教师网上录入课堂信息 Teachers enter class information online

课程编号 Course number	30231063
课程名： Course Name:	数字逻辑与处理器基础（英） Fundamentals of Digital Logic and Processors
总学时： Total Credit Hours:	48
总学分： Total Credits:	3
课程内容简介： Course Description:	数字逻辑与处理器基础课程讲述数字逻辑电路和处理器的基本概念，围绕数字单元与系统讲解表示、综合、优化的基本方法。课程分为两个部分。第一部分以数字逻辑电路为主。讲述在逻辑门与触发器级别的数字电路工作原理，并介绍组合逻辑与时序逻辑的分析与设计方法。第二部分以处理器的组织与结构为核心，讲述指令集、算术逻辑单元、控制器与输入/输出等基本概念。以一个单周期的处理器和一个流水线处理器为例讲解处理器的工作原理与基本设计方法。 The basic course of digital logic and processors introduces the basic concepts of digital logic circuits and processors, and explains the basic methods of representation, synthesis and optimization around digital units and systems. The course is divided into two parts. The first part focuses on digital logic circuits. This paper describes the working principle of digital circuits at the logic gate and flip-flop level, and introduces the analysis and design methods of combinatorial logic and sequential logic. The second part focuses on the organization and structure of the processor, and introduces the basic concepts of instruction set, arithmetic logic unit, controller, and input/output. A single-cycle processor and a pipeline processor are used as examples to explain the working principle and basic design methods of the processor.
Course Description	This course belongs to the category of mandatory EE major courses. The goal of this course is to build the connection between the fundamental physics and computing algorithms through digital circuits and processors. This course covers the basic concepts of electronic engineering from digital logic circuits to microcomputer processors in a systematic and simplifier manner. The class is divided into two sections. This first section of digital circuits describes how digital circuits work at the gate and flip-flop level and contains the analysis and design of combinational and sequential circuits. The second section describes micro-processor organization and its architecture. It introduces the fundamental concepts such as computer instruction sets, ALU, controller, registers and I/O. A simple processor and a pipeline version will be discussed. The textbooks, slides, lectures, homework assignments and exams will be in English.
进度安排： Schedule:	• 概论 (1周): □ 课程信息与要求 □ 课程背景与目标 □ 核心问题与方法 □ 历史、现状与发展规律 • 布尔代数 (1周): □ 数的表示 □ 逻辑与布尔代数及化简 • 组合逻辑 (1周): □ 布尔表达式与开关电路的实现 □ 组合电路定义与分析方法 □ 组合逻辑电路设计方法和评估 • 时序逻辑 (2周): □ 离散过程 □ 过程的有限状态机实现及其化简 □ 锁存器与触发器、时钟 □ 时序电路的特点和典型电路 □ 时序电路分析方法和设计方法 • 计算机指令系统 (2周): □ 指令集概念、设计与MIPS实例 □ 汇编语言程序设计基础 □ 程序与语言 • 微处理器设计 (2-3周): □ 计算机体系结构的基本概念 □ 控制器/ALU/存储器 □ 单周期CPU □ 多周期CPU • 流水线技术 (3周): □ 流水线数据通路与控制 □ 冒险检测与消除 □ 中断与异常 • 存储器技术与IO总线技术 (2周): □ 寄存器与缓存技术 □ 主存储器系统 □ I/O系统 • Introduction (1 week): □ Course Information and Requirements □ Course Background and Objectives □ Core Issues and Methods □ History, Present Situation and Development Law • Boolean Algebra (1 week): □ Representation of Numbers □ Logic and Boolean Algebra and Simplification • Combinatorial Logic (1 week): □ Implementation of Boolean Expressions and Switching Circuits □ Definition and Analysis Methods of Combinatorial Circuits □ Combinatorial Logic Circuit Design Methods and Evaluation • Sequential Logic (2 weeks): □ Discrete Processes □ Finite State Machine Implementation of Procedures and Their Simplification □ Latches and Flip-flops, Clocks □ Characteristics and Typical Circuits of Sequential Circuits □ Sequential Circuit Analysis Methods and Design Methods • Computer Instruction System (2 weeks): □ Instruction Set Concepts, Design and MIPS Examples □ Fundamentals of Assembly Language Programming □ Programs & Languages • Microprocessor Design (2-3 weeks): □ Basic Concepts of Computer Architecture □ Controller/ALU/Memory □ Single-cycle CPU □ Multi-cycle CPU • Pipeline Technology (3 weeks): □ Pipeline Data Pathway and Control □ Adventure Detection and Elimination □ Interruptions and Exceptions • Memory Technology & IO Bus Technology (2 weeks): □ Registers & Cache Technology □ Main Memory System □ I/O system
考核方式： Assessment Method:	
教材及参考书： Textbooks and reference books:	参考书如下： • Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "Digital Integrated Circuits: A design Perspective", 2nd Edition • David A. Patterson, John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", 5th Edition References are as follows: • Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "Digital Integrated Circuits: A design Perspective", 2nd Edition • David A. Patterson, John L. Hennessy, "Computer Organization." and Design: The Hardware/Software Interface", 5th Edition
主教材： Main Textbook:	
参考书： Reference book:	
合开教师： Co-opening Teachers:	
选课指导： Course Selection Guidance:	-Basic programing and circuit theory needed. -Proper english skills. -Attend the class on time.
先修要求： Prerequisites:	The students need to learn basic programing and circuit theory before taking this course.
教师教学特色： Teachers' Teaching Characteristics:	http://nics.ee.tsinghua.edu.cn/people/Xueqing/
Office Hour：	TBD
成绩评定标准： Grading Criteria:	Attendance and interactions, Homework, Mid-term exam, Final exam, Extra bonus points.
教学日历： Teaching Calendar:	查看教学日历 View the teaching calendar