《数字电路》教学大纲

一、课程基本信息

开课单位:	信息科学与技术学院	课程代码:	EE115B
课程名称:	数字电路	英文名称:	Digital Circuits
学 分:	3	学 时:	48
授课对象:	EE&CS	授课语言:	双语
先修课程:	EE111(电路基础)		

二、课程简介

“数字电路”是电子科学与技术专业必修的一门重要学科基础课，是研究数字电路及其应用的学科。本课程通过讲授数字逻辑基础知识、组合逻辑电和时序逻辑电路的分析和设计方法，使学生获得数字电路的基本理论、基本方法和基本技能，了解数字电路的发展概况，初步掌握数字电路的分析和设计方法，为学习后续课程打下基础。

三、教学目标

知识认知能力：通过学习本课程，学生应掌握数制、码制、布尔代数等数字逻辑基础知识，理解并掌握加法器、比较器、译码器、编码器、多路选择器等基本组合逻辑电路的分析和设计方法，理解并掌握锁存器、触发器、定时器、寄存器、计数器、有限状态机等基本时序逻辑电路的分析和设计方法，理解并掌握使用硬件描述语言进行数字电路设计和仿真的流程，了解常用的数据存储器和信号转换器。

综合素质能力：通过学习本课程，学生应理解工程职业道德和规范，具备科学精神和工程师的基本素养，具备科技报国的家国情怀和使命担当，能进行团队协作并具备合作精神和人际沟通能力。

四、教学方法

课堂讲授与讨论：本课程知识点以课堂讲授为主，在讲解基本知识点的基础上，关注课程重点难点内容的讲授，采用启发式教学方法，引导学生对问题展开思考和讨论，使学生从数学概念、物理概念及工程概念出发分析和解决数字电路领域的相关问题。

实验：本课程实验部分引导学生在掌握课程基本理论和方法的基础上搭建并测试基本数字电路以及使用硬件描述语言进行数字电路的设计和仿真。

五、教学内容与学时安排

Chapter	Contents	Week

1	Number Systems, Operations, and Codes	1
2	Logic Gates	2
3	Boolean Algebra and Logic Simplification	3-4
4	Combinational Logic: Adders, Comparators, Decoders, Encoders, Multiplexers	5-7
5	VHDL Basics	8-9
6	Sequential Logic: Latches, Flip-Flops, Timers, Registers, Counters, Finite State Machines	10-14
7	Data Storage& Signal Conversion and Processing	15

**Topics may vary a bit throughout the preparation of the lectures.*

六、考核方式和成绩评定

作业和考勤：25%
实验：25%
期中考试：25%
期末考试：25%

七、推荐教材

书名	作者	出版社	出版时间	ISBN
数字电子技术基础（第六版）	阎石	高等教育出版社		

八、参考书目

书名	作者	出版社	出版时间	ISBN
Digital Fundamentals (11th edition)	Thomas L. Floyd	Pearson		978-1-292-07598-3
Fundamentals of Digital Logic with VHDL Design(3rd edition)	Stephen Brown; Zvonko Vranesic	McGraw Hill		978–0–07–352953–0

《Digital Circuits》Syllabus

1. Basic course information

unit:	School of Information Science and Technology	course code:	EE115B
course name:	数字电路	course name:	Digital Circuits
credits:	3	period:	48
teaching object:		teaching language:	Chinese and English
previous course:	EE111: Electric Circuits		

2. Course introduction

This course covers the fundamentals of digital circuits. Main topics include digital logic (number systems, codes, and Boolean Algebra), combinational logic circuits (adders, comparators, decoders, encoders, and multiplexers), sequential logic circuits (latches, flip-flops, timers, registers, counters, and finite state machines), VHDL programming, and data storage/conversion/processing.

3. Learning Goal

Cognitive competence: Students are expected to understand the basic concepts of digital logic, understand and be able to apply the methods and tools of analyzing and designing combinational and sequential digital circuits, and understand the VHDL-based digital circuit design flow.

Comprehensive qualities: Students are expected to develop professionalism as an electrical engineer.

4. Instructional Pedagogy

Lecture: Concepts, methods, and tools of digital circuit analysis and design are covered in lectures.

Lab: VHDL-based digital circuit design and simulation are covered in labs.

5. Course Content and Schedule

Chapter	Contents	Week
1	Number Systems, Operations, and Codes	1
2	Logic Gates	2
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6. Grading Policy

Homework and Attendance: 25%
Lab: 25%
Midterm Exams: 25%
Final Exam: 25%

7. Textbook

Title	Authors	Publisher	Time	ISBN
数字电子技术基础（第六版）	阎石	高等教育出版社		

8. Recommended Reading

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