

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 <b>Course Title</b>	数字电路 <b>Digital Circuits</b>
2.	授课院系 <b>Originating Department</b>	电子与电气工程系 Department of Electrical & Electronic Engineering
3.	课程编号 <b>Course Code</b>	EE202-17
4.	课程学分 <b>Credit Value</b>	3
5.	课程类别 <b>Course Type</b>	专业基础课 Major Foundational Courses
6.	授课学期 <b>Semester</b>	春季及秋季 Spring and Fall
7.	授课语言 <b>Teaching Language</b>	中英双语 English & Chinese
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	汪飞, 副教授, 电子与电气工程系, Email: wangf@sustech.edu.cn 王恺, 副教授, 电子与电气工程系, Email: wangk@sustech.edu.cn 虞亚军, 副教授, 电子与电气工程系, Email: yuj@sustech.edu.cn Fei Wang, Associate Professor, Department of Electrical & Electronic Engineering, Email: wangf@sustech.edu.cn Kai Wang, Associate Professor, Department of Electrical & Electronic Engineering, Email: wangk@sustech.edu.cn Yajun Yu, Associate Professor, Department of Electrical & Electronic Engineering, Email: yuj@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	王珊珊, 助教 电子与电气工程系 Shanshan Wang, TA Department of Electrical & Electronic Engineering
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours	48		0		48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	PHY105B 大学物理下 B, General Physics 下 B
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

<p>本课程涵盖最基本的数字电路相关内容，介绍以下 5 大方面的知识：</p> <ol style="list-style-type: none"> <li>1. 数制和数码，数字信号，集成逻辑门，逻辑代数，和逻辑代数最小化；</li> <li>2. 组合逻辑的设计，包括加法器、比较器、编码器/译码器、线选器等，及其应用；</li> <li>3. 构成时序电路的记忆单元，如锁存器，触发器，以及用于时序电路分析和设计的状态表和状态图；</li> <li>4. 同步时序电路的分析和设计，包括有限状态机，计数器，寄存器；</li> <li>5. 多谐振荡器和 555 定时器、存储器以及，数模转换和模数转换的原理和应用；</li> </ol> <p>The subject covers the fundamentals of digital electronics. The main objective is to gain knowledge of seven main topics of digital electronics:</p> <ol style="list-style-type: none"> <li>1. Concepts of number systems, digital signals, logic gates, Boolean functions and algebra, and logic minimization techniques;</li> <li>2. Logic design of combinational circuits such as adders, comparators, decoders/encoders, multiplexers/demultiplexers, and the applications of these devices;</li> <li>3. Basics for sequential circuits, such as the basic memory elements, latches, flip-flops, and the state tables and state diagrams;</li> <li>4. Logic design of synchronous sequential circuits including finite state machines, counters and registers;</li> <li>5. The principle, operation and application of ROM and RAM, Multivibrator and 555 timer, and A/D and D/A converters</li> </ol>
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#### 16. 预达学习成果 Learning Outcomes

<p>通过这门课程的学习，学生能够</p> <ol style="list-style-type: none"> <li>1. 掌握可用于分析和设计数字电路的技术和方法，包括数制/数码、逻辑简化和最小化，状态表，状态图等；</li> <li>2. 掌握基本组合逻辑和时序逻辑模块的设计和运作方式；</li> <li>3. 分析由基本组合逻辑和时序逻辑模块组成的电路；</li> <li>4. 运用基本组合逻辑和时序逻辑模块设计更复杂的数字电路；</li> <li>5. 掌握存储器、多谐振荡器和数模模数转换器的工作原理和运作方式；以及</li> <li>6. 分析包含存储器、多谐振荡器和数模模数转换器等复杂模块构成的数字系统。</li> </ol> <p>After completing this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the techniques and methods used in analyzing and designing digital electronic circuits, including the different number systems, logic manipulation and minimization, state table, state diagram,</li> <li>2. Understand the design and operation of some basic combinational and sequential functional blocks;</li> <li>3. Analyze the digital circuits constructed from basic combinational and sequential functional blocks;</li> <li>4. Use basic combinational and sequential functional blocks to design more complex systems;</li> <li>5. Understand the operations of memories, multivibrators, as well as A/D and D/A converters; and</li> <li>6. Analyze the complex digital systems involving memories, multivibrators as well as A/D and D/A converters</li> </ol>
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17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）  
**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

本课程的主要内容有：数制和码制，集成门电路，逻辑代数基础及逻辑函数最小化、组合逻辑电路和中规模集成电路模块、触发器、时序逻辑电路、可编程逻辑模块和存储器、多谐振荡器、以及数/模及模/数转换等。

Number Systems and Logic Gates. Boolean algebra and Logic Minimization. Combinational logic design and MSI digital devices. Sequential Logic Elements. Synchronous sequential logic circuits. Programmable logic devices and memories. Multivibrators and 555 timers. A/D and D/A converters.

18. **教材及其它参考资料 Textbook and Supplementary Readings**

(一) 教材 Textbooks

阎石主编，《数字电子技术基础》（第六版），高等教育出版社，2016年4月。

Wakerly John F, Digital Design: Principles and Practices, Pearson Prentice-Hall, 4th edition, 2007

(二) 主要参考书 References

1. 刘宝琴主编，《数字系统与逻辑设计》，清华大学出版社，2004。

2. Victor P. Nelson, Digital Logic Circuit Analysis and Design, 清华大学出版社, 1997.

3. Palnitkar, Samir. Verilog® HDL. 2nd ed. Pearson Education, 2003.

4. W. Kleitz, Digital Electronics - A Practical Approach With VHDL 9/e - (Pearson, 2012)

5. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Digital Systems: Principles and Applications, 11/e - Pearson

**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance		5		
小测验 Quiz		20		
课程项目 Projects				
平时作业 Assignments		15		

期中考试 <b>Mid-Term Test</b>	20		
期末考试 <b>Final Exam</b>	40		
期末报告 <b>Final Presentation</b>			
其它（可根据需要 改写以上评估方式） <b>Others (The above may be modified as necessary)</b>			

20. 记分方式 **GRADING SYSTEM**

<input checked="" type="checkbox"/> A. 十三级等级制 <b>Letter Grading</b> <input type="checkbox"/> B. 二级记分制（通过/不通过） <b>Pass/Fail Grading</b>
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**课程审批 REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过  
**This Course has been approved by the following person or committee of authority**

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