

GRIFFITH UNIVERSITY

FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

4020MEE DIGITAL CONTROL SYSTEMS ENGINEERING

COURSE OUTLINE

1.0 IDENTIFYING INFORMATION

Course Code: 4020MEE
Course Title: Digital Control Systems Engineering
Class Number: 51439
Faculty: Engineering and Information Technology
School: Microelectronic Engineering
Discipline Code: 031305

Program/s for which course is designed:

1149 (previously MEE101) Bachelor of Engineering in Microelectronic Engineering
1151 (previously MEE103) Bachelor of Engineering in Microelectronic Engineering/Bachelor of Information Technology
1152 (previously MEE104) Bachelor of Engineering/Bachelor of Commerce in Microelectronics and Management
1153 (previously MEE105) Bachelor of Engineering in Microelectronic Engineering/Bachelor of Science
1237 (previously MEE107) Bachelor of Engineering in Computer Systems Engineering

Status of course within program: Final Year Elective Course – Communication Systems major/Computer Systems major
Credit Point Value: 10CP
Prerequisites: 3020MEE Control Systems
Corequisites: Nil
Prior Assumed: Nil
Incompatible: SM34006 Digital Control Systems Engineering
MEE4020 Digital Control Systems Engineering
Year and Semester: Year 4, Semester 2 (1149, 1237)
Year 5, Semester 2 (1151, 1152, 1153)
Year of Offer: 2002
Course Convenor: Associate Professor Ljubo Vlacic
Office Location: Technology Building, Level 3, Room 3.10 (N44 3.10)
Office Telephone: (07) 3875 5024
Email Address: l.vlacic@me.gu.edu.au
Teaching Team Members: Associate Professor Ljubo Vlacic

2.0 OBJECTIVES

To understand the principles of operation and design of digital control systems and their applications. Emphasis is placed on the practical aspects of designing and implementing digital, microcomputer/microcontroller-based control systems, and their real-time operations.

3.0 BRIEF DESCRIPTION

The course is designed to follow on from the feedback control system theory taught in 3020MEE Control Systems and to equip students with an understanding of, and experience

with, engineering approaches to design of digital (microcontroller-based and/or computer based) systems for real-time measurement, open and closed-loop control. Digital control systems are ubiquitous and find their applications from medicine to robotics, food and space industries. Often, they are embodied as embedded computer systems, ie electronic systems that include a microcomputer to perform a specific application in a real-time.

4.0 CONTENT

The course comprises both lectures and laboratory work. Emphasis is on the experimental project work, through which students will gain an experience in digital control systems design and implementation.

Lectures:

Digital control systems - principles of operations; the z-transform; digital controller design; industrial digital controller architecture; interfacing; control and decision making; real-time control; system integration; intelligent control.

Laboratory:

Laboratory (project) work is organised in line with a concept of student-centred learning. Thus, students will have an opportunity to select their own project topic on a real-time control, alternatively to a set of prescribed experiments. Available experimental platforms are as follows:

- (i) MOTOROLA 68 HC11 16-bit microcontroller;
- (ii) MICROCHIP 17C42 8-bit RISC microcontroller;
- (iii) PC-based working platform;
- (iv) Matlab, Control toolbox, Simulink, Fuzzy logic toolbox, and a real-time workshop

5.0 ORGANISATION AND TEACHING METHODS

Teaching is by way of lectures (1 hour per week over 14 weeks) and laboratory project work (experimental) (4 hours per week over 14 weeks).

6.0 ASSESSMENT

Assignment	20%
Project work running demonstration	20%
Project work report (not longer than 12,000 words)	30%
End of semester examination (Theoretical consideration - 2 hours)	30%

Students must pass all components in order to pass the course.

7.0 TEXTS AND SUPPORTING MATERIALS

Recommended Reading:

- Astrom, K J and Wittenmark, B. *Computer-Controlled Systems*. 3rd Edition, Prentice Hall: 1997. ISBN 0 13 736787 2
- Auslander, D M and Tham, C H. *Real-Time Software for Control*. Prentice-Hall: 1990. ISBN 0 13 762824 2
- Bennett, S. *Real-Time Computer Control*. Prentice-Hall: 1994. ISBN 0 13 764176 1
- Iserman. *Digital Control Systems*. Springer-Verlag: 1981.
- Kuo, B. *Digital Control Systems*. Second Edition. Sanders College Publishing: 1992.
- Williamson, A D. *Digital Control and Implementation*. Prentice-Hall, 1991.

8.0 ADMINISTRATION

8.1 The Course Convenor will administer the course through the School of Microelectronic Engineering. The Course Convenor will be available for discussions with students concerning the administrative arrangements.

8.2 **Prerequisite/Prior Assumed Requirements**

Enrolment in this course is granted on the basis that a grade of Pass (P) or better has been achieved in any prerequisite or prior assumed requirement in this course as listed under Section 1 of this outline. Failure to meet this requirement may result in you having difficulty with the course and not being able to complete it successfully. **Any additional support or special assistance cannot be expected, nor requested, if the prerequisite and/or prior assumed requirements have not been met.**