Module Definition Form (MDF)

Module code: MOD007721	**Version:** 2 **Date Amended:** 07/Feb/2023

1. Module Title
Advanced Digital Signal Processing

2a. Module Leader
Sufian Yousef

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
7

3b. Module Type
Standard (fine graded)

4a. Credits
30

4b. Study Hours
300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	None		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

DSP is an integral part of electronics systems design. Ranging from medical systems to mobile technology, DSP algorithms are in implemented in a variety of ways. This module will build on your prior knowledge of the subject and provide a solid working foundation to perform future design and development. In order to enhance your understanding of the subject, you will be expected to work through a set of programming exercises (using both C and assembly language) and implement the programs on suitable evaluation modules (EVMs) hosting a commercial DSP device. ARM Technology, which is based in Cambridge, is a major player in the design of microelectronics components. A strong working knowledge of your products, design tools and development programme strategies, forms a fitting component in the education of every electronics engineer at Master's level. You will work through a set of exercises using ARM development tools.

6b. Outline Content

- Use of Matlab for algorithm analysis
- LabView and its application in the processing of Digital Signal
- Algorithms
- Fixed Gain filters
- Adaptive filters
- Spectral Analysis
- Programming DSPs
- Design for Real-time applications
- Using Matlab in DSP
- ARM Processors
- Cortex Processors
- AMBA
- CoreLink Controllers
- CoreSight on-chip trace
- ARM Software and development tools
- Development boards
- Mali Graphics Processors

6c. Key Texts/Literature
The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources
Laboratories to perform DSP and ARM Technology design and development.

7. Learning Outcomes (threshold standards)

No.	Type	On successful completion of this module the student will be expected to be able to:
1	Knowledge and Understanding	Use critical analysis in the design of fixed gain and variable gain(adaptive) digital filters.
2	Knowledge and Understanding	Apply appropriate theoretical and practical methods to the design, analysis, and solution of advanced DSP problems.
3	Knowledge and Understanding	Formulate and analyse complex DSP problems using mathematics and engineering principles to reach substantiated conclusions. Make engineering judgements for uncertain or incomplete information and discuss the limitations of the techniques employed.
4	Intellectual, practical, affective and transferrable skills	Select and apply appropriate numerical and analytical methods to model complex problems in digital signal processing, discuss scope and limitations of the methods.
5	Intellectual, practical, affective and transferrable skills	Use practical Design and implement a range of digital functions using ARM development tools and design Voice Vocoders; Function effectively as an individual or member of at team; Evaluate the effectiveness of your own and the team performance.
6	Intellectual, practical, affective and transferrable skills	Perform timing analysis on Cortex and ARM processors when performing DSP operations.

8a. Module Occurrence to which this MDF Refers

Year	Occurrence	Period	Location	Mode of Delivery
2024/5	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	36	1-6	Practical lab/seminar work 3 hr x 12 weeks
Other teacher managed learning	36	1-6	Practical lab/seminar work 3 hr x 12 weeks
Student managed learning	228	1-6	8 hr x 12 weeks = 96 hours spent working on Laboratory exercises; remaining time to be spent on library textbook/journal research and individual study.
TOTAL:	300		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Examination Chelmsford	3 6	40 (%)	Fine Grade	40 (%)
Written examination: 2 hours, maps to Engineering Council Learning Outcome M2					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Coursework	1 2 4 5	60 (%)	Fine Grade	40 (%)
Maximum 3000 words report, maps to Engineering Council Learning Outcomes M3, M16					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]