Practical classes (40 hours); Tutorials (4 hours) & Guided independent studies.

VI. Assessment Methods

Exam: 50%

Coursework report: 50%

VII. Module Resources

None

Authors: Dr David McKevitt, Dr Paul Davis

Reviewer: Dr Ling Ma

< IoT Product Development and Management > Course Syllabus

I. Basic Information

Module Name	Chinese: 产品开发与管理		**Module Code**	EBU5607
	English: IoT Product Development and Management			
Credits / Hours	2.5/40	**Compulsory (√) / Elective ( )**	**Semester**	4
Module Type	General Courses	**Applicable Programm**	Internet of Things Engineering	
Prerequisites				

II. Teaching Objectives

To impart a basic knowledge of Management, Marketing and Product Development theory and practice; To provide students with the methods and tools necessary in proposing and managing initiatives and evaluating IoT technology innovation from a business standpoint; Appreciate how IoT is transforming business and explore the details an engineering student needs to know to position an IoT company within the changing marketplace. Help students develop and implement a successful IoT strategy for any business organisation.

III. Supporting Graduation Requirements

This module covers the following specific learning outcomes:

- The IoT Technology defined from a Value perspective and Creating and Monetizing Value with IoT;

- Management theories and models in context with IoT business;
- Marketing concepts and the Changing Customer Relationship;
- The Industry and the Changes coming;
- IoT Competition & Competitive advantages;
- The Outcome Economy;
- The IoT Company – department by department;
- Defining the IoT Product development requirements in terms of the Software-defined product and the Hardware-defined Product;
- The Network Fabric and the External systems including the Other IoT Products;
- IoT Cyber security & Risk management and the Future of IoT Products.

IV. Teaching Content and Course Schedules

No.	Teaching Content	Hours
1	Introduction to the module; The IoT Technology defined from a Value perspective and Creating and Monetizing Value with IoT; Management theories and models in context with IoT business.	10
2	Marketing concepts and the Changing Customer Relationship; The Industry and the Changes coming; IoT Competition & Competitive advantages.	10
3	The Outcome Economy; The IoT Company – department by department; Defining the IoT Product development requirements in terms of the Software-defined product and the Hardware-defined Product.	10
4	The Network Fabric and the External systems including the Other IoT Products; IoT Cyber security & Risk management and the Future of IoT Products. Revision for the Exam.	10
5	Tutorials and office hours	8

V. Teaching Methodologies

Lectures; Split-class tutorials

VI. Assessment Methods

Final Exam: 70%

Coursework: 30%

VII. Module Resources

Key prescribed text:

- Sinclair, B. (2017) IoT Inc: How your company can use the Internet of Things to win in the outcome economy, London: McGraw Hill Education.

Highly recommended texts:

- Slama, D., Puhlmann, F., Mirrish, J. and Bhatnagar, R. M. (2015) Enterprise IoT - Strategies and best practices for connected products and services , California: O'Reilly Media.
- Gothelf, J. and Seiden, J. (2017) Sense and Respond: How successful organizations listen to customers and create new products continuously, Massachusetts: Harvard Business Review Press.
- Ebert R. J. and Griffin, R. W. (2017) Business Essentials, 11th Global edition, London: Pearson.
- Armstrong, G., Kotler, P. and Opresnic, M. (2017) Marketing: An Introduction, 13th Global edition, London: Pearson

Authors: Dr David McKevitt, Dr Paul Davis

Reviewer: Dr Ling Ma