

Module Specification

Module Summary Information

1	Module Title	Digital Filters and Spectral Analysis
2	Module Credits	20
3	Module Level	6
4	Module Code	ENG6066

5	Module Overview
<p>Digital filters have numerous advantages compared to analogue filters. These filters are implemented using hardware and firmware compared to analogue filters which are implemented solely on hardware.</p> <p>Successful completion of this module will allow you to be able to analyse the magnitude and phase responses of filters. Whilst this module is rich in analytical techniques and concepts, it will be contextualised at all times for practical hardware examples.</p>	

6	Indicative Content
<p>Digital signal processing and basics concepts Digital signal processing systems. Digital signal representation. Signal sampling and reconstruction theory, quantisation error and noise, encoding.</p> <p>Linear and discrete linear system Analysis of discrete-time signals and discrete-time linear time-invariant systems. Convolution and discrete convolution process and properties.</p> <p>Spectrum Analysis of digital signal Frequency analysis of discrete-time aperiodic and periodic signals. Discrete Fourier Transform, Fast Fourier Transform. Correlation, auto-correlation and cross-correlation. Power Spectrum Density.</p> <p>Digital filter design and implementation Structure and classification of digital filters. FIR and IIR filter design techniques. Pole – Zero design. Z-Transforms and inverse Z-transforms, difference equations.</p>	

7	Module Learning Outcomes
On successful completion of the module, students will be able to:	
1	Determine and compute the solution for linear difference equations.
2	Compute, compare and relate FIR and IIR impulse responses for digital filter design.
3	Interpret the response of signals for both time and spectral analysis.
4	Apply analytical techniques to transform discrete time domain signals into their signal spectra and vice versa.

8	Module Assessment		
Learning Outcome			
	Coursework	Exam	In-Person
1-4	30%	70%	

9	Breakdown Learning and Teaching Activities	
Learning Activities	Hours	
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	48	
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	0	
Private Study (PS) includes preparation for exams	152	
Total Study Hours:	200	