

Northumbria University Programme Framework for Northumbria Awards - Module Specification

Faculty	Engineering and Environment	Department	BEng (Hons) Mechanical Engineering (Manufacturing Systems and Design), SeoulTech	Subject		Module Tutor	Kwanlae KIM			
Module Title	Signals and Systems (MSDE 312)					Module Code	MSDE 312			
Module Type* <small>(see key below)</small>	STAN									
Module size credits	Level 3:		Level 4:		Level 5:	10	Level 6:		Level 7:	
Home programme/s for which the module is designed			BEng (Hons) Mechanical Engineering (Manufacturing Systems and Design), SeoulTech				Code/s			
Additional Programme/s other than that/those for which the module for specifically designed							Code/s			
Delivery Pattern (Please tick)		Semester based <i>(please specify)</i>	Sem 1 <input checked="" type="checkbox"/> Sem 2 <input type="checkbox"/>		Year Long		<input type="checkbox"/>	Full-time Part-time Distance Learning		<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Location(s) of delivery: If delivered at EPWO partners please give partner name and location							SeoulTech, Korea (ROK)			

***KEY:**

APL Accreditation for prior learning	P/F Pass/fail module	PLIN Placement - Industrial
CORE PNVQ core skills module	P/F_DS Pass/fail dissertation module	PRAC Practical
DISS Dissertation	P/F_PJ Pass/fail project module	PROJ Project
FLDW Fieldwork	P/F_PL Pass/fail placement module	STAN Standard module
INDS Independent study	PLAY Placement – academic study abroad FT	WKBS Work base study
MAFOUN MA foundation modules - ASS	PLCL Placement – Clinical	WORK Workshop

Module Overview (Max 250 words per section) (This section is aimed at providing a prospective or current student with a brief overview of the module in answer to the specific questions and will form an element of the module handbook)

What will I learn on this module? (SRS 0001) Please give a brief indication of the content of the module including the main topic / subject areas studied	
You will learn the fundamental concepts and principles related to signals and systems in the context of electrical engineering and related fields. Specifically, you will gain an understanding of how signals are represented, analyzed, and processed, and how systems interact with these signals. Key topics may include time-domain and frequency-domain analysis, convolution, Fourier analysis, Laplace transforms, and their application in the analysis and design of electrical and electronic systems.	
How will I learn on this module? (SRS 0002) Please provide a brief overview the learning and teaching approaches the student can expect to experience.	
You will engage in a variety of learning activities to grasp the concepts of signals and systems effectively. Regular lectures will provide theoretical foundations and explanations of key concepts. Self-directed learning will be encouraged through reading materials, and assignments.	
How will I be supported academically on this module? (SRS 0003) Please provide a brief overview of the academic support available to students, including any support that may be accessed outside formal scheduled teaching.	
Academic support will be readily available to assist your learning journey on the "Signals and Systems" module. The module team will provide feedback to address student queries and offer guidance on assessments and academic progress. The e-class will serve as a comprehensive resource, offering learning materials, reading lists, and self-directed learning opportunities.	
What will I be expected to read on this module? (SRS 0004) All modules at Northumbria include a range of reading materials that students are expected to engage with. The reading list for this module can be found at: http://readinglists.northumbria.ac.uk <ul style="list-style-type: none"> - "Signals and Systems" by Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab - This classic textbook provides a strong foundation in signals and systems theory and practical applications. - "Signals and Systems" by A. Anand Kumar - A comprehensive textbook with clear explanations and a variety of examples and exercises. - "Continuous and Discrete Signals and Systems" by Samir S. Soliman and Mandyam D. Srinath - Covers both continuous and discrete-time signals and systems, offering a practical perspective. - "Introduction to Signals and Systems" by John Stuller - This book provides an accessible introduction to the topic, with a focus on real-world applications. 	
(Reading List service online guide for academic staff, this contains contact details for the Reading List team – http://library.northumbria.ac.uk/readinglists)	
Northumbria University Library Reading List Service (please confirm the following)	Please give date added
A draft reading list has been created and on the university Library Reading List Service	Click here to enter a date.
Reading material has been acquired and digitised (following approval)	Click here to enter a date.
Reading list has been published to students (for module delivery)	Click here to enter a date.

NB – for PFNA alignment process only, module authors should complete either the University Library e-Reading List, or Appendix 1.

Module Learning Outcomes (MLOs) (Max of five in total*, for standard 20-credit modules)
**this can increase to a maximum of 10, for modules with more than 20 credits*

<p><u>What will I be expected to achieve?</u> (SRS 0005)</p> <ul style="list-style-type: none"> • C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study. • C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles. • C3: Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed. 	<p><u>How will I be assessed?</u> (SRS 0006) <i>Please give details of all formative and summative assessment process indicating which MLOs will be addressed and how feedback will be provided.</i></p> <p>Formative Assessment Academic staff on the module will assess you in a formative manner to help build your confidence and highlight any misunderstandings you may have of the theoretical and professional concepts presented in the module. Your formative feedback will be given to you either verbally by academic staff on the module during formally scheduled teaching sessions. Your formative feedback aims to help you learn and prepare for the submission of your summative assessment.</p> <p>Summative Assessment Academic staff on the module will assess you in a summative manner by two pieces of assessment:</p> <p>Component 1, one written examination, assesses your knowledge and understanding of signals and systems including analyses of complex problems and application of an integrated or system approach (C1,C2,C3).</p> <p>Component 2, assignments, serves as a means to assess your proficiency in the selection and application of suitable mathematical models when tackling complex issues related to signal processing.</p>	<p><u>Programme (Level) Learning Outcomes that this module contributes to:</u> <i>[Please insert PLO number as listed on the programme specification]</i></p> <p>Knowledge & Understanding:</p> <ul style="list-style-type: none"> • KU1: Evaluate and apply complex knowledge of the scientific and mathematical principles of engineering to solve Real-World problems. • KU2: Perform comprehensive analysis of engineering systems. • KU3: Identify and utilise advanced methodologies to create solutions to a variety of engineering problems. <p>Intellectual / Professional skills & abilities:</p> <ul style="list-style-type: none"> • IPSA1: Apply advanced approaches to solving unfamiliar real world engineering problems. • IPSA4: Ability to create innovative, sustainable critically evaluated solutions to complex engineering problems. <p>Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):</p> <ul style="list-style-type: none"> • PVA2: Critically analyse advanced solutions to complex engineering problems.
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Pre-requisite(s) (SRS 0007) Any module which must already have been taken, or any stipulated level of prior knowledge required in order to study this module, (co-requisite core models need not be listed)	MSDE 213 (Engineering Mathematics I) MSDE 214 (Engineering Mathematics II) MSDE 240 (Electronic Circuits)
Co-requisite(s) (SRS 0008) Modules at this level which must be taken with this module	

Module abstract (SRS 0009)

<p>Please provide a brief a brief abstract of the module (150 words max). This section acts as the ‘shop window’ for the module, therefore it needs to engage and inspire the student. This is the first thing that the student will read about this module, so it must immediately grab their attention. The main aim is to encourage the student to read on, however the summary should be written in such a way that if the student reads nothing else this section will convey all key messages and benefits that the module will offer. Start by explaining the module title where necessary. Then highlight any selling points relating to the four pillars: Research-Rich Learning; Technology Enhanced Learning; Assessment and Feedback; Employability and Entrepreneurship. Examples may include student satisfaction rates, learning environment, state-of-the-art facilities etc. Finally indicate benefits of the module such as the key skills that the students will gain for future employment and career paths that are open to them.</p>
<p>Signals transmit data, while systems alter signals. This course presents mathematical models for the purpose of designing and comprehending both signals and systems. It is tailored for students who seek to develop a profound grasp of digitally generating and manipulating signals to measure, control the physical environment, and improve human interaction and communication. Evaluation of the module is conducted through a combination of a final examination and assignments, which are strategically aligned with the course content.</p>

Programme Framework for Northumbria Awards Research Rich Learning Design Pillar (SRS 0090)

<p>Embedding Research Rich Learning into the curriculum: Indicate how students will be actively engaged in research rich learning in this module through: research/enquiry based learning, research tutored learning, research led learning and/or research oriented learning, providing a brief overview of how this / these will feature within the delivery of the module (250 words max)</p> <p>Note:</p> <ul style="list-style-type: none"> • Research/enquiry Based: L&T_Based on student-centred enquiry and research activities (conducting research). • Research Tutored: L&T Emphasises learning focused on students actively discussing research, and critically engaging with research outputs • Research Led: T&L structured around subject content and that content is based on the research (learning about research) • Research Orientated: T&L Emphasises understanding of the knowledge production process, and methods of enquiry in the subject (learning how to research)
<p>Build on prior academic experiences to apply critical analysis and methodologies in solving complex signals and systems problems. Foster independent research, exploration, and innovative problem-solving. Engage with and evaluate research in the field, emphasizing its impact on industry practices within signals and systems.</p>

Notional Student Workload (NSW) for each mode of delivery

<i>Complete for each delivery mode where the distribution of NSW</i> Full Time Mode of Delivery	Part Time Mode of Delivery
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Activity type	Hours	KIS category	KIS category hours		Hours	KIS category	KIS category hours
Lecture	40	Scheduled	60	Lecture		Scheduled	
Seminar				Seminar			
Tutorial	20			Tutorial			
Project Supervision				Project Supervision			
Demonstration				Demonstration			
Practical classes and workshops				Practical classes and workshops			
Supervised time in studio/ workshop				Supervised time in studio/ workshop			
Fieldwork				Fieldwork			
External visits				External visits			
Tutor guided independent learning	10	Independent	40	Tutor guided independent learning		Independent	
Student independent learning	30			Student independent learning			
Placement		Placement	0	Placement		Placement	
Study abroad				Study abroad			
Work based learning				Work based learning			
Total workload <i>200 hours for 20 credit module</i>	<i>100</i>		<i>100</i>	Total workload			

Summative Assessment

Sequence 001, 002 etc.	Activity type <i>indicate ONE of the following types:</i>	Brief description of assessment (max.120 characters) <i>e.g. type/ length of exam, type/ word limit of coursework</i>	Weighting % or Pass/Fail (for grade only components) <i>Note: % weightings should add up to 100% for module overall</i>	Final assessment		Anonymous submission		ESAF submission	
				Yes	No	Yes	No	Yes	No
001	EXAM (Written examination)	Final Exam (120 min)	70%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
002	CW (Coursework)	Assignment (problem solving)	30%	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
003	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
004	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
005	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
006	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
007	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
008	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
009	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
010	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
011	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
012	Choose an item.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reassessment (specify either synoptic or non-synoptic)

Synoptic reassessment <i>One form of reassessment that tests all module learning outcomes</i>	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Non-synoptic reassessment <i>Where module referred overall, individual failed components of assessment are reassessed</i>	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>

FOR OFFICE USE ONLY

Date of FPARSC Approval

Date of entry onto SITS	Click here to enter a date.
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<u>LOG OF CHANGES POST-APPROVAL</u>
Please indicate any changes to the approved module descriptor from 2012/13 onwards

Section No.	Brief description of change	Date of Approval	Semester and year of first implementation
		Click here to enter a date.	
		Click here to enter a date.	
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Appendix 1

Indicative Reading for PFNA alignment approval only *(to be completed only if e-reading list unavailable at point of alignment approval)*

N.B. This outline indicative reading list will be utilised for approval purposes only, and **a full e-reading list must be produced and available by the June of the academic year prior to the first delivery date of the module** (at which point the section of p.2 referring to University Library Reading Lists should be completed).

Please list below essential key text underpinning the module content and ultimately the learning outcomes:

- 1) "Signals and Systems" by Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab
- 2) "Signals and Systems" by A. Anand Kumar
- 3) "Continuous and Discrete Signals and Systems" by Samir S. Soliman and Mandyam D. Srinath
- 4) "Introduction to Signals and Systems" by John Stuller