1. **Title of the module**

EENG6760 (EL676) Digital Signal Processing and Control

1. **Division or partner institution which will be responsible for management of the module**

Computing, Engineering and Mathematical Sciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 6

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn and Spring

1. **Prerequisite and co-requisite modules**

Pre-requisite: EENG5170 Mechatronics and Control

1. **The programmes of study to which the module contributes**

BEng Electronic and Computer Systems

BEng Biomedical Engineering

BEng Biomedical Engineering with a Year in Industry

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BEng Electronic and Computer Engineering with a Foundation Year

BEng/MEng Electronic and Computer Engineering

BEng/MEng Electronic and Computer Engineering with a Year in Industry

1. **The intended subject specific learning outcomes.  
   On successfully completing the module students will be able to:**

1. Demonstrate a systematic understanding of key aspects of digital transforms, and sampling for conversion between analogue and digital signals.

2. Apply the methods and techniques of digital FIR and IIR Filter implementation and to extend their knowledge of real-world applications of Digital Signal Processing.

3. Apply the methods and techniques of classical feedback & digital feedback to control systems.

4. Demonstrate a systematic understanding of key aspects of controller design and system analysis and the application of control theory in real life engineering systems.

1. **The intended generic learning outcomes.  
   On successfully completing the module students will be able to:**

1. critically evaluate data - to make judgements and to achieve a solution

2. manage their own learning, and to make use of ICT.

3. apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding,

1. **A synopsis of the curriculum**

This module is focused on the study of digital signal processing and control of continuous systems and discrete time systems. The digital signal part includes Fourier transform, IIR Filters and FIR Filters. The control part continues the study of classical control of continuous system as well as digital control. There is a strong emphasis on design and evaluation.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Control

* + Dorf, RC, Bishop, Robert H. (2017) Modern control systems, Pearson, Boston, London
  + Nise, NS. (2019) Control systems engineering, J Wiley, Hoboken N.J
  + Ogata, K (1995) Discrete-time control systems, Prentice Hall, Upper Saddle River, N.J

DSP

* + Li Tan, (2008) Digital Signal Processing, Academic Press: Boston.
  + M. H. Hayes; M. H. Hayes, Digital signal processing: a practical approach - c2002
  + John G. Proakis; Dimitris G. Manolakis, Digital signal processing, 2007

1. **Learning and teaching methods**

Total contact hours: 40

Private study hours: 110

Total study hours: 150

1. **Assessment methods**
   1. Main assessment methods

* DSP Workshop - 4 pages, 6%
* DSP Lab - 5 pages, 9%
* Control Workshop - 4 pages, 6%
* Control Lab - 5 pages, 9%
* Exam 2 hours 70%

13.2 Reassessment methods

Like-for-like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** |  |  |  |
| Lectures | **x** | **x** | **x** | **x** |  | **x** |  |
| workshops | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lab | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |
| DSP w/shop | **x** | **x** |  |  | **x** | **x** |  |
| DSP Lab | **x** | **x** |  |  | **x** | **x** | **x** |
| Control w/shop |  |  | **x** | **x** |  | **x** | **x** |
| Control Lab |  |  | **x** | **x** | **x** | **x** | **x** |
| Exam | **x** | **x** | **x** | **x** |  |  |  |

1. **Inclusive module design**

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Engineering is an international discipline with techniques developed and refined by scientists across the globe. Mastery of the subject-specific learning outcomes, will equip students to apply the theories and techniques of this module in a wide range of international contexts. This module focuses on classical control and signal processing specifically in digital design. The technical methods including formula, terms and notations used to analyse and design are internationally recognised. The reading list has reference to international research. The module team includes many members of staff with international experience of teaching and research collaboration. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material. The support provided to the students is also internationally attuned given our international student body.

**FACULTIES SUPPORT OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 15/10/2020 | Major | **Sept 2023** | 6,7,8,9,10,11,12,13,14,17 | Yes |
| 15/12/2022 | Minor | September 2023 | 6, 7, 9, 11, 14 | No |