Liverpool John Moores University

Title:	PHYSICAL EFFECTS MODELING
Status:	Definitive
Code:	**7514RSKDL** (118773)
Version Start Date:	01-08-2019
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Zaili Yang	Y

Academic Level:	FHEQ7	**Credit Value:**	10	**Total Delivered Hours:**	16.5
Total Learning Hours:	100	**Private Study:**	83.5		

Delivery Options
Course typically offered: Runs Twice - S1 & S2

Component	Contact Hours
Lecture	8
Online	.5
Tutorial	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	Essay		75	
Technology	Tech		20	
Reflection	Test& refl		5	

Aims

To enable students to categorise the range of hazardous physical effects that can occur in a given situation, assess the impact of the different physical effects, and discuss the uses and limitations of physical effect modelling.

Learning Outcomes

After completing the module the student should be able to:

1	Analyse an industrial plant/installation and devise scenarios covering the range of expected physical effects.
2	Evaluate how these physical effects affect people and plant.
3	Justify which of the available modelling techniques is appropriate to analyse physical effects in different circumstances.
4	Critically review the range of commercial physical effects modelling software and available specialist consultancy services.
5	Demonstrate expertise in physical effects modelling using simple hand calculation methods and/or publicly available software models, whilst understanding the limitations of these techniques.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Essay	1	2	4
Technological Task	5		
Online test and reflection	3		

Outline Syllabus

Outline Syllabus:

 Introduction to physical effects modelling – what are physical effects and why model them?

 Overview of human vulnerability to physical effects:

o Toxic, thermal radiation, smoke and overpressure.

 Release and discharge calculation: Steady state, time varying, accounting for depressurization.

 Dispersion analysis: Gaussian, jet, dense gas, unified modelling.

 Fires: Jet fires, pool fires; flash fires, BLEVEs, compartment fires.

 Explosions: Confined, unconfined (congested) on and offshore, detonations.

Types of models – empirical / phenomenological; computational fluid dynamics.

 Detail of human and plant vulnerability: Single value levels for thermal radiation and toxics (SLOT, SLOD, EPRG, etc.); Probit functions for thermal radiation, common toxic materials and explosions; Smoke effects, carbon monoxide and dioxide, oxygen depletion. Vulnerability of plant to fires and explosions.

 Common mitigation measures and accounting for them in analyses.

 Commercial and public domain software tools available to the analyst.

 Drawing conclusions from physical effects modelling.

Learning Activities

A combination of slides and notes, exercises, discussions, interactive web activities and supported self study.

Notes

The aim of this module is to enable students to understand the range of hazardous physical effects that can occur, an overview of human and equipment vulnerability to physical effects, and the uses and limitations of physical effect modelling. This includes an introduction to physical effects modelling and the opportunity for some hands-on practice of physical effects calculations.
The assessment for this module is a combination of a technological task, an essay and online activities (e.g. tests, discussions, etc.).