Northumbria University NEWCASTLE

Northumbria University Programme Framework for Northumbria Awards - Module Specification

Faculty	Engineering and Environment	**Department**		BEng (Hons) Mechanical Engineering (Manufacturing Systems and Design)	**Subject**			**Module Tutor**	Hyo-Sok AHN		
Module Title	Fluid Mechanics							**Module Code**	MSDE 319		
Module Type* *(see key below)*	**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)				**Code/s**			
Additional Programme/s other than that/those for which the module for specifically designed								**Code/s**			
Delivery Pattern (Please tick)		**Semester based** *(please specify)*		Sem 1 ☒ Sem 2 ☐	**Year Long**		☐	**Full-time** **Part-time** **Distance Learning**		☒ ☐ ☐	
Location(s) of delivery: If delivered at EPWO partners please give partner name and location							Mugung Hall (Seoultech)				

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*

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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
This module aims to provide the student with knowledge and understanding about relations of viscosity, velocity, density, pressure, force and momentum, and the basic concepts of static and dynamic behaviour of fluid flow. Students then learn basic equations such as Bernoulli, continuity, momentum, and energy equations and their applications. Students learn internal viscous flows and friction losses in a piping system.
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.
This module will be delivered by regular lectures. During the lectures, students will gain the essential knowledge necessary for solving problems related to fluid mechanics and will have opportunities to apply their learnings to practical problems, gaining insight into how to apply their learning in real-world scenarios.
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.
During your active learning sessions, you'll have access to academic support to assist you in engaging with problem-solving activities. The module team will offer formative feedback, which includes addressing student inquiries and offering guidance on module-related matters like assessments and your academic progress. Lecture materials will be distributed in advance, allowing students the opportunity to prepare for class ahead of time. We encourage you to communicate with academic tutors and your peers outside of formal teaching hours through designated 'office hours,' discussion boards, and email. Our professional support staff will serve as your initial point of contact for a wide range of questions, including issues related to assessment submission, late submissions/extensions, and other administrative matters.
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 (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*

What will I be expected to achieve? (SRS 0005)	**How will I be assessed?** (SRS 0006) *Please give details of all formative and summative assessment process indicating which MLOs will be addressed and how feedback will be provided.*	**Programme (Level) Learning Outcomes that this module contributes to:** *[Please insert PLO number as listed on the programme specification]*
• 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. • C16: Function effectively as an individual, and as a member or leader of a team.	**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. **Summative Assessment** Academic staff on the module will assess you in a summative manner by the following assessment(s): Component 1, written examination (midterm and final exams), is to assess your ability to model physical phenomena in mathematical terms and solve developed equations (C1 and C2). Component 2, Group project (with presentation), is to assess your ability to analyse physical phenomena and present your analysis (C1, C2, and C16).	**Knowledge & Understanding:** • KU1. Demonstrate basic knowledge of the scientific and mathematical foundations of engineering to solve basic problems. • KU2. Perform simple analysis of familiar engineering systems. • KU3. Identify and utilise basic methodologies to create solutions to specific engineering problems. **Intellectual / Professional skills & abilities:** • IPSA1. Demonstrate the use of fundamental approaches to solving readily defined engineering problems. • IPSA4. Illustrate solutions to basic engineering problems. **Personal Values Attributes** (Global / Cultural awareness, Ethics, Curiosity) (PVA): • PVA2. Demonstrate creativity in discussing solutions to standard problems.

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	N/A
Co-requisite(s) (SRS 0008) Modules at this level which must be taken with this module	N/A

Module abstract (SRS 0009)

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.
This module aims to provide the student with knowledge and understanding about relations of viscosity, velocity, density, pressure, force and momentum, and the basic concepts of static and dynamic behaviour of fluid flow. Students then learn basic equations such as Bernoulli, continuity, momentum, and energy equations and their applications. Students learn internal viscous flows and friction losses in a piping system. The learning outcomes include abilities of identifying the problem and relevant parameters, applying appropriate equations to the problem, and planning and conducting the given project subject to technical, time, and commercial constraints. Assessment is through mid-term and final examinations and a group based term project related to a refinery piping system design.

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

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) **Note:** • **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)
Students will actively engage in research/enquiry-based learning by exploring real-world engineering problems related to fluid mechanics. Through hands-on projects, case studies, and problem-solving activities, students will develop a deep appreciation for the practical relevance of mathematical principles. This approach empowers students to ask questions, gather data, and use mathematical techniques to derive solutions, fostering critical thinking and problem-solving skills.

Notional Student Workload (NSW) for each mode of delivery

Complete for each delivery mode where the distribution of NSW **Full Time Mode of Delivery**				**Part Time Mode of Delivery**			
Activity type	**Hours**	KIS category	KIS category hours		**Hours**	KIS category	KIS category hours
Lecture	50	Scheduled	50	Lecture		Scheduled	
Seminar				Seminar			
Tutorial				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		Independent	50	Tutor guided independent learning		Independent	
Student independent learning	50			Student independent learning			
Placement		Placement		Placement		Placement	
Study abroad				Study abroad			
Work based learning				Work based learning			
Total workload *200 hours for 20 credit module*	*100*		*100*	**Total workload**			

Summative Assessment

Sequence *001, 002 etc.*	**Activity type** *indicate **ONE** of the following types:*	**Brief description of assessment (max.120 characters)** *e.g. type/ length of exam, type/ word limit of coursework*	**Weighting** % or Pass/Fail (for grade only components) *Note: % weightings should add up to 100% for module overall*	**Final assessment**		**Anonymous submission**		**ESAF submission**	
				Yes	*No*	*Yes*	*No*	*Yes*	*No*
001	PRE (Presentation)	- Group project: 30%	30%	☒	☐	☐	☒	☐	☒
002	EXAM (Written examination)	- Midterm: 20% - Final: 50%	70%	☒	☐	☐	☒	☐	☒

Reassessment (specify either synoptic or non-synoptic)

Synoptic reassessment *One form of reassessment that tests all module learning outcomes*	Yes	☒	No	☐
Non-synoptic reassessment *Where module referred overall, individual failed components of assessment are reassessed*	Yes	☐	No	☒

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Date of FPARSC Approval	Click here to enter a date.

Date of entry onto SITS	Click here to enter a date.

LOG OF CHANGES POST-APPROVAL

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.	
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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) Bruce R. Munson - Fundamentals of Fluid Mechanics
2) Frank M. White - Fluid Mechanics