浙江大學

ELEC503
Digital Logic Circuits

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Instructor Contact Details

Lecturer-in-charge: Dr. Yang Zhang
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Office location: Huajiachi Campus, Zhejiang University, Hangzhou, China
Consultation Time: Book appointment by sending email to: wlwyxy_29@zju.edu.cn

Teaching Times, Modes and Locations

Course Duration: 13 Dec 2025 to 28 Dec 2025
Modes: Face-to-face
Location: Huajiachi Campus, Zhejiang University via face-to-face

Academic Level

Undergraduate

Credit Points:

The course is worth 6 units of credit point.

Credit Hours

The number of credit hours of this course equals to the credits of a standard semester- long course.

Contact Hours

The course contains a total of 53 contact hours, which consists of orientation, lectures, seminars, quiz, discussion, research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, self-study, and final exam. Students will receive an official transcript which is issued by Zhejiang University when completing this course.

Enrolment Requirements

Eligibility requires enrollment in an overseas university as an undergraduate or postgraduate student, proficiency in English, and pre-approval from the student's home institution.

Course Description:

This unit equips students with the skills to design simple digital logic circuits, which are essential modules of larger digital systems. Key topics include logic operations, Boolean algebra, number systems, combinational and sequential logic, registers, counters, bus systems, state machines, and the use of simple CAD tools for logic design. Students will also learn to describe digital system components using the VHDL hardware description language and implement digital circuits using FPGA prototyping boards, culminating in the design of a simple computer.

Prerequisite:

N/A

Learning Resources

- Brown, Stephen D., and Zvonko G. Vranesic. Fundamentals of digital logic with Verilog design. 3rd edition: McGraw-Hill, 2009.

Learning Objectives

By the end of this course, you should be able to:

・Design and Implement Digital Circuits: Design, fabricate, test, and implement combinational and sequential logic circuits and systems using a system-based approach, including the use of CAD tools and FPGA prototyping.

・Understand and Analyze Logic Circuits: Apply Boolean algebra for logic circuit analysis, describe basic digital logic building blocks, and analyze the performance of combinational and sequential digital logic circuits.

・Comprehend Sequential Logic Components: Understand the working principles of sequential logic components such as latches, flip-flops, registers, and counters, and evaluate the performance of clocked sequential circuits.

・Effective Communication and Teamwork: Communicate effectively within team settings and describe hardware functions using a hardware description language, facilitating collaboration and successful project execution.

Course Delivery:

- Face-to-face Lecture mode includes lectures, seminars, quiz, discussion,

research, case study, small tests, assignments, on-site field trip(s), in-class and after-class activities, revision, and final exam.
The following course will be taught in English. There will also be guest speakers and optional field trips available for students who would like to enhance their learning experience. All courses and other sessions will be run during weekdays.

Topics and Course Schedule:

WK	Topic	Activities
1	Orientation	
1	Introduction to Digital Logic Circuits	Lecture; Tutorial
1	Verilog and implementing logic functions	Lecture; Tutorial
1	Number representation & arithmetic circuits	Lecture; Tutorial
1	Combinational building blocks and VHDL	Lecture; Tutorial
1	Flip-flops, Registers & Counters	Lecture; Tutorial
2	Verilog building blocks, numbers and adders	Lecture; Tutorial
2	Seminar	
2	Comparators, adders and subtractors	Lecture; Tutorial
2	Synchronous sequential circuits	Lecture; Tutorial
2	Quiz	Closed book
2	Registers and counters	Lecture; Tutorial
3	Digital system design Finite state machines	Lecture; Tutorial
3	Data paths and control	Lecture; Tutorial
3	Processors, memory and branching	Lecture; Tutorial
3	Multipliers, dividers and timing Blackjack player	Lecture; Tutorial
3	Metastability and reconfigurable logic Implementing Algorithms in Hardware	Lecture; Tutorial

3	Revision	Tutorial
3	Final exam	Closed book

Assessments:

Class participation	15%
Quiz	15%
Assignments	20%
Final exam	50%

Grade Descriptors:

HD	High Distinction	85-100
D	Distinction	75-84
Cr	Credit	65-74
P	Pass	50-64
F	Fail	0-49

High Distinction 85-100

- Treatment of material evidences an advanced synthesis of ideas Demonstration of initiative, complex understanding, and analysis.
- Work is well-written and stylistically sophisticated, including appropriate referencing, clarity, and some creativity where appropriate.
- All criteria addressed to a high level.

Distinction 75-84

- Treatment of material evidences an advanced understanding of ideas Demonstration of initiative, complex understanding and analysis Work is well-written and stylistically strong.
- All criteria addressed strongly.

Credit 65-74

- Treatment of material displays a good understanding of ideas.
- Work is well-written and stylistically sound, with a minimum of syntactical errors.
- All criteria addressed clearly.

Pass 50-64

- Treatment of material indicates a satisfactory understanding of ideas Work is adequately written, with some syntactical errors.
- Most criteria addressed adequately.

Fail 0-49

- Treatment of ideas indicates an inadequate understanding of ideas Written style inappropriate to task, major problems with expression.
- Most criteria not clearly or adequately addressed.

Academic Integrity

Students are expected to uphold the university's academic honesty principles which are an integral part of the university's core values and principles. If a student fails to observe the acceptable standards of academic honesty, they could attract penalties and even disqualification from the course in more serious circumstances. Students are responsible for knowing and observing accepted principles of research, writing and any other task which they are required to complete.

Academic dishonesty or cheating includes acts of plagiarism, misrepresentation, fabrication, failure to reference materials used properly and forgery. These may include, but are not limited to: claiming the work of others as your own, deliberately applying false and inaccurate information, copying the work of others in part or whole, allowing others in the course to copy your work in part or whole, failing to appropriately acknowledge the work of other scholars/authors through acceptable referencing standards, purchasing papers or writing papers for other students and submitting the same paper twice for the same subject.

This Academic Integrity policy applies to all students of the Zhejiang University in all programs of study, including non-graduating students. It is to reinforce the University's commitment to maintain integrity and honesty in all academic activities of the University community.

Policy

The foundation of good academic work is honesty. Maintaining academic integrity upholds the standards of the University. The responsibility for maintaining integrity in all the activities of the academic community lies with the students as well as the faculty and the University. Everyone in this community must work together to ensure that the values of truth, trust and justice are upheld.
Academic dishonesty affects the University's reputation and devalues the degrees offered. The University will impose serious penalties on students who are found to have violated this policy. The following penalties may be imposed:

- ✓ Expulsion
- ✓ Suspension
- ✓ Zero mark /fail grade
- ✓ Marking down
- ✓ Re-doing/re-submitting of assignments or reports, and
- ✓ Verbal or written warning.