



<https://courseoutline.auckland.ac.nz/dco/course/PHYSICS/140/1225>

# PHYSICS 140 : Digital Fundamentals

## Science

2022 Semester Two (1225) (15 POINTS)

### Course Prescription

An introduction to the physical basis of modern computing for Computer Science students and anyone with an interest in modern Information Technology. Key topics are Boolean Algebra, logic circuits, and digital information processing. Hands-on laboratory work is a key component of the course. No prior electronics or programming knowledge is assumed.

### Course Overview

This course will be of interest to students interested in progressing in computer science or experimental physics, in the computer science or physics degree programmes, respectively. Many students from this course move onward to CompSci 215.

### Course Requirements

Restriction: PHYSICS 219, 243

### Capabilities Developed in this Course

- Capability 1: Disciplinary Knowledge and Practice
- Capability 2: Critical Thinking
- Capability 3: Solution Seeking
- Capability 4: Communication and Engagement
- Capability 5: Independence and Integrity

Graduate Profile: [Bachelor of Science](#)

### Learning Outcomes

By the end of this course, students will be able to:

1. Derive, analyse and solve Boolean algebra expressions (Capability 1 and 3)
2. Relate and apply simplified Boolean algebra to digital logic circuits (Capability 1 and 3)
3. Be able to construct digital logic circuits in the laboratory and to write laboratory reports on your work (Capability 1, 2, 3, 4 and 5)
4. Demonstrate an understanding of of the fundamental digital logic gates (NAND, NOR) in a circuit by writing the truth tables for each gate. (Capability 1, 2 and 3)
5. Gain practical skills in the use of digital logic circuit simulation (Capability 1 and 3)

### Assessments

Assessment Type	Percentage	Classification
Assignments	25%	Individual Coursework
Laboratories	25%	Individual Coursework
Final Exam	50%	Individual Coursework
3 types	100%	

Assessment Type	Learning Outcome Addressed				
	1	2	3	4	5
Assignments	✓	✓	✓	✓	
Laboratories	✓	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓	

### Special Requirements

Students must attend one the three hour long weekly laboratory sessions.

### Workload Expectations

This course is a standard 15 point course and students are expected to spend 10 hours per week involved in each 15 point course that they are enrolled in.

For this course, you can expect 3 hours of lectures, 3 hours of Laboratory work, 2 hours of reading and thinking about the content, and 2 hours of work on assignment preparation.

### Delivery Mode

Campus Experience

Attendance is expected at scheduled activities to receive credit for components of the course. You must attend the laboratory sessions.

Lectures will be available as recordings.

The course will not include live online events.

Attendance on campus is required for the final exam.

The activities for the course are scheduled as a standard weekly timetable.

## Learning Resources

Course materials are made available in a learning and collaboration tool called Canvas which also includes reading lists and lecture recordings (where available).

Please remember that the recording of any class on a personal device requires the permission of the instructor.

There is a Course Book, and a recommended textbook: Floyd, "Digital Fundamentals", latest edition.

## Student Feedback

During the course Class Representatives in each class can take feedback to the staff responsible for the course and staff-student consultative committees.

At the end of the course students will be invited to give feedback on the course and teaching through a tool called SET or Qualtrics. The lecturers and course co-ordinators will consider all feedback.

Your feedback helps to improve the course and its delivery for all students.

## Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting their learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the internet. A student's assessed work may be reviewed against online source material using computerised detection mechanisms.

## Class Representatives

Class representatives are students tasked with representing student issues to departments, faculties, and the wider university. If you have a complaint about this course, please contact your class rep who will know how to raise it in the right channels. See your departmental noticeboard for contact details for your class reps.

## Copyright

The content and delivery of content in this course are protected by copyright. Material belonging to others may have been used in this course and copied by and solely for the educational purposes of the University under license.

You may copy the course content for the purposes of private study or research, but you may not upload onto any third party site, make a further copy or sell, alter or further reproduce or distribute any part of the course content to another person.

### Inclusive Learning

All students are asked to discuss any impairment related requirements privately, face to face and/or in written form with the course coordinator, lecturer or tutor.

Student Disability Services also provides support for students with a wide range of impairments, both visible and invisible, to succeed and excel at the University. For more information and contact details, please visit the [Student Disability Services' website](http://disability.auckland.ac.nz) <http://disability.auckland.ac.nz>

### Special Circumstances

If your ability to complete assessed coursework is affected by illness or other personal circumstances outside of your control, contact a member of teaching staff as soon as possible before the assessment is due.

If your personal circumstances significantly affect your performance, or preparation, for an exam or eligible written test, refer to the University's [aegrotat or compassionate consideration page](https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html) <https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html>.

This should be done as soon as possible and no later than seven days after the affected test or exam date.

### Learning Continuity

In the event of an unexpected disruption, we undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions the University has contingency plans to ensure that access to your course continues and course assessment continues to meet the principles of the University's assessment policy. Some adjustments may need to be made in emergencies. You will be kept fully informed by your course co-ordinator/director, and if disruption occurs you should refer to the university website for information about how to proceed.

The delivery mode may change depending on COVID restrictions. Any changes will be communicated through Canvas.

Level 1: Delivered normally as specified in delivery mode.

Level 2: You will not be required to attend in person. All teaching and assessment will have a remote option. The following activities will also have an on campus / in person option: labs and office hours.

Level 3 / 4: All teaching activities and assessments are delivered remotely. Labs are available for online work using LogiSim software.

### Student Charter and Responsibilities

The Student Charter assumes and acknowledges that students are active participants in the learning process

and that they have responsibilities to the institution and the international community of scholars. The University expects that students will act at all times in a way that demonstrates respect for the rights of other students and staff so that the learning environment is both safe and productive. For further information visit [Student Charter](https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html) <https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html>.

### Disclaimer

Elements of this outline may be subject to change. The latest information about the course will be available for enrolled students in Canvas.

In this course students may be asked to submit coursework assessments digitally. The University reserves the right to conduct scheduled tests and examinations for this course online or through the use of computers or other electronic devices. Where tests or examinations are conducted online remote invigilation arrangements may be used. In exceptional circumstances changes to elements of this course may be necessary at short notice. Students enrolled in this course will be informed of any such changes and the reasons for them, as soon as possible, through Canvas.