

GRIFFITH UNIVERSITY

FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

7023MEE DIGITAL CONTROL SYSTEMS ENGINEERING

COURSE OUTLINE

1.0 IDENTIFYING INFORMATION

Course Code: 7023MEE
Course Title: Digital Control Systems Engineering
Faculty: Engineering and Information Technology
School: Microelectronic Engineering
Discipline Code: 031305

Program/s for which course is designed:

4080 (previously MEE401) Graduate Diploma of Computer and Information Engineering
4081 (previously MEE402) Graduate Diploma of Communications and Information Engineering
5223 (previously MEE502) Master of Computer and Information Engineering
5224 (previously MEE503) Master of Communications and Information Engineering

Status of course within program: First or Second Semester Elective Course (dependent upon the semester in which a student commences the program)

Credit Point Value:

10CP

Prerequisites:

7020MEE Control Systems or equivalents

Corequisites:

Nil

Prior Assumed:

Nil

Incompatible:

MEE7023 Digital Control Systems Engineering

Year and Semester:

For Graduate Diploma Students: Year 1, Semester

2

For Masters Students: Year 1, Semester 2 or Year 2, Semester 2

Year of Offer:

2005

Course Convenor:

Professor Ljubo Vlacic

Office Location:

Technology Building, Level 3, Room 3.10 (N44 3.10)

Office Telephone:

(07) 3735 5024

Email Address:

l.vlacic@griffith.edu.au

Teaching Team Members:

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 INTERRELATIONSHIP OF THE COURSE WITH OTHER COURSES AND THE PROGRAM

Program/s for which course is designed:

4080 (previously MEE401) Graduate Diploma of Computer and Information Engineering
4081 (previously MEE402) Graduate Diploma of Communications and Information Engineering
5223 (previously MEE502) Master of Computer and Information Engineering
5224 (previously MEE503) Master of Communications and Information Engineering

Status of course within program: First or Second Semester Elective Course (dependent upon the semester in which a student commences the program)

4.0 BRIEF DESCRIPTION

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. The Course portrays a digital control system as a common class of embedded systems and thus discusses hardware and software not as different domains but rather as enabling control technologies.

5.0 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 based on microcontrollers, Matlab, Control toolbox, Simulink, Fuzzy logic toolbox, and a real-time workshop.

6.0 GENERIC SKILLS DEVELOPMENT

With respect to the Resource Directory for Generic Skills Development, the attributes of the Griffith Graduates such as: Learning skills; Analysis & Critical Evaluation; Problem Solving & Decision Making; and Teamwork are the focal building blocks and areas of skills development that this course will teach and or practice.

7.0 FLEXIBLE LEARNING

In addition to the prescribed textbook, tutorial notes and laboratory manual, the Course is a web supplemented (via Learning@GU), Mode A.

8.0 RATIONALE FOR CONTENT

The course is designed to follow on from the feedback control system theory taught in 7020MEE_Y2 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.

9.0 ORGANISATION AND TEACHING METHODS

Teaching is by way of lectures (2 hours per week over 13 weeks) and laboratory project work (experimental) (4 hours per week over 10 weeks).

10.0 RATIONALE FOR TEACHING METHODS

The Constructive Alignment concept is used in the Course Design enabling students to learn. Hence, the emphasis is on teaching for enhanced student thinking and quality learning.

While lectures are to assist the students to acquire a body of factual knowledge, it is the tutorials and labs to stimulate the students to be critical and analytical about that information, to challenge, interpret and come to understand it.

As a capacity for teamwork is the most prized engineering workplace attribute, the laboratory work is also designed to assist students in developing their understanding of how to function as a team member and to share results with the other members of the team.

11.0 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%

Graduate and Master students must pass all components with 65% each in order to pass the course.

12.0 RATIONALE FOR ASSESSMENT

Assignment is set to assist students in developing their understanding of the theoretical basis for a digital control system design. It will also aid students to make a bridge between control systems theory (taught at lectures) and control systems practice (experienced through laboratory experiments).

Laboratory project work is included to ensure that students demonstrate and achieve the practical skills and competence in a control system design, and to apply the systems design skills that have been taught at lectures.

The examination assesses students' understanding of the theory and principles upon which control systems are based.

13.0 TEXTS AND SUPPORTING MATERIALS

Recommended Reading:

G C Goodwin, S F Graebe and M E Salgado. Control Systems Design. Prentice Hall 2001, ISBN 013 090870 3

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.

14.0 SCOPE OF COURSE EVALUATION

The School of Microelectronic Engineering has a practice of annually surveying every course in the School. From this survey, comments about the Course are provided to the Course Convenor for reflection and possible action.

15.0 ADMINISTRATION

- 15.1 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.
- 15.2 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.

16.0 COURSE COMMUNICATIONS

The Course Convenor is Professor Ljubo Vlacic. He can be contacted by one of the following means:

Office Location: Technology Building, Level 3,
Room 3.10 (N44_3.10)
Office Telephone: (07) 3875 5024
Email Address: l.vlacic@griffith.edu.au

The Lecture Notes as well as the Course Resource information are accessible at [Learning@GU](#).

17.0 UNIVERSITY POLICIES

The University Student and Assessment Policies are published on the University's web site at <http://www.gu.edu.au/ua/aa/sta/policy.html>. Students are directed to become familiar with, and pay particular attention to the following policies:

- Assessment Policy:
<http://www62.gu.edu.au/policylibrary.nsf/mainsearch/65e95921348eb64c4a256bdd0062f3b0?opendocument>
- Examinations Timetabling Policy and Procedures:
<http://www62.gu.edu.au/policylibrary.nsf/mainsearch/b95cbeb3c92b61564a256ba00062ffc9?opendocument>
- Student Charter:
<http://www62.gu.edu.au/policylibrary.nsf/mainsearch/da2f7338d19159a24a256bb40063379a?opendocument>
- Policy on Academic Misconduct:
<http://www62.gu.edu.au/policylibrary.nsf/mainsearch/352f26aa1a1011e64a256bbb0062fd5f?opendocument>

Plagiarism:

The School of Microelectronic Engineering views plagiarism seriously. Plagiarism can lead to the making of a complaint of academic misconduct to the Chair of the Assessment Board. Such a referral may result in the imposition of serious penalties including a fail for the Course or exclusion from the Program. Plagiarism is defined as the knowing presentation of the work or property of another person as if it were the student's own.

Some examples of plagiarism from the Policy on Academic Misconduct include the following. A more comprehensive explanation of plagiarism is contained in the Policy.

- Word for word copying without both appropriate use of quotation marks indicating direct copying as such and the including of a reference identifying the source of the material; or
- Closely paraphrasing material without acknowledging the source; or
- Submitting work, which has been produced by someone else.

It will be the practice of the teaching team to refer all suspected plagiarism to the Chair of the Assessment Board.

If students are uncertain as to their use of source materials, they should seek clarification from their Course teaching team.

Signed: _____ Date _____
Course Convenor

Signed: _____ Date _____
Head of School, School of Microelectronic Engineering

Signed: _____ Date _____
Chair, Faculty Board