目录

0010074 电路分析基础Ⅱ

课程编码：0010074

课程名称：电路分析基础Ⅱ

英文名称：Circuit Analysis Foundation Ⅱ

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业的本科生

先修课程：电路分析基础、高等数学（工）、大学物理Ⅰ、复变函数与积分变换、线性代数（工）

考核形式： 平时成绩+实验成绩+考试成绩

撰写人：陈仙红，孙阳，胡婷

课程简介：（250-300 字）

《电路分析基础Ⅱ》是信息学部电子信息工程和通信工程专业大二学生开设的学科基础必修课。本课程的主要教学内容：系统论述正弦交流电路的计算方法，共分成 6 个部分：第一部分是正弦交流电的基本概念，引入相量数学工具，利用阻抗与导纳描述电压和电流的约束关系，求解交流电路中的有功功率、无功功率、复功率等基本问题；第二部分是非正弦周期电路的分析方法，用傅立叶级数将激励源函数展开，取有限项，求解不同频率下的响应，然后在时域内用叠加法得到响应；第三部分是讨论交流电路中的谐振问题，在谐振频率处，得到放大的电压或者电流，用于弱信号跟踪放大；第四部分是讲解交流电路中的互感电路，空心变压器和理想变压器的模型与应用；第五部分是讲解三相电源对称的前提下如何求解电路；第六部分是求解线性二端口电路的 Z 参数、Y 参数和 T 参数及等效电路。

推荐教材或主要参考书：

[1] 邱关源，罗先觉主编，电路（第 5 版），高等教育出版社，2006.

[2] 李瀚荪，简明电路分析基础，高等教育出版社，2002.

0010074 Circuit Analysis Foundation Ⅱ

Course Number: 0010074

Course Title: Circuit Analysis Foundation Ⅱ

Course Type: Subject Fundamental Compulsory Courses

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Circuit Analysis Foundation, Advanced Mathematics, College Physics, Functions of complex variable and integral transforms, Linear Algebra

Evaluation Method: Course participation + Experiment performance + Examination performance

Writer： Xianhong Chen, Yang Sun, Ting Hu

Course Description:

Circuit Analysis Foundation II is one of the subject fundamental compulsory courses for sophomore students major in Electronic & Information Engineering in Faculty of Information Technology (FIT). This course mainly discusses the calculation method of sinusoidal alternating circuit system from six parts. The first part introduces the basic concept of sinusoidal alternating current and phasor mathematical like utilizing impedance and admittance to describe the constraint between voltage and current and solving the basic problems in alternating current (AC) circuit like the active power, reactive power and complex power. The second part introduces the analysis method of non-sinusoidal periodic circuit like using the Fourier series and the superposition method in time domain to solve the response. The third part discusses the resonance in AC circuits, like using the amplifying voltage or current obtained at the resonant frequency to track and amplify the weak signal. The fourth part explains the mutual inductance circuit in AC circuit and the model and application of hollow transformer and ideal transformer. The fifth part explains how to solve the circuit under the premise of three-phase power supply symmetry. At last, the sixth part solves the Z parameter, Y parameter, T parameter and the equivalent circuit of the linear two-port circuit.

Recommended Textbooks/References:

1.Qiu Ganyuan, Luo Xianjue. Circuits (Fifth Edition). *Higher Education Press*, 2006.

2.Li Hansun. Concise Circuit Analysis Basis. *Higher Education Press*, 2002.

0010126 模拟电子技术

课程编码：0010126

课程名称：模拟电子技术

英文名称： Analog Circuits

课程类型：学科基础必修课

学分： 4.0 **总学时：** 64

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电路分析基础-1，电路分析基础 II

考核形式： 平时成绩+考试

撰写人：刘军华、孙直申、牛超群

课程简介：（250-300 字）

《模拟电子技术》是信息学部为电子信息工程和通信工程专业本科生开设的学科基础必修课。本课程的任务是培养学生将电路方面的知识和方法用于推演、分析通信电子系统中的复杂工程问题的能力。教学内容重点：基本的电子器件、基本的放大电路及其指标和分析方法、电路反馈原理及其应用、电子电路的频率响、基本的线性运算电路及其应用、基本的非线性电路及其应用、电源电路等。教学内容的难点：学生系统意识、工程意识和创新意识的培养； 利用 SPICE 仿真工具对抽象问题进行建模，选择合适的电子元器件和电路形式，对所实现设计电路有效验证。

推荐教材或主要参考书：

[1] 华成英. 模拟电子技术基础（第五版）. 高等教育出版社，2015

[2] 孙景琪. 模拟电子技术基础. 高等教育出版社，2016

[3] Robert L. Boylestad, Louis Nashelsky. Electronic Devices and Circuit Theory(Ninth Edition). 电子工业出版社，2010 年

0010126 Analog Circuits

Course Number: 0010126

Course Title: Analog Circuits

Course Type: Compulsory Fundamental Course

Credit: 4.0 **Total Credit Hours:** 64

Students: Undergraduate students majoring in Communication Engineeringand Electronic Information Engineering

Prerequisites: Circuit Analysis Foundation[1], Circuit Analysis Foundation[2]

Evaluation Method: Course participation + written exams

Writer： Liu Junhua. Sun Zhishen. Niu Chaoqun

Course Description:

Analog Circuits is one of the Compulsory Fundamental courses for undergraduate students Major in Communication Engineering and Electronic Engineering . The main target of this course is to train students' abilities in analyzing and designing analog circuits. This course is focus on knowledges of the analog circuits and designing methods of analog circuits. The teaching contents are mainly covered by the following aspects: Basic amplifiers and electronic devices, basic analog electrical characteristic and method of analysis, feedback circuits, frequency response, linear analog circuits and applications, power circuits. The difficulties of teaching contents are described as followings: training students' idea of analog system, engineering and creativity.

Recommended Textbooks/References:

1.Hua. Fundamentals of Analog Circuits (Fifth Edition). *Higher Education Press*, 2015.

2.Sun. Fundamentals of Analog Circuits. *Higher Education Press*, 2016.

3.Robert L. Boylestad, Louis Nashelsky. Electronic Devices and Circuit Theory (Ninth Edition). *Electronics Industrial Press*, 2010.

0010112 计算机软件基础

课程编码：0010112

课程名称：计算机软件基础

英文名称：Fundamentals of Computer Software

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：高级语言程序设计

撰写人： 汪友生 张新峰 刘芳

考核形式：平时成绩+考试

课程简介：（250-300 字）

计算机软件基础是信息学部为电子信息工程和通信工程专业本科生开设的学科基础必修课。本课程的任务是要求学生掌握数据的表示和处理、算法的分析与设计、软件开发以及资源管理等基本技能，培养学生的计算思维能力和软件能力，提升学生对工程问题求解的水平。教学内容重点包括线性数据结构（线性表、栈、队列、串和数组）、非线性数据结构（树和图）、排序、查找以及软件开发和资源管理等基础知识。教学内容的难点是数据结构与算法。

推荐教材或主要参考书：

[1] 汪友生，张新峰，张小玲，刘芳等. 计算机软件基础， 清华大学出版社，2016.12

0010112 Fundamentals of Computer Software

Course Number: 0010112

Course Title: Fundamentals of Computer Software

Course Type: Discipline Requirements

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: High Level Language Programming

Evaluation Method: Course participation + written exams

Writer： Wang Yousheng Zhang Xinfeng Liu Fang

Course Description:

The Fundamentals of computer software is a compulsory course for the undergraduate students of electronic information engineering and Communication Engineering. The task of this course is to require students to master the basic skills of data representation and processing, algorithm analysis and design, software development and resource management, etc. , improve students' ability to solve engineering problems. The course focuses on linear data structure (linear table, stack, queue, string and array) , nonlinear data structure (tree and graph) , sorting, searching, software development and resource management. The difficulty of teaching content is data structure and algorithm.

Recommended Textbooks/References:

1.Wang Yousheng, Zhang Xinfeng, Zhang Xiaoling, Liu Fang. Fundamentals of Computer Software, *Tsinghua University Press*, Dec. 2016.

0010657 数字电路与 FPGA

课程编码：0010657

课程名称：数字电路与 FPGA

英文名称：Digital Circuit and FPGA

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：大学物理Ⅰ，电路分析基础

考核形式：平时成绩+考试

撰写人：黎海涛，崔金岭，李哲

课程简介：（250-300 字）

《数字电路与 FPGA》是信息学部信息与通信工程学院为电子信息工程、通信工程专业本科生开设的学科基础必修课程。本课程的任务是使学生掌握数字电子技术领域的基本概念、基本理论、基本知识和基本能力，掌握利用硬件语言实现进行数字电子系统设计的新方法，具备进行实验研究的初步能力。教学内容重点：数字系统设计概论，数字电子技术基础，Verilog 硬件描述语言，组合逻辑电路，时序逻辑电路，脉冲波形产生电路，数-模和模-数转换，FPGA 器件与设计实例。教学内容的难点：数字系统设计方法与流程，实际逻辑问题的描述，Verilog HDL 建模与电路设计，组合逻辑电路的 Verilog HDL 描述，异步时序逻辑电路的分析和设计，D/A 转换器和 A/D 转换器的转换原理，FPGA 的结构与编程。

推荐教材或主要参考书：

[1] 江捷，马志成等，数字电子技术基础，北京工业大学出版社，2009 年 10 月

[2] 康磊，李润洲，数字电路设计及 Verilog HDL 实现（第二版），西安电子科技大学出版社，2019 年

[3] 阎石，数字电子技术基础（第五版）， 高等教育出版社，2006 年 5 月

[4] 康华光，电子技术基础（第五版），高等教育出版社，2006 年 12 月

[5] 江捷，数字电子技术基础学习指导， 北京工业大学出版社，2010 年 2 月

[6] 黄继业，潘松等，EDA 技术与 VerilogVHDL（第 3 版），清华大学出版社，2017 年

0010657 Digital Circuit and FPGA

Course Number: 0010657

Course Title: Digital Circuit and FPGA

Course Type: Compulsory Course

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: College physics, Circuit analysis

Evaluation Method: Course participation + written exams

Writer: Haitao Li, Jinling Cui, Zhe Li

Course Description:

Digital Circuit and FPGA is one of the compulsory courses for undergraduate students majoring in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the basic concepts, basic theories, basic knowledge and basic abilities in the field of digital electronic technology, the new method of digital electronic system design using hardware language, and the preliminary ability of experimental research. The teaching contents are mainly covered by the following aspects: introduction to digital system design, fundamentals of digital electronic technology, Verilog hardware description language, combinational logic circuit, sequential logic circuit, pulse waveform generation circuit, D/A and A/D conversion, FPGA devices and design examples. The difficulties of teaching contents are described as followings: design method and process of digital system, description of practical logic problems, Verilog HDL modeling and circuit design, Verilog HDL description of combinational logic circuit, analysis and design of asynchronous sequential logic circuit, conversion principle of D/A converter and A/D converter, FPGA structure and programming.

Recommended Textbooks/References:

1.Jiangjie, Ma Zhicheng, et al, Digital Electronic Technology，*Beijing University of Technology Press*, Oct. 2009.

2.Kang Lei, Li Renzhou, Digital Circuit Design and Verilog HDL Implementation (Second Edition), *Xidian University Press*, 2019.

3.Yan Shi, Digital Electronic Technology (Fifth Edition), *Higher Education Press*, May 2006.

4.Kang Huaguang, Basic Electronic Technology (Fifth Edition), *Higher Education Press*, Dec. 2006.

5.Jiang Jie, Basic Learning Guidance of Digital Electronic Technology, *Beijing University of Technology Press*, Feb. 2010.

6.Huang Jiye, Pan Song, et al, EDA Technology and Verilog VHDL (Third Edition), *Tsinghua University Press*, 2017.

0010712 信号与系统 B

课程编码：0010712

课程名称：信号与系统 B

英文名称：Signals and Systems B

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：电子信息工程、通信工程专业本科生

先修课程：高等数学（工），线性代数，复变函数与积分变换，电路分析基础

考核形式：平时成绩+考试

撰写人：汪友生，刘鹏宇

课程简介：

《信号与系统 B》是信息学部为电子信息工程和通信工程专业本科生开设的学科基础必修课。本课程的任务是研究确定性信号的特性、线性时不变系统的特性以及信号驱动线性时不变系统时的基本分析方法。教学内容重点：在信号分析方面研究连续和离散信号建模的基本理论和方法，包括：连续和离散信号的模型描述，连续和离散信号(序列)的变换域分析。在系统分析方面，研究连续及离散系统的各种描述方法，包括：连续系统微分方程模型、离散系统差分方程模型，系统传递函数的概念及其计算。在分析方法应用方面，则主要研究卷积积分、卷积和以及傅立叶变换、拉普拉斯变换和 z 变换等变换域方法。教学内容的难点：包括两个卷积(卷积积分与卷积和)和三个线性变换(傅立叶变换、拉普拉斯变换和 z 变换)。

推荐教材或主要参考书：

[1] 张延华，刘鹏宇，信号与系统（第二版），机械工业出版社，2017.9

[2] Alan V. Oppenheim, et al.，Signals and Systems(Second Edition), Prentice Hall 1997

[3] Edward W. Kamen, et al. Fundamentals of Signals and Systems Using the Wbe and MATLAB. Third Edition(英文影印版). 北京：电子工业出版社，2007

[4] 郑君里，应启珩. 信号与系统（第三版）. 高等教育出版社，2011.3

0010712 Signals and Systems B

Course Number: 0010712

Course Title: Signals and Systems B

Course Type: basic compulsory course

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: "Advanced mathematics", "linear algebra", "integral transformation", "complex function", "Fundamentals of circuit analysis"

Evaluation Method: Course participation + written exams

Writer: Yousheng Wang, Pengyu Liu

Course Description:

Signals and Systems B is one of the basic compulsory courses for undergraduate students major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the characteristics of deterministic signals, the characteristics of linear time invariant systems, and the basic analysis methods when signals drive the linear time invariant systems. The teaching contents are mainly covered by the following aspects: In the aspect of signal analysis, we guide students to study the basic theory and method of continuous and discrete signal modeling, including the model of continuous and discrete signal, and the transform domain analysis of continuous and discrete signal (sequence). In the aspect of system analysis, various description methods of continuous and discrete systems are taught to the students, including differential equation model of continuous system, difference equation model of discrete system, the concept and calculation method of system transfer function. In the application of analysis methods, we mainly introduce the students to study the transform domain methods including the convolution integral, convolution sum, Fourier transform, Laplace transform and Z-transform etc. The difficulties of teaching contents are described as followings: Two convolutions (convolution integral and convolution sum) and three linear transforms (Fourier transform, Laplace transform and Z transform).

Recommended Textbooks/References:

1.Zhang Yanhua, Liu Pengyu, Signal and System (Second Edition), *China Machine Press*, Sep. 2017.

2. Alan V. Oppenheim, et al.， Signals and Systems(Second Edition), *Prentice Hall* 1997

3. Edward W. Kamen, et al. Fundamentals of Signals and Systems Using the WBE and MATLAB. Third edition. *Electronic Industry Press*, 2007.

4. Zheng Junli, Ying Qiheng. Signal and System (Third Edition). *Higher Education Press*, Mar. 2011

0010667 随机信号分析 B

课程编码：0010667

课程名称：随机信号分析 B

英文名称： Random Signal Analysis B

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象： 通信工程、电子信息工程专业本科生

先修课程： 概率论与数理统计、复变函数与积分变换、电路分析基础、信号与系统

考核形式： 平时成绩+考试

撰写人：张新峰，冯金超，王琪

课程简介：（250-300 字）

《随机信号分析 B》是信息学部为通信工程、电子信息工程两个专业本科生开设的一门学科基础必修课。本课程的任务是讲解随机信号的时域和频域特性及随机信号通过系统之后的基本规律，使学生掌握随机信号分析的基础知识和基本方法，并将其用于分析本专业相关的复杂工程问题，为学生解决复杂工程问题奠定基础。本课程的教学内容重点是：随机信号基础知识、特征函数、平稳随机过程的基本概念与性质、各态历经过程、平稳过程的功率谱、高斯过程、随机信号通过线性系统。教学内容的难点：平稳随机过程、平稳过程的功率谱、随机过程通过线性系统。

推荐教材或主要参考书：

[1]郑薇，赵淑清，李卓明. 随机信号分析（第三版）. 电子工业出版社，2015

[2]王永德. 随机信号分析（第 5 版）. 电子工业出版社，2020

[3]李晓峰，周宁，傅志忠等. 随机信号分析（第 5 版）. 电子工业出版社，2018

[4]常建平，李海林. 随机信号分析，科学出版社，2006

[5]罗鹏飞，张文明. 随机信号分析（第二版）. 国防科技大学出版社，2012

[6]北京工业大学电子信息工程/通信工程专业培养方案，北京工业大学，2020

0010667 Random Signal Analysis B

Course Number: 0010667

Course Title: Introduction to Random Signal Analysis B

Course Type: Discipline Requirements

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering and Electronic Information Engineering

Prerequisites: Probability and Mathematical Statistics, Function of Complex Variable and Integral Transform, Fundamentals of circuit analysis, Signals and Systems

Evaluation Method: homework after class + final exams

Writer： Zhang Xinfeng, Feng Jinchao, Wang Qi

Course Description:

Random Signal Analysis is a required basic course for undergraduates majoring in electronic information engineering and communication engineering in the school of information and communication engineering which belongs to the Faculty of Information Technology(FIT) of Beijing University of Technology. The main target of this course is to clarify the time-domain and frequency-domain characteristics of random signals and the basic laws when random signals is input the system, so that students can master the basic knowledge and basic methods of random signal analysis, and use them to analyze complex engineering problems related to their major, so as to lay a foundation for them to solve complex engineering problems. This course is focus on the basic knowledge of random signal, characteristic function, the basic concepts and properties of stationary stochastic process, ergodic process, calculus of random process, power spectrum of stationary random process, random signal processed through linear system, and gaussian process and so on. The difficulties of teaching contents are described as followings: stationary random process, power spectrum of stationary stochastic process, random signal passing through linear system.

Recommended Textbooks/References:

1. Zheng Wei, Zhao Shuqing, Li Zhuoming. Random signal analysis (Third Edition). *Publishing House of Electronics Industry*, 2015.

2.Wang Yongde. Random signal analysis (Fifth Edition). *Publishing House of Electronics Industry*, 2020.

3.Li Xiaofeng, Zhou Ning,et al. Random signal analysis, 2015.

4. Chang Jianping, Li Hailin, Random signal analysis, *Science Press*, 2014.

5. Luo Pengfei, Zhang Wenming, Random signal analysis (Second Edition), *National Defense Science and Technology University Press*

0007263 电磁场与电磁波

课程编码：0007263

课程名称：电磁场与电磁波

英文名称：Electromagnetism Field and Electromagnetism Wave

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：大学物理

考核形式：平时成绩+考试

撰写人：蔡轶珩； 陈华敏

课程简介：（250-300 字）

《电磁场与电磁波》是信息学部为电子信息工程专业及通信工程专业本科生开设的学科基础必修课。本课程的任务是使学生掌握场和波的有关定理、定律等的物理意义及数学表达式，熟悉一些重要的电磁场问题的数学模型的建立过程以及分析方法，培养学生正确的思维方法和分析问题的能力，使学生学会用“场”的观点去观察、分析和计算一些简单、典型的场的问题，为后续课程打下坚实的理论基础。教学内容重点：针对场描述中的矢量分析基础、电磁场的基本规律、静态电磁场及其边值问题分析、时变电磁场、均匀平面波在无界空间中的传播、均匀平面波的反射与透射、导行电磁波。教学内容的难点：电磁场与电磁波的数学表达及分析。

推荐教材或主要参考书：

[1] 谢处方，饶克谨，《电磁场与电磁波》，高等教育出版社(第五版)，2019 年 10 月

[2] 林志瑗，杨铨让，沙玉钧， 《电磁场工程基础》，高等教育出版社，1983 年 6 月

[3] 周建华，游佰强（译）， 《工程电磁学基础》，机械工业出版社，2006 年 9 月

0007263 Electromagnetism Field and Electromagnetism Wave

Course Number: 0007263

Course Title: Electromagnetism Field and Electromagnetism Wave

Course Type: Discipline Requirements

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: College Physics

Evaluation Method: Course participation + written exams

Writer: Yiheng Cai; Huamin Chen

Course Description:

Electromagnetism Field and Electromagnetism Wave is one of the discipline requirements courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the physical meaning and mathematical expression of the relevant theorems of fields and waves, the establishment process and analysis methods of some important mathematical models of electromagnetic field problems. This course is focus on cultivating students' ability to analyze some typical field problems with the view of "field", and laying theoretical foundation for the following courses. The teaching contents are mainly covered by the following aspects: The basic principle of electromagnetic field; static electromagnetic field and boundary value problems; time-varying electromagnetic field; Propagation of uniform plane wave; reflection and transmission of uniform plane wave; Guided electromagnetic wave. The difficulties of teaching contents are described as followings: mathematical expression and analysis of electromagnetic field and electromagnetic wave.

Recommended Textbooks/References:

1.XIE Chufang, RAO Kejin, Electromagnetic Field and Electromagnetic Wave (fifth Edition), *Higher Education Press*, Oct. 2019.

2.LIN Zhiyuan, YANG Quanrang, SHA Yujun, Engineering Fundamentals of electromagnetic field, *Higher Education Press*, Jun. 1983.

3.ZHOU Jianhua, YOU Baiqiang, Engineering Electromagnetic Fundamentals, *Mechanical Industry Press*, Sep. 2006.

0010697 现代微处理器原理及应用

课程编码：0010697

课程名称：现代微处理器原理及应用

英文名称：Theory and System of Modern Microprocessor

课程类型：学科基础必修课

学分： 3.5 **总学时：**56

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电路分析基础、模拟电子技术、数字电路与 FPGA、计算机软件基础、高级语言程序设计

考核形式： 平时成绩+实验+考试

撰写人：刘晓民，稂时楠，王波涛

课程简介：（250-300 字）

《现代微处理器原理及应用》是信息学部为电子信息工程和通信工程专业本科生开设的学科基础必修课。本课程的任务是在电路分析、数字电路、软件基础等课程的基础以 x86、龙芯、RISC-V、ARM 等当前主流微处理器为背景，通过对计算机系统的内部结构、工作原理、应用系统设计等方面的讲授，以及对学生设计能力的训练，使学生从理论和实践上掌握微处理器的分类、结构及工作原理、指令系统、存储器及其接口电路设计等概念及应用等内容。为学习后续课程以及开发、设计、使用计算机微处理器及应用系统打下良好的基础。教学内容重点：微处理器基本结构、寻址、存储器、IO 接口设计。教学内容的难点：寻址、存储器、IO 接口设计。

推荐教材或主要参考书：

[1] 余春暄，左国玉等，80×86/Pentium 微机原理及接口技术第 3 版，机械工业出版社， 2015 年 6 月

[2] 严海蓉, 薛涛, 曹群生, 时昕，嵌入式微处理器原理与应用——基于 ARM Cortex-M3 微控制器（第二版），清华大学出版社，2019 年 2 月

[3] 靳国杰，张戈，胡伟武，龙芯应用开发标准教程，人民邮电出版社，2018 年 12 月

[4] 胡振波，手把手教你设计 CPU—RISC-V 处理器篇，人民邮电出版社，2018 年 5 月

0010697 Theory and System of Modern Microprocessor

Course Number: 0010697

Course Title: Theory and System of Modern Microprocessor

Course Type: Professional basic compulsory course

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Circuit analysis basics, Analog electronics, Digital electronics and FPGA, Software basics, Advance language programming

Evaluation Method: Course participation + Experiments+ Examination

Writer： Liu Xiaomin,Lang Shinan,Wang Botao

Course Description:

The Theory and Application of Modern Microprocessor is a professional basic course offered by the Faculty of Information Technology for undergraduates majoring in Electronic Information Engineering and Communication Engineering. The task of this course is based on the current mainstream microprocessors such as x86, Loongson, RISC-V, ARM, and basic courses such as circuit analysis, digital circuit, software basics and other courses. Through teaching on the internal structure, working principle, application system design and other aspects of computer systems and the training of students' design ability, enabling students to master the classification, structure and working principle of microprocessor, instruction system, memory and interface circuit design and other concepts and applications in theory and practice. It lays a good foundation for learning follow-up courses and developing, designing and using computer microprocessors and application systems. The main contents of teaching: basic structure of microprocessor, addressing, memory, IO interface design. Difficult points in teaching: addressing, memory, IO interface design

Recommended Textbooks/References:

1.Chunxuan Yu, Guoyu Zuo, et al., 80×86/Pentium Theory and I/O Technology of Microprocessor, *China Machine Press*, Jun. 2015.

2.Hairong Yan, Tao Xue, et al., Theory and Application of Embedded Microprocessor Based on ARM Cortex-M3 micro controller, *Tsinghua University Press*, Feb. 2019.

3.Guojie Jin, Ge Zhang, Weiwu Hu, Standard Application Development Course of Loongson, *Post&Telecom Press*, Dec. 2018.

4.ZhenBo Hu, Teaching You to Design CPU—RISC-V Processor with Hands-on, *Post&Telecom Press*, May 2018.

0010145 射频与通信电路

课程编码：0010145

课程名称：射频与通信电路

英文名称：Radio Frequency and Communication Circuits

课程性质：学科基础必修课

学分：3.5　　学时：56

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电磁场与电磁波、电路分析基础、模拟电子技术

考核形式：平时成绩+考试

撰写人：赛景波，司鹏搏，李琦，刘畅

课程简介：

《射频与通信电路》是信息学部为信息与通信类专业本科生开设的必修课程类型。本课程的任务是使学生理解并掌握射频通信系统功能电路的基本原理及实现方法,培养学生在电子信息、通信及相关领域从事科学研究、教学、科技研发工作时具有射频电路分析、设计的能力。教学内容重点：通信收发信机的结构及应用、射频元器件及电路模型、传输线理论、Smith 圆图及应用方法、射频网络分析、阻抗匹配与调谐、射频放大器、幅度调制解调电路、角度调制解调电路及混频电路等。教学内容的难点：Smith 圆图及应用方法、射频网络分析、阻抗匹配与调谐。

推荐教材或主要参考书：

[1]文光俊，谢甫珍，李建.无线通信射频电路技术与设计.电子工业出版社，2010.10

[2]陈邦媛.射频通信电路(第三版).科学出版社，2020.03

[3]孙景琪，赛景波，曹小秋，司鹏搏. 高频电子线路. 高等教育出版社，2015.12

0010145 Radio Frequency and Communication Circuits

Course Number: 0010145

Course Title: Radio Frequency and Communication Circuits

Course Type: Discipline requirements

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Electromagnetic Field and Electromagnetic Wave, Circuit Analysis Basis, Analog Electronic Technology

Evaluation Method: Course participation + written exams

Writer: Jingbo Sai, Pengbo Si, Qi Li, Chang Liu

Course Description:

Radio Frequency and Communication Circuits is one of the subject required courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to enable students to understand and master the basic principles and implementation methods of RF communication system functional circuits, and to cultivate students' ability of RF circuit analysis and design when they are engaged in scientific research, teaching and scientific research and development in electronic information, communication and related fields. This course is focus on impedance matching. The teaching contents are mainly covered by the following aspects: structure and application of communication transceiver, RF components and circuit model, transmission line theory, Smith circle chart and application method, RF network analysis, impedance matching and tuning, RF amplifier, amplitude modulation and demodulation circuit, angle modulation and demodulation circuit and mixing circuit, etc. The difficulties of teaching contents are described as followings: Smith chart and its application, RF network analysis, impedance matching and tuning.

Recommended Textbooks/References:

1.Wen Guangjun, Xie Fuzhen, Li Jian. Radio frequency circuit technology and design of wireless communication. *Electronic Industry Press*, Oct. 2010.

2.Chen bangyuan. Radio frequency communication circuit (Third Edition). *Science Press*, Mar. 2020

3.Sun Jingqi, Sai Jingbo, Cao Xiaoqiu, Si Pengbo. High frequency electronic circuit. *Higher Education Press*, Dec. 2015.

0010665 数字信号处理 B

课程编码：0010665

课程名称：数字信号处理 B

英文名称：Digital Signal Processing B

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：电子信息工程、通信工程专业本科生

先修课程：信号与系统、高等数学（工）、复变函数与积分变换

考核形式：笔试

撰写人：贾懋珅，李晖

课程简介：

数字信号处理 B 课程是信息学部为电子信息工程与通信工程专业本科生开设的一门学科基础必修课。本课程的目标是：以离散时间信号与系统作为对象，研究对信号进行各种处理和利用的原理和方法。通过该课程的学习，使学生能够深入理解信号处理的内涵和实质。同时，为以后进一步学习和研究数字通信、模式识别、图像处理、随机数字信号处理、时频分析等专业课奠定良好的基础。课程主要内容包括：离散时间信号和系统分析的理论和方法、离散时间傅里叶变换、离散傅里叶级数、离散傅里叶变换、快速傅里叶变换、无限冲激响应数字滤波器和有限冲激响应数字滤波器的实现结构以及设计方法等。

推荐教材或主要参考书：

[1] 胡广书. 数字信号处理导论. 清华大学出版社，2013.05

[2] Sanjit K. Mitra, McGraw-Hill Companies Inc，Digital Signal Processing - A Computer-based Approach，Third Edition，清华大学出版社，2006

[3] 丁玉美等. 数字信号处理(第四版). 西安电子科技大学出版社，2016.04

[4] 门爱东，苏菲等. 数字信号处理(第二版). 科学出版社，2009.09

0010665 Digital Signal Processing B

Course Number: 0010665

Course Title: Digital Signal Processing B

Course Type: Discipline Requirements

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students major in Electronic and Information Engineering and Communication Engineering

Prerequisites: Signals and Systems, Calculus (Engineering), Complex Function and Integral Transforms

Evaluation Method: Written exams

Writer： Jia Maoshen, Li Hui

Course Description:

Digital signal processing (DSP) B is one of the discipline requirements courses for undergraduate students Major in electronic information and communication engineering. The main target of this course is to clarify the principles of discrete time signal and system and to study the theories, technologies and applications of signal processing. Through this course, students can gain a basic insight into the connotation and essence of signal processing. In the meantime, the course provides a good foundation for the further study of courses, such as digital communication, pattern recognition, image processing, random digital signal processing and time-frequency analysis. This course is focus on basic theories and methods of discrete time signal and system analysis, discrete-time Fourier transform (DTFT), discrete Fourier series (DFS), discrete Fourier transform (DFT), fast Fourier transform (FFT), structures and design of infinite impulse response (IIR) digital filters and finite impulse response (FIR) digital filters, etc.

Recommended Textbooks/References:

1. Hu Guangshu. An Introduction to Digital Signal Processing, *Tsinghua University Press,* 2013
2. Sanjit K．Mitra, McGraw-Hill Companies Inc．Digital Signal Processing – A Computer- based Approach (3rd Edition), *Tsinghua University Press*, 2006
3. Ding Yumei. Digital Signal Processing (4th Edition), *Xidian University Press*, 2016
4. Men Aidong, SU Fei. Digital Signal Processing (2nd Edition), *Science Press,* 2009

0010673 通信系统原理 B

课程编码：0010673

课程名称：通信系统原理 B

英文名称：Principles of Communication Systems

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：通信工程本科生

先修课程：信号与系统, 概率论与数理统计, 随机信号分析

考核形式：平时成绩+考试

撰写人：孙艳华

课程简介：

《通信系统原理 B》是信息学部为通信工程及电子信息工程专业本科生开设的学科基础必修课程类型。本课程的任务是引导学生对通信系统概念和原理更深入理解，增强学生对抽象、理论、分析过程的理解，学习基本思维方法和研究方法；使学生掌握通信系统有关基础理论知识，加强系统观念，提高分析和设计通信系统的能力。教学内容重点：模拟通信系统及数字通信系统的基本知识、分析方法和噪声性能。教学内容的难点：基带传输部分介绍的无码间串扰系统，模拟及数字通信系统性能分析及差错控制。

推荐教材或主要参考书：

[1] 樊昌信、曹丽娜等，通信原理（第七版），国防工业出版社，2018 年 7 月

0010673 Principles of Communication Systems B

Course Number: 0010673

Course Title: Principles of Communication Systems B

Course Type: compulsory course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Communication Engineer

Prerequisites: Signal and System, Probability and Statistics, Random Signal Analysis

Evaluation Method: Course participation + written exams

Writer: Yanhua Sun

Course Description:

Principles of Communication Systems B is one of the compulsory courses for undergraduate students Major in Communication Engineer and Electronic Information Engineering. The main target of this course is to clarify a deeper understanding of communication system concepts and principles, research methods; enable students to master basic theoretical knowledge about communication systems, improve analysis and design ability. This course is focus on basic knowledge, analysis methods and noise performance of analog communication systems and digital communication systems. The difficulties of teaching contents are described as followings: the free inter-symbol-interference system of digital baseband signal transmission, analog and digital communication system analysis and error control coding.

Recommended Textbooks/References:

1.Fan Changxin, Cao Lina, etc., Principles of Communication (Seventh Edition), *National Defense Industry Press*, Jul. 2018.

0008132 通信网络基础

课程编码：0008132

课程名称：通信网络基础

英文名称：Fundamentals of Communication Networks

课程类型：学科基础选修课、专业选修课、学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：信号与系统，通信系统原理、现代微处理器原理及应用

考核形式：平时成绩+考试

撰写人：李萌

课程简介：（250-300 字）

《通信网络基础》是信息学部信息与通信工程学院为电子信息工程和通信工程专业本科生开设的选修课。本课程的任务是通过课程内容的学习使学生掌握通信网络的基本概念、基本理论和基本方法，培养学生具有应用通信网络知识分析和解决实际网络问题的基本能力，为学生从事通信、电子相关的工作打下坚实的基础。教学内容重点：通信网络的基本构成原理、通信网络协议、网络的时延分析、多址接入方式和常用路由算法。教学内容难点：通信网络协议、网络的时延分析以及路由算法。

推荐教材或主要参考书：

[1] 李建东，盛敏,《通信网络基础》,（第二版），北京：高等教育出版社，2011.

[2] 周炯磐主编，《通信网理论基础》（修订版），人民邮电出版社，2009.

[3] Bruce Hajek，《Communication Network Analysis》，2006.

[4] 王海涛等译，《通信网—基本概念与主体结构（第 2 版）》，清华大学出版社，2005.

0008132 Fundamentals of Communication Networks

Course Number: 0008132

Course Title: Fundamentals of Communication Networks

Course Type: Major Electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Signal and Systems, Theory of Communications, Principles of Computer

Evaluation Method: Course participation + written exams

Writer: Meng Li

Course Description:

The Fundamentals of Communication Networks course is an elective course for undergraduates in Electronic and Information Engineering and Communication Engineering in the School of Information and Communication Engineering of the Faculty of Information Engineering. The task of this course is to enable students to master the basic concepts, theories and basic methods of communication network through the study of course content, to train students with the basic ability to analyze and solve practical network problems, and to lay a solid foundation for students to engage in communication and electronic engineering related work.

Teaching focus: the basic composition principle of communication network, communication network protocol, network delay analysis, multi-access mode and common routing algorithms.

Teaching difficulties: communication network protocol, network delay analysis and routing algorithms.

Recommended Textbooks/References:

1.Jiandong Li, Min Sheng, Fundamentals of Communication Networks, (2nd edition), Beijing: *Higher Education Press*, 2011.

2.Weipan Zhou, Theoretical Basis of the Communication Network, (revised version), *People's Post and Telecommunications Press*, 2009.

3.Bruce Hajek, Communication Network Analysis, 2006.

4.Haitao Wang etal., Communication Network - Basic Concepts and Main Structure (2nd Edition), *Tsinghua University Press*, 2005.

0010688 无线通信

课程编码：0010688

课程名称：无线通信

英文名称：Wireless Communications

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：信号与系统，通信系统原理，射频与通信电路，随机信号分析，电磁场与电磁波

考核形式：平时成绩+考试

撰写人：杨睿哲

课程简介：（250-300 字）

《无线通信》是电子信息工程专业和通信工程专业本科生的专业课。本课程的主要任务：了解、掌握无线通信中无线信道的基本特性、以及抵抗无线信道衰落的有效技术，为未来继续深造和参加工作，在通信系统的研究、开发和维护打下必要的理论基础和技能，增加深造、就业竞争力。教学内容重点：以无线通信信道为基础，从无线信道及其容量特性、编码、交织、调制、多天线技术、正交频分复用、扩频等方面掌握无线通信过程。教学内容的难点：无线信道特性、多天线技术、正交频分复用和各技术参数设计。

推荐教材或主要参考书：

[1] Theodore S. Rappaport 著，周文安等译. 无线通信原理与应用. 电子工业出版社，第二版，2018 年 1 月

[2] Andrea Goldsmith 著，杨鸿文等译. 无线通信. 人民邮电出版社，2007 年 6 月

[3] Cory Beard，William Stallings 著，朱磊译. 无线通信网络与系统. 机械工业出版社，2017 年 10 月

[4] David Tse, Pramod Viswanath 著，李锵译. 无线通信基础. 人民邮电出版社，2009 年 8 月

[5] Andreas F. Molisch 著，田斌，帖翊，任光亮译著. 无线通信（第二版）. 电子工业出版社，2015 年 1 月

0010688 Wireless Communications

Course Number: 0010688

Course Title: Wireless Communications

Course Type: Major Elective

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communications Engineering

Prerequisites: Signal and System, Communication System Principle, Random Signal Analysis, Electromagnetic Fields and Waves

Evaluation Method: Course participation + written exams

Writer： Ruizhe Yang

Course Description:

'Wireless communications' is a major elective course for undergraduates majoring in Electronic Information Engineering and a subject basic compulsory course for undergraduates majoring in Communication Engineering. The main target of this course will make the students master the basic characteristics of wireless channels in wireless communication, as well as the effective technologies to resist wireless channel fading and lay the necessary theoretical foundation for the further study and work in the development, maintenance of communication systems, therefore increasing the opportunities of further education and employment. According to the characteristics of students, based on the wireless communication channel and the main line of wireless communication process, the main content of the course includes the wireless channel and its capacity characteristics, coding, interleaving, modulation, multi-antenna technology, orthogonal frequency division multiplexing, spread spectrum, etc. The difficulties of teaching contents are described as followings: wireless channel， multi-antenna technology, orthogonal frequency division multiplexing and the design of the related parameters.

Recommended Textbooks/References:

1.Theodore S. Rappaport, Translated by Wenan Zhou, Wireless Communications Principles and Practice (Second Edition), *Electronic Industry Press*, 1-2018.

2.Andrea Goldsmith, Translated by Hongwen Yang, Wireless Communications. *Posts and Telecommunications Press*, 6-2007.

3.Cory Beard，William Stallings, Translated by Lei Zhu. Wireless Communication Networks and Systems. *Mechanical Industry Press,* 10-2017.

4.David Tse, Pramod Viswanath, Translated by Qiang Li. Fundamentals of Wireless Communications. *People's post and Telecommunications Press*, 8-2009.

5.Andreas F. Molisch, Translated by Bin Tian, Yi Tie, Guangliang Ren. Wireless Communications

(Second Edition). *Electronic Industry Press*, 1-2015.

0008121 计算机软件基础实验

课程编码：0008121

课程名称：计算机软件基础实验

英文名称：Experiment of Computer Software Fundamentals

课程类型：实践环节必修课

学分： 0.5 **总学时：** 16

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：高级语言程序设计

考核形式：平时成绩+代码质量+实验报告

撰写人： 汪友生，张新峰，刘芳

课程简介：（250-300 字）

《计算机软件基础实验》是信息学部为电子信息工程、通信工程专业本科生开设的实践环节必修课。本课程是计算机软件基础课程的实践性教学环节，课程任务是培养学生实际编程能力，掌握对电子信息和通信工程领域的较复杂问题进行分析、计算和设计，并能通过编程利用计算机解决问题的能力。实验内容包括线性表、栈和队列、树和二叉树等数据结构的实现和应用，以及排序和查找典型算法的实现和应用。通过实验课加深对计算机软件基础理论课基本概念、基本理论的理解，具体体验如何将基本的原理和典型算法用于解决实际问题，借此来提高学生分析问题和解决问题的能力。

推荐教材或主要参考书：

[1] 汪友生，张新峰，张小玲，刘芳等. 计算机软件基础， 清华大学出版社，2016.12

0008121 Experiment of Computer Software Fundamentals

Course Number: 0008121

Course Title: Experiment of Computer Software Fundamentals

Course Type: Compulsory Practice Course **Credit:** 0.5 **Total Credit Hours:** 16

Students: Undergraduate students majoring in Electronic Information Engineeringand Communication Engineering

Prerequisites: High Level Language Programming

Evaluation Method: Course participation+Code quality+Experimental report

Writer： Wang Yousheng，Zhang Xinfeng，Liu Fang

Course Description:

Experiment of Computer Software Fundamentals is a practical requirement for the undergraduates of Electronic Information Engineering and Communication Engineering. This course is a practical teaching link in the basic course of computer software. It cultivates students' practical programming ability, masters the analysis, calculation and design of more complex problems in the field of electronic information and communication engineering, and can use computers to solve problems through programming. The experimental content includes the implementation and application of data structures such as linear tables, stacks and queues, trees and binary trees, and the implementation and application of typical algorithms for sorting and searching. Deepen the understanding of the basic concepts and basic theories of computer software basic theory courses through experiment classes, and experience how to use basic principles and typical algorithms to solve practical problems, thereby improving students' ability to analyze and solve problems.

Recommended Textbooks/References:

1.Wang Yousheng, Zhang Xinfeng, Zhang Xiaoling, Liu Fang. Fundamentals of Computer Software, *Tsinghua University Press*, 12-2016

0010127 模拟电子技术实验

课程编码：0010127

课程名称：模拟电子技术实验

英文名称：Experiments of Analog Circuits

课程类型：实践环节必修课

学分： 1.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程

先修课程：电路分析基础-1，电路分析基础 II

考核形式： 平时成绩+考试

撰写人：刘军华、孙直申、牛超群

课程简介：（250-300 字）

《模拟电子技术实验》是信息学部为电子信息工程和通信工程专业的本科生开设的实践环节必修课。本课程的主要任务是在模拟电子技术课程学习的同时通过实验加深学生电路的理解和对电路调试方法的掌握，引导学生从电路理论到电路实现的认知能力，培养其数学思维、设计与实现的专业基本能力。实现电路功能，强化学生系统观念、工程观念、创新观念等专业核心意识；课程主要内容包括：除了学习知识外，还要学习工程实践方法。

推荐教材或主要参考书：

[1] 华成英. 模拟电子技术基础（第五版）. 高等教育出版社，2015

[2] 孙景琪. 模拟电子技术基础. 高等教育出版社，2016

[3] Robert L. Boylestad, Louis Nashelsky. Electronic Devices and Circuit Theory(Ninth Edition). 电子工业出版社，2010 年

0010127 Experiments of Analog Circuits

Course Number: 0010127

Course Title: Experiments of Analog Circuits

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering, Electronic Information Engineering

Prerequisites: Circuit Analysis Foundation[1], Circuit Analysis Foundation[2]

Evaluation Method: Course participation + written exams

Writer： Liu Junhua. Sun Zhishen. Niu Chaoqun

Course Description:

Experiments of Analog Circuits is one of the Compulsory Fundamental courses for undergraduate students Major in Communication Engineering and Electronic Information Engineering. The main target of this course is to train students' abilities in designing and analyzing analog circuits. This course is focus on operating ability of the analog circuits test and designing methods of analog circuits. The teaching contents are mainly covered by the following aspects: Basic amplifiers and electronic devices, feedback circuits, frequency response, linear analog circuits and applications, power circuits. The difficulties of teaching contents are described as followings: training students' idea of analog system, engineering and creativity.

Recommended Textbooks/References:

1.Hua. Fundamentals of Analog Circuits (Fifth Edition). *High Education Press*, 2015

2.Sun. Fundamentals of Analog Circuits. *High Education Press*, 2016

3.Robert L. Boylestad, Louis Nashelsky. Electronic Devices and Circuit Theory(Ninth Edition). *Electronics Industrial Press*, 2010

0010658 数字电路与 FPGA 实验

课程编码：0010658

课程名称：数字电路与 FPGA 实验

英文名称：Digital Circuit and FPGA Experiment

课程类型：实践环节必修课

学分： 1.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：大学物理Ⅰ，电路分析基础

考核形式：考查

撰写人：黎海涛，崔金岭，李哲

课程简介：（250-300 字）

《数字电路与 FPGA 实验》是信息学部信息与通信工程学院为电子信息工程、通信工程专业本科生开设的实践环节必修课程。本课程的任务是使学生加深对相关理论知识的理解，初步具备进行数字电路和 FPGA 实验的能力，具备分析问题、分解问题和解决问题的方法。教学内容重点：元器件基础知识，常用电子仪器的使用方法，数字电路和 FPGA 实验的基本过程。教学内容的难点：运用 EDA 软件分析数字电路，利用 FPGA 器件设计数字电路的新方法，较强的数字电路和 FPGA 实验研究的能力。

推荐教材或主要参考书：

[1] 江捷，马志成等，数字电子技术基础，北京工业大学出版社，2009 年 10 月

[2] 康磊，李润洲，数字电路设计及 Verilog HDL 实现（第二版），西安电子科技大学出版社，2019 年

[3] 阎石，数字电子技术基础（第五版）， 高等教育出版社，2006 年 5 月

[4] 康华光，电子技术基础（第五版），高等教育出版社，2006 年 12 月

[5] 江捷，数字电子技术基础学习指导， 北京工业大学出版社，2010 年 2 月

[6] 黄继业，潘松等，EDA 技术与 VerilogVHDL（第 3 版），清华大学出版社，2017 年

0010658 Experiment of Digital Circuit and FPGA

Course Number： 0010658

Course Title: Experiment of Digital Circuit and FPGA

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: College physics, Circuit analysis

Evaluation Method: check

Writer: Haitao Li, Jinling Cui, Zhe Li

Course Description:

Experiment of Digital Circuit and FPGA is one of the compulsory experimental courses for undergraduate students majoring in Electronic Information Engineering and Communication Engineering. The main target of this course is to enable students to deepen their understanding of relevant theoretical knowledge, initially be able to carry out digital circuit and FPGA experiments, and have the methods to analyze, decompose and solve problems. The teaching contents are mainly covered by the following aspects: basic knowledge of components, usage of common electronic instruments, basic process of digital circuit and FPGA experiment. The difficulties of teaching contents are described as followings: analyze digital circuit based on EDA software, design digital circuit based on FPGA device, research ability of digital circuit and FPGA experiment.

Recommended Textbooks/References:

1.Jiangjie, Ma Zhicheng, et al, Digital Electronic Technology，*Beijing University of Technology Press*, 10-2009

2.Kang Lei, Li Renzhou, Digital Circuit Design and Verilog HDL Implementation (Second Edition), *Xidian University Press*, 2019

3.Yan Shi, Digital Electronic Technology (Fifth Edition), *Higher Education Press*, 5-2006

4.Kang Huaguang, Basic Electronic Technology (Fifth Edition), *Higher Education Press*, 12-2006

5.Jiang Jie, Basic Learning Guidance of Digital Electronic Technology, *Beijing University of Technology Press*, 2-2010

6.Huang Jiye, Pan Song, et al, EDA Technology and Verilog VHDL (Third Edition), *Tsinghua University Press*，2017

0010078 电子工程设计（通信）-1

课程编码：0010078

课程名称：电子工程设计（通信）-1

英文名称：Electronic Engineering Design (Communication)-1

课程类型：实践环节必修课

学分：1.5　　**总学时：**45

面向对象：通信工程专业本科生

先修课程：电路分析基础、信号与系统、模拟电子技术、现代电子测量技术及仪器等

考核形式：课程作业+设计成果+笔试

撰写人：高新

课程简介：

《电子工程设计》是电子信息工程、通信工程、自动化、电子科学与技术等多个专业本科生必修的实践类课程。该课程以小型电子系统的设计为载体，使学生了解产品研发的一般过程、掌握产品设计的基本方法、积累初步的实际工作经验，为从工科大学生向工程师的角色转换做好准备。

《电子工程设计（通信）-1》是课程的第一阶段，学习如何在产品设计初期收集资料、设计方案，如何进行产品的模块化设计，如何绘制设计图纸和设计印刷电路板，并且完成产品中部分电路模块的设计与实现。通过该阶段的学习，使学生掌握一个电路系统中各个单元电路分别实现、单独调试的方法，提高电路实现过程中故障的排查能力，提高电路的组装、焊接水平。

推荐教材或主要参考书：

[1]孙肖子，邓建国．电子设计指南．北京：高等教育出版社．2006

[2]高有堂，翟天嵩．电子设计与实践指南．北京：电子工业出版社．2007

0010078 Electronic Engineering Design (Communication)-1

Course Number: 0010078

Course Title: Electronic Engineering Design (Communication)-1

Course Type: Compulsory Practice Course

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students major inCommunication Engineering

Prerequisites: Circuit Analysis Foundation, Signals and Systems, Analog Circuits, Modern Electronic Measuring Technology and Instruments

Evaluation Method: Classroom work + Design Results + Written Test

Writer: Xin Gao

Course Description:

"Electronic Engineering Training" is a compulsory practice undergraduate course for students of Electronic Information Engineering, Communication Engineering, Automation and other majors. The course is based on a small electronic system design, which enables the students to understand the general process of product development, the basic method in product design and the accumulation of the preliminary practical work experience. It is like a bridge to convert participants from engineering students to the role of the actual engineers.

" Electronic Engineering Design (Communication)-1" is the first phase of the course. The students will learn how to collect data in the early stage of product design, how to give design proposal, how to design the modular of the product, how to draw the design drawings and how to design of printed circuit board. In this course student will finish the each parts of the circuit and products design till to the implementation of the module. Through each stages of learning, it enables the students to master each unit circuit and realization of a circuit system, separate debug and improve the ability to detect the circuit failure investigation and improve the circuit assembly and welding level.

Recommended Textbooks/References:

1. SUN Xiaozi, Deng Jianguo. Electronic Design Guide. Higher Education Press.2006

2. GAO Youtang, Zhai Tiansong. Electronic Design and Practice Guide. Electronic Industry Press. 2007

0007260 认识实习

课程编码：0007260

课程名称：认识实习

英文名称：Professional SocialPractice

课程类型：实践环节必修课

学分： 1.0 **总学时：** 30

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：无

考核形式：参与度、出勤情况+实习总结报告

撰写人：王卓峥

课程简介：

《认识实习》是信息学部信息与通信工程学院为电子信息、通信专业本科生开设的实践环节必修课。本课程的任务是提高学生对专业的认知度，使学生对所学专业建立感性认识，初步了解与专业学习和实践相关的内容、专业相关领域的发展趋势和前沿，初步了解未来就业环境。教学内容重点：组织学生参观专业相关的企业、开展校际交流、领域专家讲座、专业介绍、师生讨论等方式引导学生理解典型的电子信息、通信产品的设计流程、设计规范和设计特点。教学内容的难点：参与部分实际电子产品局部设计、调试和测试、加工等工作。

推荐教材或主要参考书：

无

0007260 Professional Social Practice

Course Number: 0007260

Course Title: Professional SocialPractice

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: None

Evaluation Method: Participation, attendance + internship report

Writer: Zhuozheng Wang

Course Description:

Professional SocialPractice is one of the Compulsory Practice courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to improve students' awareness of majors ,make studentunderstandthe content related to professional learning and practice, the development trends and frontiers of professional-related fields, and the future employment environment. The teaching contents are mainly covered by the following aspects: by organizing students to visit major-related companies, conduct inter-school exchanges, listen expert lectures, professional introductions, teacher-student discussions, etc, makes student understand the design process, design specifications and design characteristics of typical electronic information and telecommunication products. The difficulties of teaching contents are described as followings: Participate in the partial design, debugging and testing, processing of some actual electronic products.

Recommended Textbooks/References:

None

0010079 电子工程设计（通信）-2

课程编码：0010079

课程名称：电子工程设计（通信）-2

英文名称：Electronic Engineering　Design (Communication)-2

课程类型：实践环节必修课

学分：2.0　　**总学时：**60

面向对象：通信工程专业本科生

先修课程：电子工程设计（通信）-1、数字电子技术、现代微处理器原理及应用、高级语言程序设计、自动控制原理Ⅱ等

考核形式：设计成果+工作日志+实操考试

撰写人：高新

课程简介：

《电子工程设计（通信）-2》是《电子工程设计》课程的第二阶段，学习如何进行多个电路模块相互协调的电路系统设计，如何在多模块电路系统实现过程中进行阶段性成果评估，如何进行系统级故障的诊断与排除，并且完成由多个电路模块和程序模块组成的电路系统的联调、联测工作。通过该阶段的学习，将达到使学生了解产品研发的一般过程、掌握产品设计的基本方法、积累初步的实际工作经验的课程设置目标。

电路系统按模块进行成果评估以及系统级故障的诊断与排除是该阶段授课的重点，也是学生能力提升的关键点。这二个过程为学生理论联系实际，分析、综合，观察、判断等能力提供了较大的提升空间。也对学生科学严谨的工程素养形成起到重要作用。

推荐教材或主要参考书：

[1]孙肖子，邓建国．电子设计指南．北京：高等教育出版社．2006

[2]高有堂，翟天嵩．电子设计与实践指南．北京：电子工业出版社．2007

0010079 Electronic Engineering Design (Communication)-2

Course Number: 0010079

Course Title: Electronic Engineering Design (Communication)-2

Course Type: Compulsory Practice Course

Credit: 2.0 **Total Credit Hours:** 60

Students: Undergraduate students major inCommunication Engineering

Prerequisites: Electronic Engineering Training Design (Communication)-1, Digital Electronic, Principles and Applications of Modern Microprocessors, C Language Programming Design, Principles of Automatic Control II

Evaluation Method: Design results + Daily log + Practical Operation Examination

Writer: Xin Gao

Course Description:

“Electronic Engineering Design (Communication)-2"is the second phase of the Electronic Engineering Training courses. The students will learn how to conduct several circuit modules coordinated circuit system design, how to evaluate the stages results a multi-module circuit system, how to solve system-level fault diagnosis and troubleshooting,. Finally the students will complete the joint observation and debugging and connection of the whole circuit system consisting of multiple circuit modules and software program modules. Through the stages of learning, it will reach the goal of the curriculum to enable students to understand the general process of product development, to master the basic methods of product design, and the accumulation of the preliminary practical work experience.

The focus instruction of this stage is the circuit module outcome assessment and system-level fault diagnosis and elimination, which is also the key to enhance the students' ability. These two processes provide students greater room for improvement in theory, actual analysis, observation and judgment ability. At meanwhile, it plays an important role in the formation of rigorous engineering science literacy for students.

Recommended Textbooks/References:

1. SUN Xiaozi, Deng Jianguo. Electronic Design Guide. *Higher Education Press*. 2006

2. GAO Youtang, Zhai Tiansong. Electronic Design and Practice Guide. *Electronic Industry Press*. 2007

0008130 通信电路与系统实验

课程编码：0008130

课程名称：通信电路与系统实验

英文名称：Experiment of Communication Circuits and System

课程性质：实践环节必修课

学分：1.0　　学时：32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：射频与通信电路、通信系统原理

考核形式：平时成绩

撰写人：孙光民、赛景波、刘杰、孙恩昌、孙艳华、刘畅、李琦

课程简介：

通信电路与系统实验是信息学部为电子信息工程和通信工程专业学生开设的实践环节必修课。本课程的主要任务是是射频与通信电路、通信系统原理等理论教学课程在实验教学方面的延伸。经过熟悉各实验箱和相关实验仪器的使用和操作，掌握射频电路、幅度、角度调制解调电路、混频电路及 PAM、PCM、CVSD、FSK、PSK 等数字调制解调等电路的工作原理和设计方法，完成各项实验任务。

推荐教材或主要参考书：

[1]文光俊，谢甫珍，李建.无线通信射频电路技术与设计.电子工业出版社，2010.10

[2]陈邦媛.射频通信电路(第三版).科学出版社，2020.03

[3]孙景琪，赛景波，曹小秋，司鹏搏. 高频电子线路. 高等教育出版社，2015.12

[4]武汉凌特电子技术有限公司　通信原理综合实验指导书 V1.0.1

0008130 Experiment of Communication Circuits and System

Course Number: 0008130

Course Title: Experiment of Communication Circuits and System

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: Radio Frequency and Communication Circuits, Communication System Principle.

Evaluation Method: Course participation

Writer： Sun Guangmin. Sai Jingbo. Liu Jie. Sun Enchang. Sun Yanhua. Liu Chang. Li Qi

Course Description:

Experiment of Communication Circuits and System Experiment is a comprehensive experimental project of basic courses of Communication Engineering specialty, and it is an extension of theoretical teaching courses such as radio frequency and communication circuit and communication system principle in experimental teaching. After familiarizing with the use and operation of various experimental boxes and related experimental instruments, mastering the working principles and design methods of RF circuits, amplitude and angle modulation, demodulation circuits, mixing circuits, PAM, PCM, CVSD, FSK, PSK ,other digital modulation and demodulation circuits, students can fulfill various experimental tasks.

Recommended Textbooks/References:

1. Wen Guangjun, Xie Fuzhen, Li Jian. Radio frequency circuit technology and design of wireless communication. *Electronic Industry Press*, Oct. 2010.
2. Chen bangyuan. Radio frequency communication circuit (Third Edition). *Science Press*, Mar. 2020.
3. Sun Jingqi, Sai Jingbo, Cao Xiaoqiu, Si Pengbo. High frequency electronic circuit. *Higher Education Press*, Dec. 2015.
4. Wuhan Lingte Electronic Technology Co.,Ltd, Comprehensive experiment instruction for communication principle V1.0.1

0010668 通信工程应用设计

课程编码：0010668

课程名称：通信工程应用设计

英文名称：Design of Communication System Application

课程类型：实践环节必修课

学分： 1.0 **总学时：**30

面向对象：通信工程专业本科生

先修课程：高级语言程序设计信号与系统、数字信号处理。

考核形式： 平时成绩+考试

撰写人：席大林

课程简介：（250-300 字）

通信工程应用设计课是信息通信工程学院为通信工程专业本科生开设的把理论知识应用于实际工程的课程。本课程的任务是培养学生的工程应用和设计能力。教学内容重点是理论知识应用于实际工程当中的意识、思路、步骤、方法和技巧。教学内容的难点是从理论课到实践要有学习方法上的转变，要改变理论学习中的一些习惯做法，使学生具有运用一门计算机语言处理实际工程问题的能力，处理问题时有着良好清晰的工程意识和规范，能把工程实际和理论知识有机结合于工程设计当中。

推荐教材或主要参考书：

[1] 郑君里，信号与系统，高等教育出版社，2018 年 10 月

[2] (美)奥本海姆//威尔斯基//纳瓦卜（Alan V.Oppenheim//Alan S.Willsky//S.HHamid Nawh），信号与系统，电子工业出版社，2010 年 1 月

[3] 赵健，数字信号处理，清华大学出版社，2011 年 11 月

0010668 Design of Communication System Application

Course Number: 0010668

Course Title: Design of Communication System Application

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: 1. Advanced Language Program Design, 2. Signal and System, 3. Digital Signal Processing.

Evaluation Method: Course participation + written exams

Writer: Daling Xi

Course Description:

Design of Communication System Application is one of the compulsory practical courses for undergraduate students Major in Communication Engineering. The main target of this course is to clarify the application of theoretical knowledge in practical engineering. This course is focus on training the students' engineering ability and design ability. The teaching contents are mainly covered by the following aspects: the consciousness, thought, procedure, methods and skills of applying theoretical knowledge to practical engineering. The difficulties of teaching contents are described as followings: From theoretical learning to practical operation, students should change the learning methods, especially some habitual thinking method in theoretical learning. We should guide students to learn how to use the computer language to deal with the practical engineering problems. When dealing with practical problems, they should have a good and clear engineering consciousness, and can effectively integrate the theoretical knowledge and the engineering practice into the engineering design.

Recommended Textbooks/References:

1.Zheng Junli, signals and systems, *Higher Education Press*, Oct. 2018

2.Alan V.Oppenheim//Alan S.Willsky//S.HHamid Nawh, signals and systems, *Electronic Industry Press*, Jan. 2010.

3.Zhao Jian, digital signal processing, *Tsinghua University Press*, Nov. 2011.

0007256 工作实习

课程编码：0007256

课程名称：工作实习

英文名称：Work Practice

课程类型：实践环节必修课

学分： 4.0 **总学时：** 120

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：无

考核形式：工作态度、出勤情况、所分配工作完成的情况、实习报告的撰写与验收

撰写人：窦慧晶

课程简介：

《工作实习》是信息学部信息与通信工程学院为电子信息、通信专业本科生开设的实践环节必修课。本课程的任务是使学生通过参与企业项目的设计与开发、运用已经掌握的基础知识和专业知识，了解、研究、分析电子信息与通信系统的设计、开发、利用中实际的复杂问题，并通过文献查阅、小组讨论、信息综合以获得有效结论，增强其独立解决实际问题的能力以及团队协作能力和自学能力。教学内容重点：面向复杂工程问题的电子或通信软硬模块的设计及实现。教学内容的难点：电子或通信系统性的设计与实现。

推荐教材或主要参考书：

无

0007256 Work Practice

Course Number: 0007256

Course Title: Work Practice

Course Type: Compulsory Practice Course

Credit: 4.0 **Total Credit Hours:** 120

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: None

Evaluation Method: Work attitude, attendance, and completion of assigned work, writing and acceptance of internship report.

Writer: Huijin Dou

Course Description:

Work Practice is one of the Compulsory Practice courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to enable students to understand, research, and analyze the actual complex problems in the design, development, and utilization of electronic and telecommunication systems.

This course is focus on using the basic knowledge and professional knowledge they have mastered, and reviewing through group discussions, information searching to obtain effective conclusions, enhance their ability to solve practical problems independently and teamwork and self-learning ability. The teaching contents are mainly covered by the following aspects: the design and implementation of electronic or communication software and hardware modules for complex engineering problems. The difficulties of teaching contents are described as followings: systematic design and implementation of electronics or telecommunications system.

Recommended Textbooks/References:

None

0010669 通信系统创新应用实践 A

课程编码：0010669

课程名称：通信系统创新应用实践 A

英文名称：Innovation and Application Practice of Communication System A

课程类型：专业实践必修课

学分：1.0　**总学时：** 30

面向对象：通信工程专业本科生

先修课程：无

考核形式：平时成绩+设计报告+现场演示

撰写人：郑鑫，郑鲲

课程简介：（250-300 字）

“通信系统创新应用实践”是信息与通信学院为通信工程专业本科生开设的实践课。本课程的任务是结合模块化软硬件系统设计，完成一个具体、真实的通信系统。并在此过程中体现创新的应用。教学内容重点：通信原理应用、系统设计、GPS/北斗/GSM/蓝牙/视频流/模拟信号等图像和信号收发, 以及将这些信号进行融会贯通设计创新性通信系统设计课题。教学内容难点：团队协作、通信工程规范。

推荐教材或主要参考书：

[1] 郑鲲，孙宝岐. 通信网络安全原理与应用. 清华大学出版社，2014 年 7 月

[2] 王伟雄. 通信技能综合实践教程. 机械工业出版社，2018 年 4 月

[3] 李时东. 通信原理实践教程. 科学出版社 2015 年 11 月

[4] 鲁郁. 北斗/GPS 双模软件接收机原理与实现技术. 电子工业出版社 2016 年 4 月

0010669 Innovation and Application Practice of Communication System A

Course Number: 0010669

Course Title: Innovation and Application Practice of Communication System A

Course Type: Compulsory Practice Course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: None

Evaluation Method: Course participation + Comprehensive design + Class Presentation

Writer: Xin Zheng, Kun Zheng

Course Description:

Innovation and Application Practice of Communication System is one of the professional elective courses for undergraduate students Major in Communication Engineering. The main target of this course is to complete a concrete and real communication system combined with the modular hardware and software system design. And the application of innovation is reflected in this process. The teaching contents are mainly covered by the following aspects: communication principle application and system design, image and signal transceiver such as GPS/Beidou Satellite/GSM/Bluetooth/video stream/analog signal. The above content will be integrated and aimed at design a personality innovative communication system. The difficulties of teaching contents are described as followings: team cooperation, communication engineering specification.

Recommended Textbooks/References:

1.Zheng Kun,Sun Baoqi, Principle and application of communication network security, *Tsinghua University Press*, 07-2014

2.Wang Weixiong. Comprehensive practice course of communication skills. *China Machine Press*, 08-2018

3.Li Shidong. Practical course of communication principle. *Science Press*, 11-2015

4.Lu Yu. Principle and implementation technology of Beidou/GPS dual-mode software receiver. *Electronic Industry Press*, 04-2016

0008111 毕业设计

课程编号：0008111

课程名称：毕业设计

英文名称：Senior Project

课程类型：实践环节必修课

学分：8.0　　**学时：**480

适用对象：，电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电路分析基础，模拟电子技术，数字电路与 FPGA，信号与系统，数字信号处理，现代微处理器原理及应用，通信系统原理

考核形式：论文+答辩

撰写人：窦慧晶

课程简介：（200-300 字）

《毕业设计》是信息学部为电子信息工程专业本科生开设的一门实践环节必修课。 它是一项重要的综合性实践环节。课程的主要任务是培养学生工程实践能力，培养学生运用所学基础理论、专业知识和基本技能分析和解决工程实际问题的能力，巩固和加深所学知识、理论和技能，培养实事求是、独立思考、敢于创新的科学精神。毕业设计要求学生综合运用所学的知识和技能，结合毕业实习，分析和解决电子工程领域实际问题，使理论认识深化，知识领域扩展，专业技能延伸。通过收集、整理、加工与分析资料，完成对课题的研究，掌握电路及系统设计的基本方法，掌握从事工程实践的基本方法和撰写论文的能力, 提交高质量的本科毕业设计。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

无

0008111 Senior Project

Course Number: 0008111

Course Title: Senior Project

Course Type: Compulsory Practice Course

Credit: 8.0 **Total Credit Hours:** 480

Students: Undergraduate students major in Electronic Information Engineering and Communication Engineering

Prerequisites: Fundamental of circuits analysis, Analog Electronics, Digital Electronics and FPGA, Signals and Systems, Digital Signal Processing, Principles and Applications of Modern Microprocessors, Communication System Principle

Evaluation Method: Thesis + Presentation

Writer: Huijin Dou

Course Description:

Senior Project is a course of compulsory practice requirements for electronic information engineering major. It is an importantly comprehensive practice aspect. The main target of this course is to develop students' ability of engineering practice, to train students to use the basic theory, professional knowledge and basic skills and the ability to solve practical engineering problems, to consolidate and deepen the knowledge, theory and skills, to develop practical and realistic, independent thinking and to the scientific spirit of innovation. Senior Project requires students to use the knowledge and skills, combined with graduation practice, analyze and solve practical problems in Electronic Engineering, so theoretical understanding further deepened, extended field of knowledge, professional skills extension Through collection, collation, processing and analysis of information on the subject related to the project and completion of the project, students can grasp design methods of circuits and system and master basic methods engaged in electronic engineering practice and writing papers to submit high-quality Senior Project.

Recommended Textbooks/References:

None

0003213 自动控制原理Ⅱ

课程编码：0003213

课程名称：自动控制原理Ⅱ

英文名称：Automatic Control TheoryⅡ

课程类型：学科基础选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：信号与系统、电路分析基础、复变函数与积分变换，模拟电子技术、数字电子技术

考核形式：平时成绩+考试

撰写人：蒙西

课程简介：（250-300 字）

《自动控制原理Ⅱ》是信息学部人工智能与自动化学院为通信工程和电子信息工程专业本科生开设的学科基础选修课。本课程的任务是通过讲述自动控制系统数学描述、时域分析、频率分析及校正方法，向学生传授自动控制原理理论知识和解决问题的办法，使学生掌握电子信息工程领域控制系统的建模与分析、校正方法。教学内容重点：自动控制、闭环控制的基本概念；典型物理对象系统的传递函数及动态结构图；时域中系统稳定性、稳态误差以及动态性能的分析方法；频域稳定性判据以及基于开环频率特性的系统性能分析；采用超前、滞后校正装置以及参考模型法进行控制系统校正的方法。教学内容难点：掌握反馈控制思想方法；一般物理对象系统传递函数的求取；理解高阶线性定常系统的分析方法及思路；时域、频域的对应关系；系统固有特性、校正装置特性。

推荐教材或主要参考书：

[1] 孙亮，《自动控制原理》第三版， 高等教育出版社，2011 年 6 月

[2] 胡寿松，《自动控制原理》第七版， 科学出版社，2019 年 1 月

[3] Richard C., Robert H. Modern Control Systems 13th, Prentice Hall, 2018 年 7 月

0003213 Automatic Control Theory Ⅱ

Course Number: 0003213

Course Title: Automatic Control Theory Ⅱ

Course Type: Discipline-based optional course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students with Major Electronic Information Engineering and Communication Engineering

Prerequisites: Signals and systems, Circuit theory, Complex functions, Integral transformation, Electronics technique

Evaluation Method: Course participation + written exams

Writer： Xi Meng

Course Description:

Automatic control theory Ⅱ is a Discipline-based optional course for the undergraduate students with major Communications Engineering and Electronic Information Engineering by the college of artificial intelligence and automation. The main target of this course is to clarify the knowledge of automatic control theory by the discussion of automatic control system mathematical description, time domain analysis, frequency analysis and correction methods, such that the students are able to model, analyze and correct the controlled systems. This course is focus on the basic concepts of control theory and closed-loop control; the transfer function and dynamic structure diagram of typical object systems; the analytical methods of stability criterion, the steady-state error and dynamic property in the time domain; the frequency domain stability criterion and open-loop frequency characteristic analysis; the correction of controlled networks by advance and lag network and reference model method. The difficulties of teaching contents are described as followings: application of feedback control methods, the performing traditional functions of general objective systems, the analysis of linear high-order stationary systems, the relationship between time and frequency domains, as well as the characteristics of inherent system and correction device.

Recommended Textbooks/References:

1.Sun Liang, Automatic Control Theory 3th, *Beijing: Higher Education Press*, June-2011

2.Hu Shousong, The Principles of Automatic Control 7th. *Beijing: Science Press*, January-2019

3.Richard C, Robert H. Modern Control Systems 13th, *Prentice Hall*, July-2018

0010138 人工智能理论与实践

课程编码：0010138

课程名称：人工智能理论与实践

英文名称：Theory and Practice of Artificial Intelligence

课程类型：学科基础必修课、学科基础选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：高级语言程序设计，计算机软件基础

考核形式：平时成绩+实验成绩+考试成绩

撰写人：张文利，简萌

课程简介：（250-300 字）

《人工智能理论与实践》是信息学部为电子信息工程、通信工程专业本科生开设的学科基础必修课课程类型。本课程的任务是使学生掌握人工智能理论的基本概念、基本理论、基本方法，了解人工智能应用领域的新方法和新技术，培养本专业学生应用人工智能理论解决实际工程问题的实践能力，为今后从事电子信息与通信工程领域的相关研究和开发工作奠定良好的基础。教学内容重点：人工智能的定义、知识表示及搜索技术、机器学习。教学内容的难点：智能算法、人工神经网络与深度学习。

推荐教材或主要参考书：

[1] 李德毅，《人工智能导论》，中国科学技术出版社，2018.

[2] 王万良，《人工智能导论》第 4 版，高等教育出版社，2017.

[3] 焦李成，刘若辰，慕彩红，刘芳.《简明人工智能》，西安电子科技大学出版社，2019.

[4] 蔡自兴，刘丽珏，蔡竞峰，陈白帆，《人工智能及其应用》第五版，清华大学出版社，2016.

0010138 Theory and Practice of Artificial Intelligence

Course Number: 0010138

Course Title: Theory and Practice of Artificial Intelligence

Course Type: Subject Basic Compulsory Course. Subject Basic Elective Course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Advanced Language Programming, Fundamentals of Computer Software

Evaluation Method: Course participation + experimental participation + written exams

Writer： Wenli Zhang, Meng Jian

Course Description:

Theory and practice of artificial intelligence is one of the Discipline Requirements courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify basic concepts, basic principles and basic methods of artificial intelligence theory and to make student understand new methods and technologies in the field of artificial intelligence, which help cultivate practical ability of students to solve practical engineering problems with artificial intelligence theory, and to lay a good foundation for their future research and development in the field of electronic information and communication engineering. This course is focused on artificial intelligence concept and its application to practical engineering problems. The teaching contents are mainly covered by the following aspects: definition of artificial intelligence, knowledge representation and searching, machine learning. The difficulties of teaching contents are described as followings: intelligent algorithms, artificial neural networks and deep learning.

Recommended Textbooks/References:

1. Deyi Li, Introduction to Artificial Intelligence, China *Science and Technology Press*, 2018.

2. Wanliang Wang, Introduction to Artificial Intelligence 4th Edition, *Higher Education Press*, 2017.

3. Licheng Jiao, Ruochen Liu, Caihong Mu, Fang Liu. Concise Artificial Intelligence, *Xidian University Press*, 2019.

4. Zixing Cai, Lijue Liu, Jingfeng Cai, Baifan Chen, Fifth Edition of Artificial Intelligence and Its Applications, *Tsinghua University Press*, 2016.

0008138 信息论基础

课程编码：0008138

课程名称：信息论基础

英文名称：Fundmentals of Information Theory

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：高等数学（工），线性代数（工），概率论与数理统计（工）

考核形式：平时成绩+考试

撰写人： 李如玮，王朱伟

课程简介：

《信息论基础》是信息与通信工程学院为电子信息工程和通信工程专业本科生开设的学科基础课。本课程的讲授以 Shannon 信息论三大定理为主线展开，涉及信息度量、信源、信道、信源和信道编码等经典内容。教学内容重点包括：信息的概念及度量、信源模型及其信息测度、信道模型及其容量、无失真信源编码、限失真信源编码及有噪信道编码等。教学内容的难点包括：熵的概念、离散熵计算、信道容量的定义与计算、变长编码方法、率失真理论、错误概率计算及译码规则设计等。

推荐教材或主要参考书：

[1] 李如玮，信息理论基础，北京工业大学出版社，2020

[2] 周荫清，信息理论基础，北航大学出版社，2013

[3] Thomas M. Cover 编著（阮吉寿，张华译），Elements of Information Theory，机械工业出版社，2008

[4] 唐朝京，雷菁，信息论与编码基础，电子工业出版社，2015

[5] 傅祖芸，信息论—基础理论与应用（第 4 版），电子工业出版社，2015

0008138 Fundmentalsof Information Theory

Course Number: 0008138

Course Title: Fundmentals of Information Theory

Course Type: Subject Basic Compulsory Course. Subject Basic Elective Course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Advanced mathematics, linear algebra, probability theory and mathematical statistics

Evaluation Method: Course participation + exams

Writer: Ruwei LI, Zhuwei WANG

Course Description:

Fundmentalsof Information Theory is one of the discipline requirement courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The course focuses on the three main theorems of Shannon's information theory and involves classic content such as information measurement, source and source coding, channel and channel coding. The main contents including the concept and entropy of information, source model and its information measurement, channel model and its capacity, lossless source coding, distortion constraint source coding, and the noisy channel coding. Difficult learning points contain the concept of entropy, discrete entropy calculation, definition and calculation of channel capacity, variable-length coding method, rate-distortion theory, error probability calculation and decoding rule design, etc.

Recommended Textbooks/References:

1.Ruwei Li, Elements of Information Theory, *Beijing University of Technology Press*, 2020

2.Yinqing Zhou, Elements of Information Theory, *Beihang University Press*, 2013

3.Thomas M. Cover, Elements of Information Theory, John Wiley & Sons, Inc, 2008

4.Chaojing Tang, Qing Lei, Introduction to Information Theory and Coding, *Publishing House of Electronics Industry*, 2015

5.Zhuyun Fu, Information Theory: Principles and Applications (The Fourth Edition), *Publishing House of Electronics Industry*, 2015.

0010659 移动通信 APP 及平台软件实践

课程编码：0010659

课程名称：移动通信 APP 及平台软件实践

英文名称：Mobile Communication APP and Platform Software Practice

课程类型：实践环节选修课

学分：1.5　　**学时：**45

面向对象：通信工程专业本科生

先修课程：计算机软件基础(C 语言程序设计)

考核形式：源代码 + 报告 + 答辩

撰写人：王卓峥

课程简介：（200-300 字）

移动通信 APP 及平台软件实践是信息学部为通信工程专业本科生开设的综合性较强的软件编程实践课程。本门课程涉及的语法有 Java 和 Python，本课程的任务是掌握面向对象的编程思想与开发框架，为通信领域的上层应用软件开发提供较为完整的实践思路和方法。

本门课程中 Java 和 Python 语言的基本语法由学生自学。教学内容重点：类的概念、接口、多重继承及高级特性，使学生掌握如何通过面向对象的编程思想进行建模和软件设计。教学内容的难点：讲授移动通信中安卓 APP 的开发方法及常用框架，针对不同的典型应用案例进行分析，使学生掌握常用数据通信与展示的方法，为人才培养体系中毕业要求需要掌握的技术方法、解决复杂工程问题提供支撑。

推荐教材或主要参考书：

[1] Magnus Lie Hetland 著，袁国忠 译. Python 基础教程（第 3 版），人民邮电出版社，2018 年 02 月

[2] 孙卫琴. Java 面向对象编程（第 2 版），电子工业出版社，2017 年 01 月

[3] 欧阳燊. Kotlin 从零到精通 Android 开发（移动开发丛书），清华大学出版社，2018 年 03 月

0010659 Mobile Communication APP and Platform Software Practice

Course Number: 0010659

Course Title: Mobile Communication APP and Platform Software Practice

Course Type: Elective Practice Course

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: Fundamentals of computer software (C programming language)

Evaluation Method: Course participation + report + presentation

Writer: Zhuozheng Wang

Course Description:

Mobile Communication APP and Platform Software Practice is one of the practice elective courses for undergraduate students Major in Communication Engineering. The syntax of this course includes Java and Python. The main target of this course is to clarify the object-oriented programming idea and development frameworks, which provides a more complete practical idea and method for the development of upper application software in the field of communication.

In this course, the basic syntax of Java and Python languages is taught by students themselves. This course is focus on programming thinking and framework. The teaching contents are mainly covered by the following aspects: the concept, interface, multiple inheritance and advanced features of classes is taught to enable students to master how to model and design software through object-oriented programming ideas; the development methods and common frameworks of android app in the mobile communication field. The difficulties of teaching contents are described as followings: different typical application cases are analyzed to enable students to master the common methods of data communication and display provide support for the technical methods needed to master in the personnel training system and solve complex engineering problems.

Recommended Textbooks/References:

1.Magnus Lie Hetland, Beginning Python(Third Edition), *Posts & Telecom Press*, Feb. 2018

2.Weiqin SUN, Java Object Oriented Programming(Second Edition) , *Publishing House of Electronics Industry*, Jan. 2017

3.Shen OUYANG, Kotlin from zero to proficient in Android Development , *Tsinghua University Press*, Mar. 2018

0010080 电子工程设计（通信）-3

课程编码：0010080

课程名称：电子工程设计（通信）-3

英文名称：Electronic Engineering Design (Communication)-3

课程类型：实践环节选修课

学分：1.5　　**总学时：**45

面向对象：通信工程专业本科生

先修课程：电子工程设计（通信）-1、电子工程设计（通信）-2、射频与通信电路等

考核形式：设计成果+设计报告+答辩

撰写人：高新

课程简介：

《电子工程设计（通信）-3》是《电子工程设计》课程的第三阶段。前二个阶段为强化学习过程，特点是教师主导课程内容和进程，并且全程辅导。第三阶段为自主学习过程，特点是学生脱离教师的帮助，自主完成一个完整电路系统的设计与实现工作。《电子工程设计-3》提供了 9 个以上的设计选题，其内容与前面所做工作具有关联性。包括功能补充、性能升级、方案更新、有线和无线通信能力扩展等设计方向。

《电子工程设计（通信）-3》将使学生逐步具备独立完成小型产品研发任务的能力，积累更多的分析问题、解决问题的经验。该阶段的学习是学生本科学习阶段的一段准工作经历，将成为学生从工科大学生向工程师角色转换的“催化剂”。

推荐教材或主要参考书：

[1]徐用懋，魏庆福．现场总线技术及其应用．北京：电子工业出版社．2007

[2]苏长赞，邹殿贵．红外线与超声波遥控．北京：人民邮电出版社．1999

[3]高有堂，翟天嵩．ZigBee 无线网络技术入门与实战．北京：北京航空航天大学出版社．2007

[4]潘松，黄继业．EDA 技术与 VHDL．北京：清华大学出版社．2005

0010080 Electronic Engineering Design (Communication)-3

Course Number: 0010080

Course Title: Electronic Engineering Design (Communication)-3

Course Type: Elective Practice Course

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students major in Communication Engineering

Prerequisites: Electronic Engineering Design (Communication)-1, Electronic Engineering Design (Communication)-2, Radio frequency and communication circuit

Evaluation Method: Design results + Design Report + Oral Examination

Writer: Xin Gao

Course Description:

“Electronic Engineering Design (Communication)-3" is the third stage of the electronic engineering training courses. The first two stages are to strengthen the learning process, which is teacher-led curriculum content and process, plus the entire counseling. The third stage is the self-learning process. Students will finish independent completion of a entire circuits of the system design and implementation work without the teachers help. "Electronic engineering training-3" course provides more than nine design topics, which is connecting to the previous work in content. The design directions include feature additions, performance upgrades, program updates, wired and wireless communications capacity expansion.

" Electronic Engineering Design (Communication)-3" enable the students to improve the independently design and implementation ability of a small product development tasks. The students will gradually accumulate more analysis, problem-solving experience. This stage of learning is a quasi-work experience for undergraduate student at school, which will become a "catalyst" conversion for students from engineering students to actual engineer roles.

Recommended Textbooks/References:

1. Xu Yongmao, WEI Qingfu. Fieldbus Technology and Applications. *Electronic Industry Press*. 2007

2. Su Changzan, Zou Diangui. Infrared and ultrasonic Remote Control. *People's Posts and Telecommunications Press*. 1999

3. GAO Youtang, Zhai Tiansong.. Introduction to ZigBee Wireless Network Technology and Application *Beighang University Press*. 2007

4. PAN Song, Huang Jiye EDA Technology and the VHDL. Beijing: *Tsinghua University Press*. 2005

0008654 嵌入式系统综合实践

课程编码：0008654

课程名称：嵌入式系统综合实践

英文名称：Comprehensive Practice of Embedded System

课程类型：实践环节选修课

学分： 1.5 **总学时：** 45

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：现代微处理器原理及应用, 高级语言程序设计

考核形式：平时成绩+大作业

撰写人：崔金岭

课程简介：

《嵌入式系统综合实践》是信息学部为电子信息工程和通信工程专业本科生开设的实践环节选修课。本课程的任务是以学生为中心，在前期课程基础上，将软硬件系统与人工智能相结合，深入理解嵌入式系统的工作原理、掌握人工智能算法在硬件平台的部署方法，提高学生的软硬件开发能力及嵌入式系统与人工智能的融合能力。教学内容重点：Linux 系统的应用及驱动程序的开发、神经网络算法的认知及人工智能算法在硬件平台的部署方法。教学内容的难点：Linux 系统任务的调度以及任务管理器、同步与通信方法，多线程编程方法。

推荐教材或主要参考书：

[1] 任哲，樊生文，嵌入式操作系统基础 μC/OS-II 和 Linux(第 2 版)，北京航空航天大学出版社，2011 年 8 月

[2] 克里斯托弗·哈利南，嵌入式 Linux 基础教程（第 2 版），人民邮电出版社，2016 年 7 月

0008654 ComprehensivePractice of Embedded System

Course Number: 0008654

Course Title: ComprehensivePractice of Embedded System

Course Type: Elective Practice Course

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Principle and application of modern microprocessor, Advanced Language Programming

Evaluation Method: Course participation + project

Writer: Jinling Cui

Course Description:

Comprehensive Practice of Embedded System is one of the practice courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify embedded system. Taking students as the essential, the course combines the software and hardware system with artificial intelligence on the basis of preliminary courses. The course helps students understand the principle of embedded system deeply, deploy artificial algorithm on the hardware platform. There are also other benefits. It not only improves the students' ability of software and hardware development but also promotes the integration ability of embedded system and artificial intelligence. This course is focus on the Linux system and neuro network algorithm. The teaching contents are mainly covered by the following aspects: the development of application and driver in Linux, neural network algorithm and the deployment of artificial intelligence algorithm in hardware platform. The difficulties of teaching contents are described as followings: task management, intertask communication and multithreaded programming.

Recommended Textbooks/References:

1.Ren Z, Fan S.W, Embedded operating system foundation μC / OS-II and Linux , Second Edition, *Beihang University Press*, 8-2011

2.Christopher Hallinan, Embedded Linux Primer: A Practical Real-World Approach, Second Edition, *The People's Posts and Telecommunications Press*, 7-2016

0010678 网络通信与安全

课程编码：0010678

课程名称：网络通信与安全

英文名称：Communication Network Security

课程类型：专业选修课

学分：2.0　**总学时：** 32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：无

考核形式：平时成绩+考试

撰写人：郑鲲

课程简介：

《网络通信与安全》是信息学部信息与通信学院为电子信息工程专业和通信工程专业本科生开设的专业选修课。本课程的任务是掌握信息安全的基本理论，对信息系统的整体安全有较为深刻的认识，并且掌握实现信息安全的基本工具的使用方法。教学内容重点：数据加密技术、网络与数据库安全、计算机病毒及防治、虚拟专用网、防火墙技术、网络攻击与防范\入侵检测技术。教学内容难点：通信网络安全的基本原理和安全设置、安全漏洞、黑客原理与防范。

推荐教材或主要参考书：

[1] 郑鲲，孙宝岐. 通信网络安全原理与应用. 清华大学出版社，2014 年 7 月

[2] 沈鑫剡, 俞海英, 伍红兵, 李兴德. 网络安全. 清华大学出版社，2019 年 8 月

[3] DouglasR Stinson. 密码学原理与实践（第 3 版）.北京:电子工业出版社，2012 年 3 月

0010678 Communication Network Security

Course Number: 0010678

Course Title: Communication Network Security

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: None

Evaluation Method: Course participation + written exams

Writer: Kun Zheng

Course Description:

Communication Network Security is one of the professional elective courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the basic theory and methods of information security. This course is focus on deeply understanding the overall security of information system. The teaching contents are mainly covered by the following aspects: data encryption technology, network and database security, computer virus and prevention, virtual private network, firewall technology, network attack and prevention / intrusion detection technology. The difficulties of teaching contents are described as followings: basic principles and security settings, security loopholes, hacker principles and precautions of communication network security.

Recommended Textbooks/References:

1.Zheng Kun,Sun Baoqi, Principle and application of communication network security, *Tsinghua University press*, 07-2014

2.Shen Xinshan, Yu Haiying, Wu Hongbing, Li Xingde. Network security. *Tsinghua University Press*, 08-2019

3.Douglas Stinson. Principles and Practice of Cryptography (3rd Edition). *Electronic Industry Press*, 03-2012

0008139 移动通信

课程编码：0008139

课程名称：移动通信

英文名称：Mobile Communications

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：通信工程、电子信息工程（实验班）、电子信息工程专业的本科生

先修课程：通信系统原理，无线通信，信息论基础，信号与系统，射频与通信电路，随机信号分析

考核形式：平时成绩+大作业+前沿报告

撰写人：吴文君

课程简介：（250-300 字）

移动通信是信息学部信息与通信工程学院为通信工程、电子信息工程（实验班）、电子信息工程专业本科生开设的专业选修课。课程的主要任务是：使学生了解移动通信系统的发展历史与标准化进程、掌握移动通信系统的基本原理、熟悉移动通信系统的基础工作流程；使学生具备运用所学移动通信理论知识解决通信领域复杂工程问题的能力；使学生具备进行文献研究和综合分析的能力。教学内容重点是蜂窝移动通信系统架构与关键技术，包括：移动通信系统发展历史和移动通信系统标准化、移动通信链路、蜂窝组网原理与技术、2G-5G 移动通信系统、移动通信前沿技术报告与研讨。教学内容的难点是移动通信中信号处理的基本过程、多址接入技术。

推荐教材或主要参考书：

[1] 啜钢，王文博，常永宇，全庆一，高伟东. 移动通信原理与系统（第 4 版）. 北京邮电大学出版社，2019 年 8 月.

[2] 宋铁成，宋晓勤. 移动通信技术. 人民邮电出版社，2018 年 2 月.

[3] 丁奇，阳桢. 大话移动通信. 人民邮电出版社，2011 年 10 月.

[4] 张明和. 深入浅出 4G 网络 LTE/EPC . 人民邮电出版社，2016 年 1 月.

0008139 Mobile Communications

Course Number: 0008139

Course Title: Mobile Communications

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering and Electronic Information Engineering

Prerequisites: Communication System Principles, Wireless Communications, Information Theory Foundations, Signals & Systems, Radio & Communication Circuits, Random Signal Analysis

Evaluation Method: Course participation + System design assignment + Technical report and presentation

Writer： Wenjun Wu

Course Description:

Mobile Communications is one of the major elective courses for undergraduate students Major in Communication Engineering and Electronic Information Engineering. Through the study of this course, students can understand the development history and standardization process of mobile communication systems, master the basic principles of mobile communication systems, and become familiar with the basic workflow of mobile communication systems. Besides, students can apply their knowledge of mobile communication theory to solve complex engineering problems in the field of communications. Students can also conduct literature research and accomplish comprehensive analysis. The main contents of the course are the architecture and key technologies of cellular mobile communication systems, including the history and standardization of mobile communication systems, mobile communication link technologies, cellular networking principles and technologies, 2G to 5G mobile communication systems, technical reports and discussions on mobile communications. The difficulties of teaching contents are the basic process of signal processing in mobile communication and the multi access technologies.**Recommended Textbooks/References:**

1.Chuai Gang, Wang Wenbo, Chang Yongyu, Quan Qingyi, Gao Weidong. Mobile Communication Principles and Systems (Fourth Edition). Beijing University of Posts and Telecommunications Press, Aug. 2019.

2.Song Tiecheng, Song Xiaoqin. Mobile Communication Technologies. Post & Telecom Press, Feb. 2018.

3.Ding Qi, Yang Zhen. Dahua Mobile Communication. Post & Telecom Press, Oct. 2011.

4.Zhang Minghe. LTE / EPC of 4G Networks. Post & Telecom Press, Jan. 2016.

0010703 信息感知技术与应用

课程编码：0010703

课程名称：信息感知技术与应用

英文名称：Information Perception Technology and Application

课程类型：专业选修课

学分： 2.0 **总学时：**32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：大学物理Ⅰ、高等数学（工）、电路分析基础

考核形式： 平时成绩+考试

撰写人：霍如

课程简介：（250-300 字）

《信息感知技术与应用》是信息学部信息与通信工程系为电子信息工程专业和通信工程专业本科生开设的选修课程。本课程的任务是：通过本课程的学习，使学生了解信息感知技术的概念、基本原理、应用领域和发展趋势。培养学生利用现代信息感知技术解决生产实际中信息采集与处理等问题的能力，为工业测控、机器人、无人机、智能车、智能信息处理系统等实际应用系统的设计与开发奠定基础。教学内容重点：信息感知技术的原理和相关设备的选型。教学内容的难点：信息感知技术的原理。

推荐教材或主要参考书：

[1]王庆有，图像传感器应用技术. 电子工业出版社，2019

[2]王雪松，雷达技术与系统，电子工业出版社，2010

[3]黄丁发，GPS 卫星导航定位技术与方法，科学出版社，2019

0010703 Information Perception Technology and Application

Course Number: 0010703

Course Title: Information Perception Technology and Application

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: College physics, advanced mathematics, , circuit analysis

Evaluation Method: Course participation + written exams

Writer： Ru Huo

Course Description:

Information perception technology and application is a professional elective course provided by the College of Information and Communication Engineering in the Department of Information Technology for undergraduates of Electronic Information Engineering (Experimental Class), Electronic Information Engineering, and Communication Engineering. The task of this course is to enable students to understand the concept, basic principles, application fields, and development trends of information perception technology, especially common image perception methods and location perception methods. The course aims to cultivate students' ability to use modern information perception technology to solve problems in information acquisition and processing in production practice, laying a foundation for the design and development of practical application systems such as industrial measurement and control, robots, UAVs, intelligent vehicles, and intelligent information processing systems. Teaching content highlights: the principles of information perception technology and related equipment selection. Teaching content difficulties: the principle of information perception technology.

Recommended Textbooks/References:

1.Wang Qingyou. Image sensor application technology. *Electronics Industry Press*, 2019

2.Wang Xuesong, Radar Technology and System, *Electronic Industry Press*, 2010

3.Wang Dingfa, GPS satellite navigation positioning technology and method, *Science Press*, 2019

0004629 数字语音处理与编码

课程编码：0004629

课程名称：数字语音处理与编码

英文名称：Digital Speech Processing and Coding

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：信号与系统、数字信号处理、随机信号分析

考核形式：平时成绩+考试

撰写人：鲍长春

课程简介：（250-300 字）

《数字语音处理与编码》是信息学部为电子信息工程与通信工程专业本科生开设的选修课。本课程的任务是使学生掌握数字语音处理与编码的基本概念、基本理论、基本方法，了解语音信号处理应用领域的新方法和新技术，为今后从事电子信息与通信工程领域的相关研究和开发工作奠定良好的基础。教学内容重点：语音信号的数字模型、语音信号的数字分析、语音信号的基频检测、语音信号的线性预测分析、语音信号的矢量量化和基于线性预测的低速率语音编码原理。教学内容的难点：语音信号的数字分析、线性预测分析和矢量量化。

推荐教材或主要参考书：

[1]鲍长春，《数字语音编码原理》，西安电子科技大学出版社，2007

[2]Lawrence R. Rabiner and Ronald W. Schafer. Theory and Applications of Digital Speech Processing. 北京：电子工业出版社，2011

0004629 Title Digital Speech Processing and Coding

Course Number: 0004629

Course Title: Digital Speech Processing and Coding

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students major in Electronic Information Engineering and Communication Engineering

Prerequisites: Signal and System, Digital Signal Processing and Random Signal Analysis

Evaluation Method: Course participation + written exams

Writer: Changchun Bao

Course Description:

Digital Speech Processing and Coding is one of the optional courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify basic concepts, basic principles and basic methods of digital speech processing and coding for the students who like to know new methods and techniques in the fields of speech signal processing applications. This course is focused on the model of speech production, analysis and quantization of speech signal. The teaching contents are mainly covered by the following aspects: digital model of speech production, digital analysis of speech signal, pitch detection of speech signal, linear prediction of speech signal, vector quantization of speech signal and some typical speech coding methods at low bit rates based on linear prediction. The difficulties of teaching contents are described as followings: digital analysis, linear prediction and vector quantization of speech signal.

Recommended Textbooks/References:

1.Changchun Bao. Principles of Digital Speech Coding. *Publishing House of Xidian University*, 2007

2.Lawrence R. Rabiner and Ronald W. Schafer. Theory and Applications of Digital Speech Processing. *Publishing House of Electronics Industry*, 2016

0008129 数字图像处理（双语）

课程编号：0008129

课程名称：数字图像处理（双语）

英文名称：Digital Image Processing (Bilingual)

课程类型：专业选修课

学分：2.0　**总学时：**　32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：信号与系统、数字信号处理

考核形式：平时成绩+考试

撰写人：毋立芳

课程简介

《数字图像处理（双语）》是信息学部为电子信息工程（实验班）与通信工程专业本科生开设的双语类专业选修课。本课程的任务：使学生能够应用数字图像处理的专业知识解决图像处理领域的复杂工程问题，了解数字图像处理学科前沿；能够针对特定问题设计方案，并通过软件编程实现，以及对实现结果进行实验测试与分析的能力；能够阅读并理解原版英文教材，能够用英文进行沟通交流。课程的主要内容：学习图像处理基础知识、图像空域增强、图像频域增强、图像复原、图像压缩、彩色图像处理、图像分析与理解简介等相关理论，完成与课程内容相关的实验。

推荐教材或主要参考书：

[1]冈萨雷斯，Digital Image Processing, 电子工业出版社，2010 年 11 月

[2]阮秋琦，数字图像处理学，电子工业出版社，2013 年 1 月

[3]北京工业大学电子信息工程专业培养方案，北京工业大学，2012 年 4 月

0008129 Digital Image Processing (Bilingual)

Course Number: 0008129

Course Title: Digital Image Processing (Bilingual)

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:**32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Signal and system, Digital signal processing

Evaluation Method: Course participation + Final exams

Writer: Lifang Wu

Course Description:

Digital Image Processing (Bilingual) is a bilingual elective course offered by the Information Science Department for undergraduate students majoring in Electronic Information Engineering and Communication Engineering. The main target of this course is to enable students master professional knowledge of digital image processing to solve complex engineering problems in the field of image processing, and to understand the forefront of digital image processing; to design solutions for specific problems and implement them through software programming, as well as to conduct experimental testing and analysis of implementation results; to read and understand the original English textbooks, and be able to communicate and communicate in English. The main content of the course is to learn the basic knowledge of image processing, image spatial enhancement, image frequency domain enhancement, image restoration, image compression, color image processing, introduction to image analysis and understanding, and other related theories, and complete experiments related to the course content.**Recommended Textbooks/References:**

1.Rafael Gonzalez et al. Digital Image Processing. *Publishing House of Electronics Industry*, Nov. 2001.

2.Qiuqi RUAN, Digital Image Processing (Third Edition), Publishing House of Electronics Industry, Jan. 2013.

3.Beijing University of Technology Electronic Information Engineering / Communication Engineering Professional Training Program, *Beijing University of Technology*, Apr. 2020.

0008105 DSP 技术与应用 I（双语）

课程编码：0008105

课程名称：DSP 技术与应用 I（双语）

英文名称：DSP Technology and Applications I(Bilingual)

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：数字电路与 FPGA，数字信号处理，现代微处理器原理及应用

考核形式：平时成绩+考试

撰写人：吴强

课程简介：

《DSP 技术与应用 I（双语）》是信息学部信息与通信工程学院为电子信息工程和通信工程专业本科生开设的专业选修课。本课程的任务是使学生了解当今 DSP 发展的前沿技术，拓宽专业知识面，掌握现代 DSP 处理器的体系结构、信号处理算法的实现原理和程序设计方法，能够使用 DSP 完成一定的算法和系统程序设计任务。将 DSP 处理器体系结构和数字信号处理算法实践相结合，是本课程的最大特色。教学内容重点：DSP 体系结构与性能优化。教学内容的难点：DSP 实时处理编程模型。

推荐教材或主要参考书：

[1] 王俊，张玉玺等编著，《DSP/FGPA 嵌入式实时处理技术及应用》,电子工业出版社，2015.9

[2] Analog Devices Inc，《ADSP-219X/2191 DSP Hardware Reference》，2002.10

[3] Andrew Bateman 著，《DSP 算法、应用与设计（英文版）》，机械工业出版社，2003.3

[4] 夏际金，赵洪立，李川著，《TI C66x 多核 DSP 高级软件开发技术》，清华大学出版社，2017.5

0008105 DSP Technology and Applications I (Bilingual)

Course Number: 0008105

Course Title: DSP Technology and Applications I (Bilingual)

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Digital Circuits and FPGA, Digital Signal Processing, Theory and Application of Modern Microprocessor Design

Evaluation Method: Course participation + written exams

Writer： Qiang Wu

Course Description:

DSP Technology and Applications I(Bilingual) is one of the professional elective courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the architecture of DSP processors, including core, data address generators, program sequencer and memory，grasp the connotation and DSP programming model and the design method of DSP algorithms and systems. The teaching contents are mainly covered by the architecture of DSP processors and performance optimization. The difficulties of teaching contents are described as the DSP programming model.

Recommended Textbooks/References:

1.Jun Wang, Yuxi Zhang, etc., DSP/FPGA Embedded Realtime Technology and Applications, *Electronic Industry Press*, 2015.9

2.Analog Devices Inc, ADSP-219X/2191 *DSP Hardware Reference*, 2002.10

3.Andrew Bateman, The DSP Handbook Algorithms, Applications and Design Techniques. *China Machine Press*, 2003

4.Jijin Xia, Hongli Zhao, Chuan Li, TI C66x Multicore DSP Advanced Software Development Technology, *Tsinghua University Press*, 2017.5

0010095 光通信原理（双语）

课程编码：0010095

课程名称：光通信原理（双语）

英文名称：Principle of Optical Communication（Bilingual）

学分：2.0　　**总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：模拟电子技术、通信系统原理

考核形式：平时成绩+考查

撰写人：朱江淼

课程简介：

《光通信原理（双语）》是信息学部为电子信息工程和通信工程专业本科生开设的专业选修课。本课程的任务是介绍光通信领域的相关理论和技术，使学生对光通信这一在当今信息领域内高速发展并起着关键作用的技术有较深入的了解。教学内容的重点：光通信概述、光纤传输原理与特性、光源与光发射系统、光探测器与光接收系统、光放大器原理与应用，光纤局域网设计与测试、光网络、可见光通信、大气激光通信和星间激光通信等。教学内容难点：光纤传输原理与特性、光源与光发射系统、光探测器与光接收系统、光放大器原理与应用。

本课程采用双语教学模式，选用英文原版教材，辅以中文教材，以英文多媒体课件为主，课程讲授时中英文结合，使学生熟悉光通信领域的主要技术用语和技术的中英文描述方法，并能合理应用。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] Djafar K. Mynbaev and Lowell L. Schniner 编著，Fiber - Optic Communications Technology（英文影印本），科学出版社，2003 年 1 月（国外高校电子信息类优秀教材）

[2] 朱勇、王江平编著，光通信原理与技术（第二版），科学出版社，2019 年 7 月

[3] 顾畹仪编著，光纤通信系统（第 3 版），北京邮电大学出版社，2013 年

[4] 邓大鹏等编著，光纤通信原理，人民邮电出版社，2009 年

[5] 刘增基等编著，光纤通信（第二版），西安电子科技大学出版社，2008 年

[6] 原荣等编著，光纤通信，机械工业出版社，2013 年

0010095 Principle of Optical Communication（Bilingual）

Course Number: 0010095

Course Title: Principle of Optical Communication（Bilingual）

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students major in Electronic Information Engineering and Communication Engineering

Prerequisites: Analog Electronic Technology，Principle of Communication

Evaluation Method: Course participation +exam

Writer: Jiangmiao Zhu

Course Description:

The principle of optical communication (bilingual) is one of the elective courses for undergraduate students major in Electronic Information Engineering or and Communication Engineering offered by the Faculty of Information Technology. The main target of this course is to clarify the related theory and technology in the field of optical communication, so that students have a better understanding of optical communication, which is developing rapidly and playing a key role in today's information field. The teaching contents are mainly covered by the following aspects: overview of optical communication, transmission principle and characteristics of optical fiber, light source and optical transmitting system, optical detector and optical receiving system, optical amplifier principle and application, optical local area network design and test, optical network, visible light communication, atmosphere laser communication and inter-satellite laser communication. The difficulties of teaching contents are described as followings: Optical fiber transmission principle and characteristics, light source and optical emission system, optical detector and optical receiving system, optical amplifier principle and application.

This course adopts bilingual teaching mode, using English original teaching materials, supplemented by Chinese teaching materials, mainly using English multi-media courseware, to familiarize students with the main technical terms and description methods in Chinese and English in the field of optical communication, and to be able to apply them reasonably.

Recommended Textbooks/References:

1. Djafar K. Mynbaev and Lowell L. Schniner, Fiber - Optic Communications Technology, *Science Press*，Jan. 2003 (Excellent Teaching Materials of electronic information in foreign universities)

2. Zhu Yong, Wang Jiangping, Principles and techniques of optical communication (second edition), *Science Press*, Jul. 2019

3. Gu Wangyi, Fiber-optic communication system (3rd edition), *Beijing University of Posts and Telecommunications Press*, 2013

4. Deng Dapeng et Al., The Fiber-optic communication principle, *POSTS & Telecom Press*, 2009

5. Liu Zengji, Fiber-optic communication (second edition), *Xi'an University of Electronic Science and Technology Press*, 2008

6. Yuan Rong, Fiber-optic communication, *China Machine Press*, 2013

0010144 射频天线设计与仿真

课程编码：0010144

课程名称：射频天线设计与仿真

英文名称：Radio Frequency Antenna Design and Simulation

课程类型：专业选修课

学分：2.0　**总学时：**32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电磁场与电磁波

考核形式：平时成绩+考试

撰写人：高巨

课程简介：（250-300 字）

《射频天线设计与仿真》是信息学部为电子信息工程和通信工程专业本科生开设的专业选修课。本课程的任务是使学生掌握微波技术及天线的基础概念、理论和分析方法，通过利用 CST 电磁仿真软件，能够独立设计天线。教学内容重点：理解并掌握微波网络的概念，掌握微波网络的散射矩阵和传输矩阵；理解并掌握天线的特征参数，基本振子的种类和结构特征；天线几个基本类型的结构功能以及相应的特性；天线阵的作用以及方向性；人工电磁材料的调控方式。教学内容的难点：掌握散射矩阵、传输矩阵的表达方法；掌握麦克斯韦方程组在天线系统中的应用；天线上的电流分布，学习绘制天线的方向图；阵列天线在提高天线方向性中的重要意义；人工电磁材料对电磁波的多重调控能力。

推荐教材或主要参考书：

[1] 王新稳，微波技术与天线，电子工业出版社，2010 年 1 月

[2] 廖承恩，微波技术基础，西安电子科技大学出版社，1995 年 3 月

[3] 刘学观，微波技术与天线（第二版），西安电子科技大学出版社，2006 年 7 月

0010144 Radio Frequency Antenna Design and Simulation

Course Number: 0010144

Course Title: Radio Frequency Antenna Design and Simulation

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:**32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Electromagnetic field and electromagnetic wave

Evaluation Method: Course participation + written exams

Writer: Ju Gao

Course Description:

Radio frequency antenna design and simulation is one of the professional elective courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to make students master the basic concepts, theories and analysis methods of microwave technology and antenna, and make students understand the radiation principle of communication front-end and the design idea of mobile phone antenna by using CST electromagnetic simulation software. students can design antennasby themselves. This course is focus on understanding and mastering the concept of microwave network, mastering the scattering matrix and transmission matrix of microwave network, understanding and mastering the characteristic parameters of antenna, the types and structural characteristics of basic vibrators, the structural functions and corresponding characteristics of several basic types of antennas, the function and directivity of antenna array, and the regulation and control mode of artificial electromagnetic materials. The difficulties of teaching contents are described as followings: mastering the expression of scattering matrix and transmission matrix, mastering the application of Maxwell equations in antenna system, current distribution on antenna, learning to draw antenna pattern, the importance of array antenna in improving antenna directivity, and the multiple regulation and control ability of artificial electromagnetic materials to electromagnetic waves.

Recommended Textbooks/References:

1.Xinwen Wang, Microwave Technology and Antenna, *Electronic Industry Press*, 1-2010

2.Chenen Liao, The basis of Microwave Technology, *Xi'an University of Electronic Science and Technology Press,*03-1995

3.Xueguan Liu, Microwave Technology and Antenna (second edition), *Xi'an University of Electronic Science and Technology Press*,07-2006

0010086 多媒体通信技术

课程编码：0010086

课程名称：多媒体通信技术

英文名称：Multimedia Communication Technique

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：数字信号处理，概率论与数理统计

考核形式：平时成绩+实验成绩+考试

撰写人：孙中华

课程简介：（250-300 字）

《多媒体通信技术》是信息学部为电子信息工程、通信工程专业本科生开设的专业选修课程类型。本课程的任务是使学生掌握多媒体数据编码基本原理、多媒体数据的相关格式、数据通信协议以及对应的多媒体技术在行业中的发展现状等。教学内容重点：多媒体数据格式及其对数据通信的要求，数据压缩的基本原理，图像视频编码的基本原理以及国际标准，多媒体通信网络协议以及网络质量控制方法。教学内容的难点：视频图像的率失真编码，嵌入式零树小波编码，HEVC 编码框架，多媒体内容描述，通信中的多媒体同步基本技术，多媒体通信网络的质量控制协议。

推荐教材或主要参考书：

[1] 蔡安妮，多媒体通信技术基础（第四版）. 电子工业出版社，2017 年 7 月

[2] 刘勇，石方文，孙学康. 多媒体通信技术与应用. 人民邮电出版社，2017 年 8 月

[3] 晏燕，李立，彭清斌. 多媒体通信：原理、技术及应用. 清华大学出版社，2019 年 8 月

0010086 Multimedia Communication Technique

Course Number: 0010086

Course Title: Multimedia Communication Technique

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Digital Signal Processing, Probability and Statistics

Evaluation Method: Course participation + experiment performance + written exams

Writer: Zhonghua Sun

Course Description:

Multimedia Communication Technique is one of the major electives for undergraduate students Major in Electronic Information Engineering and Communication Engineering in Beijing University of Technology. The main target of this course is to clarify the fundamentals of multimedia communication and systems. This course is focusing on teaching students on knowing about the technique history on multimedia communication which would let them know the technique trend. Besides this this course also focusing on introducing student with fundamental theories on multimedia communication, including protocols and coding theory. The teaching contents are mainly covered by the following aspects: the format of multimedia data and its challenge for communication techniques, the fundamental theory on data compression, and the international standard on multimedia compression and communication etc. The difficulties of teaching contents are described as followings: rate-distortion based image and video coding, embedded zero-tree wavelet coding, framework of HEVC, multimedia content description, multimedia synchronization, quality control protocols in multimedia communication.

Recommended Textbooks/References:

1.CAI An-ni, Fundamentals of multimedia communication (4th edition). *Publishing House of Electronics Industry*, Jul. 2017

2.LIU Yong, SHI Wen-fang, SUN Xue-kang. Multimedia communication techniques and application. *Posts & Telecom Press*， Aug. 2018

3.YAN Yan, LI Li, PENG Qing-bin. Multimedia communication: theory, technique and its application. *Tsinghua University Press*, Aug. 2019

0001981 卫星通信

课程编码：0001981

课程名称：卫星通信

英文名称：Satellite Communication

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：通信工程、电子信息工程（实验班）专业本科生

先修课程：通信系统原理，移动通信

考核形式：平时成绩+考查

撰写人：方超

课程简介：（250-300 字）

《卫星通信》是信息学部信息与通信工程学院为通信工程专业本科生开设的专业限选课。本课程的任务是使学生掌握卫星通信的基本原理和技术,了解卫星通信领域的新进展和新技术，为学生从事通信、电子相关的工作岗位打下坚实的基础。教学内容重点：卫星通信的基本原理和技术，并结合系统的组成介绍主要设备及当前所达到的水平，同时包括了卫星通信的一些新技术和典型的实际系统。教学内容的难点：卫星通信的基本原理、技术、典型应用与发展趋势。

推荐教材或主要参考书：

[1] 朱立东等，《卫星通信导论》（第 4 版），电子工业出版社，2015.

[2] Joseph N. Pelton. Satellite Communications (1st edition). Springer, 2012.

[3] K. N. Raja Rao. Satellite Communication: Concepts and Applications (2nd edition). Prentice-Hall of India Pvt.Ltd, 2013

0001981 Satellite Communication

Course Number: 0001981

Course Title: Satellite Communication

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in majors related to Communication Engineering and Electronic Information Engineering

Prerequisites: Communication Principle, Mobile Communication

Evaluation Method: Course participation + Test

Writer: Chao Fang

Course Description:

Satellite communication is one of the specialized direction courses for undergraduate students Major in Communication Engineering and Electronic Information Engineering. The main target of this course is to clarify that students should master the basic principles and techniques of satellite communications, understand the new developments and new technologies in the field of satellite communications, and lay a solid foundation for students to engage in communications and electronics-related jobs. This course is focus on the basic principles and techniques of satellite communications combined with the system composition to introduce the main equipment and the current research level, and some new technologies and typical actual systems of satellite communications. The teaching contents are mainly covered by the following aspects: the basic architecture, applications and development trends of satellite communication networks. The difficulties of teaching contents are described as followings: basic principles and technologies, typical applications, and development trends of satellite communications.

Recommended Textbooks/References:

1.Liyong Zhu, Tingyong Wu, Yongning Zhuo, Introduction to Staellite Communications (4th edition), *Publishing House of Electronics Industry*, 2015

2.Joseph N. Pelton. Satellite Communications (1st edition). *Springer*, 2012

3.K. N. Raja Rao. Satellite Communication: Concepts and Applications (2nd edition). *Prentice-Hall of India Pvt.Ltd*, 2013

0007270 电磁兼容技术

课程编码：0007270

课程名称：电磁兼容技术

英文名称：Technology of Electromagnetic Compatibility

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：电路分析基础、模拟电子技术、数字电子技术

考核形式：平时成绩+期末总结

撰写人：李煜

课程简介：（250-300 字）

《电磁兼容技术》是信息学部为通信工程、电子信息工程专业本科生开设的专业选修课。本课程主要讲授电磁兼容的基本原理和电磁干扰防护技术。本课程的任务是给学生提供系统的电磁兼容和抗干扰的基本知识和技能，以便于他们能够从事实用的电子线路及装置的开发、设计、实验、制造、调试。教学内容包括电磁兼容的概念，电磁干扰源，电磁干扰的传输途径，屏蔽技术，接地技术，隔离技术，滤波技术，瞬态干扰的抑制，箝位技术，续流技术，线路板的电磁兼容设计，计算机系统的抗干扰技术以及实施电磁兼容的措施和方法。教学内容的难点包括屏蔽效能的计算和实际电磁兼容问题的分析。

推荐教材或主要参考书：

[1] 杨克俊编著，电磁兼容原理与设计技术，人民邮电出版社，2004.8。

[2] 路宏敏，工程电磁兼容，西安电子科技大学出版社.2003.5。

[3] 白同云，吕晓德，电磁兼容设计.北京邮电大学出版社，2001.3。

0007270 Technology of Electromagnetic Compatibility

Course Number: 0007270

Course Title: Technology of Electromagnetic Compatibility

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students major in Electronic Information Engineering and Communication Engineering

Prerequisites: Analog Circuits, Digital Circuits, Circuit Analysis

Evaluation Method: Course participation + final project

Writer： LI Yu

Course Description:

Technology of Electromagnetic Compatibility is one of the professional elective courses offered by the faculty of information technology for undergraduate students major in Electronic Information Engineering and Communication Engineering. The goal of this course is to provide students with basic knowledge and skills of electromagnetic compatibility and anti-interference of the system, so that they can be engaged in the development, design, experiment, manufacturing and debugging of practical electronic circuits and devices. The teaching contents are mainly covered by the following aspects: the concepts of electromagnetic compatibility, source of the electromagnetic interference, transmission path of the electromagnetic interference, shielding technology, grounding techniques, isolation technology, filtering techniques, clamp technique, technology of continued flow, circuit board design of EMC and anti-interference technology of computer system. The difficulties of teaching content include the calculation of shielding effectiveness and the analysis of practical EMC problems.

Recommended Textbooks/References:

1.Kejun Yang, Electromagnetic Compatibility Theory and Design Technology. *Posts and Telecom Press*, 2004.

2.Hongmin LU, Engineering Electromagnetic Compatibility. *XIDIAN University Press*,2003.

3.Tongyun Bai, Xiaode Lv. Electromagnetic Compatibility Design. *Beijing University of Posts and Telecommunications Press*, 2001.

0010090 智能无线网络技术（双语）

课程编码：0010090

课程名称：智能无线网络技术（双语）

英文名称：Intelligent Wireless Network Technologies (Bilingual)

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：通信工程专业本科生

先修课程：通信系统原理，无线通信，移动通信，信息论基础，信号与系统

考核形式：平时成绩+前沿报告

撰写人：吴文君

课程简介：（250-300 字）

智能无线网络技术（双语）是信息学部信息与通信工程学院为通信工程专业本科生开设的专业选修课，是一门以理论为基础、密切结合工程应用的课程。课程主要内容包括：无线网络新兴技术、凸优化简介、深度学习与深度强化学习简介、无线网络中的智能优化。通过对本课程的学习、文献调研、报告撰写、演讲交流等环节训练，学生能够了解无线网络技术的最新发展趋势及无线网络的智能优化技术，获得文献分析、持续学习、以及跨文化交流的语言和书面表达等能力，为将来从事与无线通信相关的产品设备开发和前沿科学研究等工作储备必要的基本知识。

推荐教材或主要参考书：

[1] 啜钢，王文博，常永宇，全庆一，高伟东. 移动通信原理与系统（第 4 版）. 北京邮电大学出版社，2019 年 8 月.

[2] 小火车，好多鱼. 大话 5G. 电子工业出版社，2016 年 3 月.

[3] Stephen Boyd, Lieven Vandenberghe. Convex Optimization. Cambridge University Press, 2009.

[3] Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning. MIT Press, November 2016.

[4] Richard S. Sutton, Andrew G. Barto. Reinforcement Learning: An Introduction (2nd Edition). MIT Press, 2018.

0008139 Mobile Communications

Course Number: 0008139

Course Title: Intelligent Wireless Network Technologies (Bilingual)

Course Type: Major elective

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: Communication System Principles, Wireless Communications, Mobile Communications, Information Theory Foundations, Signals & Systems

Evaluation Method: Course participation + Technical report and presentation

Writer: Wenjun Wu

Course Description:

Intelligent Wireless Network Technologies (Bilingual) is one of the major elective courses for undergraduate students Major in Communication Engineering. The main contents of the course include emerging technologies of wireless networks, introduction to convex optimization, introduction to deep learning and deep reinforcement learning, intelligent optimization in wireless networks, technical reports and discussions on intelligent wireless network technologies. Through the study of this course, students can understand the latest development trend of wireless network technologies and the intelligent optimization technologies of wireless networks, acquire the literature review ability, continuous learning ability, written and oral ability in cross-cultural communications. These experiences are necessary for future work such as product development and cutting-edge scientific research related to wireless communications.

Recommended Textbooks/References:

1.Chuai Gang, Wang Wenbo, Chang Yongyu, Quan Qingyi, Gao Weidong. Mobile Communication Principles and Systems (Fourth Edition). *Beijing University of Posts and Telecommunications Press*, Aug. 2019.

2.Xiao Huo Che, Hao Duo Yu. Dahua 5G. *Publishing House of Electronics Industry*, March 2016.

3.Stephen Boyd, Lieven Vandenberghe. Convex Optimization. *Cambridge University Press*, 2009.

4.Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning. *MIT Press*, Nov. 2016.

5.Richard S. Sutton, Andrew G. Barto. Reinforcement Learning: An Introduction (2nd Edition). *MIT Press*, 2018.

0010716 工业互联网技术

课程编码：0010716

课程名称：工业互联网技术

英文名称：Industrial Internet Technology

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：通信工程专业本科生

先修课程：通信系统原理，通信网络基础

考核形式：平时成绩+学期报告

撰写人：李萌

课程简介：（250-300 字）

工业互联网技术是信息学部为通信工程专业本科生开设的专业选修课。本课程的任务是通过对工业互联网的发展现状、体系架构、关键技术、应用场景、解决方案等知识的学习，熟悉掌握工业互联网中万物感知、信息传输、平台构造、数据分析几类关键技术，理解互联化、协同化、柔性化、定制化的智慧制造新模式，培养泛在互联、数据驱动、共享服务、跨界融合的互联网创新思维，强化学生理论分析、场景迁移、网络技术设计的工程意识，同时培养其理论方法的工程化意识和实践/实现能力。教学内容重点：工业互联网的关键技术、平台构造、应用解决方案等。教学内容的难点：工业互联网体系架构模型与异构网络的技术实现。

推荐教材或主要参考书：

[1] 魏毅寅，柴旭东，工业互联网技术与实践，电子工业出版社，2017 年 8 月

[2] Alena Traukina & Jayan, Industrial Internet Application Development, Packt Publishing, Sep. 2019.

0010716 Industrial Internet Technology

Course Number: 0010716

Course Title: Industrial Internet Technology

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: Principle of Communication System, Fundamentals of Communication Networks

Evaluation Method: Course participation + final reports

Writer: Meng Li

Course Description:

Industrial Internet Technology is one of the major elective courses for undergraduate students major in Communication Engineering. The main target of this course is to learn some development status, system architectures, key technologies, application scenarios and solutions of Industrial Internet, and master key technologies of perception of everything, information transmission, platform construction and data analysis. This course focuses on new interconnected, collaborative, flexible, and customized smart manufacturing models. Based on this course, the innovative thought of ubiquitous interconnection, data-driven, shared services, cross-border integration can be cultivated, and the students' engineering awareness of theoretical analysis, scene migration, network design can be strengthened. Meanwhile, the engineering awareness and practice/implementation capabilities can be improved through this course. The teaching contents are mainly covered by the following aspects: key technologies, platform construction and application solutions of industrial Internet. The difficulties of teaching contents are described as followings: architecture model of industrial Internet and technology realization of heterogeneous network.

Recommended Textbooks/References:

1.Yiyin Wei, Xudong Chai, Industrial Internet Technology and Practice, *Electronic Industry Press*, Aug. 2017.

2.Alena Traukina & Jayan, Industrial Internet Application Development, *Packt Publishing*, Sep. 2019.

0010136 区块链技术

课程编码：0010136

课程名称：区块链技术

英文名称：Blockchain Technology

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：通信工程专业本科生

先修课程：计算机软件基础、通信网络基础

考核形式：平时成绩+学期报告

撰写人：李萌

课程简介：（250-300 字）

区块链技术是信息学部为通信工程专业本科生开设的专业选修课。本课程的任务是让学生掌握区块链中涉及的加密原理、P2P 网络、分布式一致性等基础知识，培养其应用区块链技术，准确分析各行业中存在的去中心化信任、公开透明、不可篡改、不可伪造以及跟踪溯源等安全问题，设计和使用区块链技术解决各行业应用问题。教学内容重点：区块链网络架构模型、分布式网络架构、加密技术、共识机制、激励机制、智能合约、P2P 网络等的基本原理，以及区块链技术在不同行业领域的应用和解决方案。教学内容的难点：区块链网络框架及技术实现，共识机制与智能合约概念的理解。

推荐教材或主要参考书：

[1] 毕伟、雷敏、贾晓芸. 区块链导论. 北京邮电大学出版社，2019 年 6 月

[2] 魏翼飞、李晓东、于非. 区块链原理、架构与应用. 清华大学出版社，2019 年 6 月

[3] 朱建明、高胜、段美姣等. 区块链技术与应用. 机械工业出版社，2017 年 12 月

0010136 Blockchain Technology

Course Number: 0010136

Course Title: Blockchain Technology

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: Fundamentals of Computer Software, Fundamentals of Communication Networks

Evaluation Method: Course participation + final reports

Writer: Meng Li

Course Description:

Blockchain Technology is one of the major elective courses for undergraduate students major in Communication Engineering. The main target of this course is to grasp the basic technology of principles of cryptography, P2P networks, distributed consistency in blockchain, cultivate the students to apply the blockchain technology, analyze some security issues such as decentralized trust, openness and transparency, non-tampering, non-forgery, and traceability in various areas accurately, and solve the application problems in various industries based on blockchain technology. The teaching contents are mainly covered by the following aspects: basic principles of blockchain network architecture model, distributed network architecture, cryptographic technology, consensus mechanism, incentive mechanism, smart contract, P2P network, and the applications and solutions of blockchain technology in different industries. The difficulties of teaching contents are described as followings: understanding of blockchain network framework and technology implementation, consensus mechanism and smart contract concepts.

Recommended Textbooks/References:

1.Wei Bi, Min Lei, Xiaoyun Jia, An Introduction to Block Chain, *Beijing University of Posts and Telecommunications Press*, Jun. 2019.

2.Yifei Wei, Xiaodong Li, Fei Richard Yu, Blockchain Principle, Architecture and Application, *Tsinghua University Press*, Jun. 2019.

3.Jianming Zhu, Sheng Gao, Meijiao Duan, Block Chain Technology and Application, *China Machine Press*, Dec. 2017.

0010051 5G 与物联网技术

课程编码： 0010051

课程名称：5G 与物联网技术

英文名称：5G and IoT Technology

课程类型：专业选修课程

学分：2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：无线通信、信号与系统、通信系统原理、高级语言程序设计

考核形式：平时成绩+考查

撰写人：陈华敏

课程简介：

《5G 与物联网技术》是信息学部为电子信息工程和通信工程专业本科生开设的专业选修课程。本课程的任务是让学生对 5G 和物联网技术形成全貌认识，紧跟新一代通信技术发展步伐，掌握 5G 和物联网技术在国际学术、标准化和产业发展应用的最新研究进展和发展趋势。同时，培养学生从系统的角度出发，以需求为驱动，获得正确的思维方法、分析问题和解决问题的能力。并且，帮助学生了解我国在 5G 和物联网领域的发展和应用情况，培养学生的专业自信、科技自信、民族自信和祖国自信，为学生投身国家科技创新前沿做技术铺垫和思想准备。教学内容重点：5G 基本概念，5G 系统架构，5G 关键技术，5G 标准化进程和技术演进，物联网系统架构，物联网关键技术，物联网中的无线通信技术，云计算和边缘计算，物联网技术演进。教学内容的难点：5G 关键技术，移动通信技术的演进，物联网系统开发实例研讨，物联网技术的演进。

推荐教材或主要参考书：

[1] 刘毅，刘红梅，张阳，郭宝，深入浅出 5G 移动通信，机械工业出版社, 2019 年 3 月

[2] 张传福 等，5G 移动通信系统及关键技术，电子工业出版社，2018 年 11 月

[3] 朱怀松，王剑，刘阳 译，5G NR 标准：下一代无线通信技术，机械工业出版社， 2019 年 6 月

[4] 李涛, 卢冶, 董前琨 译，物联网导论，机械工业出版社, 2019 年 12 月

[5] 丁灵 译，图解物联网，人民邮电出版社, 2017 年 4 月

0010051 5G and IoT Technology

Course Number: 0010051

Course Title: 5G and IoT Technology

Course Type: Major elective

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication engineering

Prerequisites: Wireless communication technology, signals and systems, communication system principle, High level language programming.

Evaluation Method: Course participation + written exams

Writer: Huamin Chen

Course Description:

5G and IoT technology is one of the major elective courses for undergraduate students Major in Electronic Information Engineering and Communication engineering. The main target of this course is to clarify the main principles and architectures of 5G and IoT, know the standardization progress and industrial status of 5G and IoT, master the method to analyze problems and design systems according to real requirements. This course is focus on the architecture and key technologies of 5G and IoT, including wireless sensor network technology, heterogeneous network technology, IoT communication technology, cloud computing and edge computing, and helping students to keep up with the development pace of the new generation of communication technology, and master the latest research progress and development trend of 5G and IoT technology in the area of the international academic, standardization and industrial development. The teaching contents are mainly covered by the following aspects: 5G definition, 5G architecture, 5G key technologies, standardization progress and technology evolution of 5G, architecture of IoT system, IoT key technologies, wireless communication technologies for IoT, cloud computing and edge computing, technology evolution of IoT. The difficulties of teaching contents are described as followings: 5G key technologies, evolution of mobile communication technology, discussion of IoT system design and technology evolution of IoT.

Recommended Textbooks/References:

1. Yi Liu, Hongmei Liu, et al, 5G Mobile Communication in Simple Terms, *China Machine Press*, 03- 2019
2. Chuanfu Zhang et al, 5G Mobile Communication System and Key Technologies, *Electronic Industry Press*, 11- 2018
3. Translated by Huaisong Zhu, Jian Wang and Yang Liu, 5G NR Standard: Next Generation Wireless Communication Technology, *China Machine Press*,06- 2019

4. Translated by Tao Li, Ye Lu and Qiankun Dong, Introduction to The Internet Of Things,*China Machine Press*, 12-2019
5. Translated by Ling Ding, Illustrated Internet of Things, *People's Post and Telecommunications Press*, 04-2017

0010054 FPGA 与嵌入式系统高级设计

课程编码：0010054

课程名称：FPGA 与嵌入式系统高级设计

英文名称：Advanced Design of FPGA and Embedded System

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：数字电路与 FPGA，数字信号处理，现代微处理器原理及应用

考核形式： 平时成绩+考试

撰写人：吴强

课程简介：

《FPGA 与嵌入式系统高级设计》是信息学部信息与通信工程学院为电子信息工程和通信工程专业本科生开设的学科基础选修课。本课程的任务是使学生了解当今 FPGA 与嵌入式系统发展的前沿技术，拓宽专业知识面，掌握现代 FPGA 与嵌入式系统的体系结构、图像处理常用算法的 FPGA 实现原理和设计方法，能够使用 XILINX ZYNQ SOC 完成图像采集、图像处理和图像传输的实时系统。将实时图像处理算法与 FPGA 和嵌入式处理器实践融合，是本课程的最大特色。教学内容重点：使用 XILINX ZYNQ SOC 完成图像采集处理系统。教学内容的难点：FPGA 实时图像算法设计。

推荐教材或主要参考书：

[1] 牟新刚,周晓,郑晓亮著，《基于 FPGA 的数字图像处理原理及应用》，电子工业出版社，2017.1

[2] 符晓,张国斌,朱洪顺编著，《Xilinx ZYNQ-7000 AP SoC 开发实战指南》，清华大学出版社，2015.11

[3] 王敏志编著，《FPGA 设计实战演练（高级技巧篇）》，清华大学出版社，2015.10

0010054 Advanced Design of FPGA and Embedded System

Course Number: 0010051

Course Title: Advanced Design of FPGA and Embedded System

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Digital Circuits and FPGA, Digital Signal Processing, Theory and System of Modern Microprocessor Design

Evaluation Method: Course participation + written exams

Writer: Qiang Wu

Course Description:

Advanced Design of FPGA and Embedded System is one of the basic elective courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the architecture of modern FPGA and embedded system, grasp the theory and the design method of common algorithms on digital image processing using FPGA, fulfill a realtime image acquisition, processing and transferring system using XILINX ZYNQ SOC. The teaching contents are mainly covered by the image acquisition and processing system using ZYNQ SOC. The difficulties of teaching contents are described as the design of realtime image algorithms using FPGA.

Recommended Textbooks/References:

1.Xingang Mou, Xiao Zhou, Xiaoliang Zheng, The Principle and Application of Digital Image Processing Based on FPGA, *Electronic Industry Press*, 2017.1

2.Xiao Fu, Guobin Zhang, Hongshun Zhu, Xilinx ZYNQ-7000 AP SoC Development Practical Guide, *Tsinghua University Press*, 2015.11

3.Minzhi Wang, FPGA Design Practice Exercise (Advanced Skills), *Tsinghua University Press*, 2015.10

0010068 大数据与云计算

课程编码：0010068

课程名称：大数据与云计算

英文名称：Big Data and Cloud Computing

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：电子信息工程（实验班），电子信息工程、通信工程专业本科生

先修课程： 计算机软件基础、高级语言程序设计、通信网络基础

考核形式： 平时成绩+考试

撰写人：赵德群

课程简介：

《大数据与云计算》是信息学部为电子信息工程，通信工程类专业本科生开设的专业选修课课程类型。本课程的任务是通过本课程学习，使学生掌握大数据与云计算相关的理论与技术，为从事大数据与云计算分析与应用打下一定的基础。教学内容重点：云计算的应用及与其他计算服务模式的区别，大数据环境的技术特征，大数据处理技术，大数据分析技术，云存储技术，云安全，云计算与物联网，云计算与移动互联网，云部署及对大数据的支持，虚拟化技术架构 Hadoop 的组成、体系结构和部署。教学内容的难点：大数据和云计算的关系，云计算的架构及标准化，大数据处理技术，大数据分析技术，云存储技术，云安全，虚拟化技术架构，Hadoop 的组成、体系结构和部署。

推荐教材或主要参考书：

[1] 吕云翔 钟巧灵 张璐 王佳玮 编著.《云计算与大数据技术》. 清华大学出版社，2018.10

[2] 陶皖主编. 《云计算与大数据》. 西安电子科技大学出版社，2017.1

[3] 刘鹏. 《云计算》（第三版）. 电子工业出版社，2015.8

[4] 张华平著. 《大数据搜索与挖掘》. 科学出版社，2014.5

[5] 王鹏等编著. 《云计算与大数据技术》. 人民邮电出版社，2014.5

0010068 Big Data and Cloud Computing

Course Number: 0010068

Course Title: Big Data and Cloud Computing

Course Type: Major electives

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Fundamentals of Computer Software, Advanced Language Program Design，Fundamentals of Communication Networks

Evaluation Method: Course participation + written exams

Writer: Dequn Zhao

Course Description:

Big Data and Cloud Computing is one of the Major Electives courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the theory and technology of big data and cloud computing. This course is focus on laying a foundation for big data and cloud computing analysis and Application. The teaching contents are mainly covered by the following aspects: the application of cloud computing and its difference from other computing service models, technical characteristics of big data environment, big data processing technology, big data analysis technology, cloud storage technology, cloud Security, cloud computing and Internet of things, cloud computing and mobile Internet, cloud deployment and support for big data, the composition, architecture and deployment of Hadoop. The difficulties of teaching contents are described as followings: the relationship between big data and cloud computing, cloud computing architecture and standardization, big data processing technology, big data analysis technology, cloud storage technology, cloud security, virtualization technology architecture, composition, architecture and deployment of Hadoop.

Recommended Textbooks/References:

1.Lu Yunxiang, Zhong Qiaoling, Zhang Lu, Wang Jiawei, Cloud Computing and Big Data Technology, *Tsinghua University Press*, Oct. 2018

2.Tao Wan, chief editor, Cloud Computing and Big Data, *Xi'an University of Electronic Science and Technology Press*, Jan. 2017

3.Liu Peng, Cloud computing (the Third Edition), *Electronic Industry Press*, Aug. 2015

4.Zhang Huaping, Big Bata Search and Mining, *Science Press*, may-2014

5.Wang Peng, et al Cloud Computing and Big Data Technology, *People's Post and Telecommunications Press*, May 2014

0009394 新生研讨课

课程编码：0009394

课程名称：新生研讨课

英文名称：Freshman Seminar

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：通信工程类本科生

先修课程：无

考核形式：平时成绩+期末报告

撰写人：张延华

课程简介：（250-300 字）

通信工程专业新生研讨课是信息学部面向通信工程类专业一年级新生开设的专业认知自主课程。课程的主要任务是使新生认知所学专业，了解专业学科前沿和专业就业方向，引导学生做好学业规划，激发学生的好奇心和研究兴趣, 培养学生积极思考、自主学习和表达能力。课程主要内容包括：通信工程专业简介，专业培养方案解读、学业与职业规划、专业学科前沿发展动态学习和研讨。通过该课程的学习，使学生了解通信工程专业概貌和专业发展趋势，激发学生后续专业学习的积极性。

推荐教材或主要参考书：

[1] 田禾. 大学生职业生涯规划与就业指导. 人民邮电出版社，2010 年 11 月

[2] 北京工业大学通信工程专业培养方案. 北京工业大学，2012 年 4 月

[3] 钟义信. 信息科学与技术导论（第 3 版）.北京邮电大学出版社，2015 年 8 月

0009394 Freshman Seminar

Course Number:0009394

Course Title: Freshman Seminar

Course Type: Independent course

Credit: 1.0 **Total Credit Hours:** 16

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: No requirement

Evaluation Method: Course participation + Prensentation

Writer： Yanhua Zhang

Course Description:

Freshman seminar is an independent course for undergraduates majoring in Communication Engineering. The task of this course is to enable freshmen to recognize their major, understand the disciplinary frontier and professional development direction of communication engineering, stimulate students' curiosity and research interest, and cultivate students' positive thinking, independent learning and expression ability. There is no fixed teaching material for this course, and the teaching contents mainly include the brief history of communication engineering major development, professional training scheme and curriculum system, professional discipline frontier and development trend. To enable students to understand the general situation and professional development trends of communication engineering, and lay the foundation for subsequent professional learning.

Recommended Textbooks/References:

[1] Tian He, Career Planning and Employment Guidance for College Students. *Posts and Telecom Press*, Nov. 2010.

[2] Major Training Program for Communication Engineering. Beijing University of Technology, Apr. 2012.

[3] Zhong Yixin, Introduction to Information Science and Technology (The 3rd Edition), *Beijing University of Posts and Telecommunications Press*, Aug. 2015.

0010120 离散数学

课程编码：0010120

课程名称：离散数学

英文名称：Discrete Mathematics

课程类型：自主课程

学分：2.0　**总学时：** 36

面向对象：电子信息工程（实验班）、电子信息工程、通信工程专业本科生

先修课程：线性代数

考核形式：平时成绩+考试

撰写人：熊文梦, 相叶，石戈

课程简介：

《离散数学》是信息学部信息与通信工程学院为电子信息工程和通信工程专业本科生开设的自主课程类型。本课程的任务是旨在通过学习离散数学基础理论，强化学生程序逻辑、算法模型等专业核心意识，培养其包括问题抽象、模型建立、数学描述、程序实现等在内的复杂系统设计实现能力，为学生以后学习其他专业课程打下良好的基础。教学内容重点：学习命题逻辑，谓词逻辑，集合与关系，图论，函数和布尔代数等基本数学概念、数学理论和数学方法。教学内容的难点：集合与关系，图论等数学概念、数学理论和数学方法的掌握。

推荐教材或主要参考书：

[1] 左孝凌 等. 离散数学. 上海科学技术文献出版社，1982 年 1 月

[2] 邵学才、叶秀明. 离散数学. 机械工业出版社，2004 年 2 月

[3] Bernard Kolman, Robert C.Busby，离散数学结构（第四版，影印版）. 高等教育出版社，2001 年 1 月

[4] 耿素云 等. 离散数学,北京:北京大学出版社，1987 年 9 月

[5] John A. Dossey, Albert D. Otto 等. 离散数学（英文版，第 5 版）. 机械工业出版社，2007 年 7 月

0010120 Discrete Mathematics

Course Number: 0010120

Course Title: Discrete Mathematics

Course Type: Independent course

Credit: 2.0 **Total Credit Hours:** 36

Students: Undergraduate students majoring in Electronic Information Engineering and Communication engineering

Prerequisites: Linear Algebra

Evaluation Method: Course participation + examination

Writer： Wenmeng Xiong, Ye Xiang, Ge Shi

Course Description:

Communication system modeling and simulation is one of the independent course courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to clarify the basic theory of discrete mathematics. This course is focus on strengthening the core consciousness of students' program logic and algorithm model, and cultivating their ability to design and implement the complex systems including problem abstraction, model building, mathematical description, and program implementation. The study of this course can lay a good foundation for the students to study other professional courses in the future. The teaching contents are mainly covered by the following aspects: the basic mathematical concepts, mathematical theory and mathematical methods of the propositional logic, the predicate logic, the sets and relationships, the graph theory, the functions and the Boolean algebra. The difficulties of teaching contents are described as followings: mastering the basic mathematical concepts, mathematical theory and mathematical methods of the sets and relationships and the graph theory.

Recommended Textbooks/References:

1. Zuo Xiaoling et al. Discrete mathematics. *Shanghai Science and Technology Literature Press*, Jan. 1982.

2. Shao Xuecai, ye Xiuming. Discrete mathematics. *China Machine Press*, Feb. 2004

3. Bernard Kolman, Robert C. Busby, discrete mathematical structure (Fourth Edition, photocopies). *Higher Education Press*, Jan. 2001.

4. Geng Suyun et al. Discrete mathematics, *Beijing: Peking University Press*, Sep. 1987.

5. John A. Dossey, Albert D. Otto et al. Discrete Mathematics (English version, 5th Edition). *China Machine Press*, Jul. 2007.

0010663 学术写作课程

课程编码：0010663

课程名称：学术写作课程

英文名称：Academic Writing

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：通信工程专业本科生

先修课程：电路分析基础、信号与系统、数字信号处理、现代微处理器原理及应用、电磁场与电磁波

考核形式：平时成绩+大作业

撰写人：稂世楠

课程简介：（250-300 字）

学术写作课是信息与通信工程学院为通信工程专业本科生开设的专业基础课程类型。本课程的任务是通过对科技论文的概念、学位论文编写格式、学术论文编写格式、科技论文写作指南和写作规范等方面的讲授，使学生了解科技论文写作的基本内容，掌握科技论文写作的基本方法，熟悉科技论文写作的基本规范，为后续将自己的研究成果写作成符合科技写作要求的和高质量的科技论文打下良好的基础。教学内容重点：科技论文的分类与写作的要求，学位论文和学术论文的编写格式，科技论文中题名、作者署名、关键词、插图、表格、公式的书写。教学内容的难点：科技论文主体部分、结论以及参考文献的书写和标注。

推荐教材或主要参考书：

[1] 姚养无编著. 科技论文写作基础. 国防工业出版社，2017 年 4 月

[2] Barbara Gastel、Robert A. Day 著，任治刚译. 科技论文写作与发表教程（第八版）. 电子工业出版社，2018 年 1 月

[3] 刘振海、刘永新、陈忠财、臧庆军、李桃编著. 中英文科技论文写作教程. 高等教育出版社，2007 年 9 月

0010663 Academic Writing

Course Number： 0010663

Course Title： Academic Writing

Course Type： Independent course

Credit： 1.0 **Total Credit Hours：** 16

Students： Undergraduate students majoring in Communication Engineering

Prerequisites： Circuit analysis, Signals and systems, Digital signal processing, Principles and applications of modern microprocessors, Electromagnetic fields and electromagnetic waves

Evaluation Method： Usual performance + Final project

Writer: Shinan Lang

Course Description:：

Academic writing is a professional basic course offered by the school of information and communication engineering for undergraduates majoring in Communication Engineering. The task of this course is to make students understand the basic content and norms of scientific paper writing and master the basic writing methods of science and technology thesis writing by lecturing the format of degree and academic thesis writing and scientific papers' writing guide and standardize. This course will lay a good foundation for students to write their research results into high quality scientific papers that meet the requirements of scientific writing. This course is focus on the writing format of degree and academic thesis writing as well as the classification and writing requirements of scientific papers where writing of title, author signature, keywords, illustrations, tables, formula are included. The difficulties of teaching contents are described as followings: The writing and marking of scientific papers' main body, conclusion and references.

Recommended Textbooks/References:

[1] Yao Yangwu, Writing Fundamentals of Scientific Paper. National Defence Industry Press, Apr. 2017.

[2] Barbara Gastel、Robert A. Day. Scientific Paper Writing and Publishing Course (The 8th Edition). *Electronic Industry Press*, Jan. 2018.

[3] Liu Zhenhai, Liu Yongxin, et al. Chinese and English Scientific Paper Writing Course. *Higher Education Press*, Sep. 2007.

0010671 通信系统建模与仿真

课程编码：0010671

课程名称：通信系统建模与仿真

英文名称：Communication System Modeling and Simulation

课程类型：专业选修课、自主课程

学分：2.0　**总学时：** 32

面向对象：电子信息工程（实验班）、通信工程专业本科生

先修课程：信号与系统，通信系统原理

考核形式：平时成绩+考查

撰写人：孙阳

课程简介：

《通信系统建模与仿真》是信息学部信息与通信工程学院为电子信息工程（实验班）、通信工程专业本科生开设的选修课。本课程的任务是帮助学生建立起通信系统的概念，掌握通信建模方法和仿真方法。帮助学生加深对《信号与系统》和《通信系统原理》中基本概念的理解，培养学生解决复杂工程问题的能力，熟悉评估通信系统性能的关键指标及仿真方法，为后续从事通信领域工程技术研发奠定基础。教学内容重点：通信系统建模与仿真理论、模拟调制解调方法、数字通信系统的建模仿真、复杂无线信号的接收与分析、无线通信系统工程实践中复杂问题的分析等。教学内容的难点：复杂无线信号的接收与分析、无线通信系统工程实践中复杂问题的分析。

推荐教材或主要参考书：

[1] 陈树新 著. 通信系统建模与仿真教程（第 3 版）.电子工业出版社. 2017 年 03 月 01 日.

[2] 邵玉斌 著. MATLAB/SIMULINK 通信系统建模与仿真实例分析. 清华大学出版社. 2010 年 04 月 15 日.

[3] 张瑾 周原 著. 基于 MATLAB/Simulink 的通信系统建模与仿真 第 2 版. 北京航空航天大学出版社. 2017 年 10 月 01 日.

[4] 刘学勇 著.详解 MATLAB/Simulink 通信系统建模与仿真. 电子工业出版社. 2011 年 11 月 01 日.

0010671 Communication System Modeling and Simulation

Course Number: 0010671

Course Title: Communication System Modeling and Simulation

Course Type: Major electives, Independent course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Electronic Information Engineering and Communication Engineering

Prerequisites: Signals and Systems, Communication System Theory

Evaluation Method: Course participation + Experimental examination

Writer： Yang Sun

Course Description:

Communication system modeling and simulation is one of the elective courses for undergraduate students Major in Electronic Information Engineering and Communication Engineering. The main target of this course is to help students to master the basic theory and key problems in the communication system, establishing the concept of communication system, mastering the communication modeling method and simulation method, to deepen their understanding of the basic concepts in "signals and systems" and "communication system principle". To cultivate the ability to solve the complex engineering problems, be familiar with the key indicators and simulation methods to evaluate the performance of communication system, and lay a foundation for the subsequent research and development in the field of communication. The main contents of this course: the communication system modeling and simulation theory, analog modulation and demodulation method, modeling and simulation of digital communication system, reception and analysis of complex wireless signals, analysis of complex problems in practical wireless communication system engineering, etc. The difficulties of teaching contents are described as followings: modeling and simulation of digital communication system, reception and analysis of complex wireless signals, analysis of complex problems in practical wireless communication system engineering.

Recommended Textbooks/References:

1.Shuxin Chen, Communication System Modeling and Simulation Course (Version 3), *Electronic Industry Press*, 03-2017.

2.Yubin Shao, Matlab/Simulink Communication System Modeling and Simulation Example Analysis, *Tsinghua University Press*,04-2010.

3.Jin Zhang, Yuan Zhou, Communication System Modeling and Simulation Based on MATLAB / Simulink Version 2, *Beijing University of Aeronautics and Astronautics Press*, 10-2017.

4.Xueyong Liu, Detailed Explanation of MATLAB / Simulink Communication System Modeling and Simulation, *Electronic Industry Press*, 11-2011.

0010708 信息与通信工程学术前沿课程

课程编号：0010708

课程名称：信息与通信工程学术前沿课程

英文名称：Advanced Courses in Information and Communication Engineering

课程类型：自主课程

学分：1.0　**总学时：**　16

面向对象：通信工程专业本科生

先修课程：信号与系统、通信网络基础、无线通信

考核形式：提交学术报告

撰写人：司鹏搏

课程简介

信息与通信工程学术前沿课是一门以学术讲座(报告)的形式介绍信息与通信工程领域的前沿技术及研究，共包括 16 次学科前沿讲座，其中在第四、第五学期，专业教授每人做一次学科前沿讲座共 8 次，第 3，6 学期邀请校外专家做学术报告，共 8 次。学生可以根据自己的兴趣任意选择听其中的 8 次报告。

推荐教材或主要参考书：

[1]　通信工程学科前沿技术和进展报告、文献等

0010708 Advanced Courses in Information and Communication Engineering

Course Number: 0010708

Course Title: Advanced Courses in Information and Communication Engineering

Course Type: Independent course

Credit: 1.0 **Total Credit Hours: 16**

Students: Undergraduate students majoring in Communication Engineering

Prerequisites: "Signals and Systems", "Foundation of Communication Network", "Wireless Communication" and other basic courses

Evaluation Method: Course participation + Summary report

Writer: Yanhua Zhang

Course Description:

Advanced Courses in Information and Communication Engineering is an academic lecture (report) that introduces cutting-edge technology and research in the field of information and communication engineering, including 16 subject-frontier lectures. In the fourth and fifth semesters, each professional professor gives a lecture on the frontier of the subject for a total of 8 times. In the third and sixth semesters, Invited experts from outside the school to give academic reports, a total of 8 times. Students can arbitrarily choose to listen to 8 of these reports according to their own interests.

Recommended Textbooks/References:

1.Frontier technology and progress report of communication engineering discipline, literature, etc.