

## Liverpool John Moores University

Title: Availability, Reliability, Maintainability (ARM) Analysis  
Status: Definitive  
Code: **7538RSKDL** (118806)  
Version Start Date: 01-08-2019

Owning School/Faculty: Maritime and Mechanical Engineering  
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Alan Wall	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		95	
Reflection	Test&refl		5	

### Aims

*To demonstrate expertise in Availability, Reliability and Maintainability (ARM) assessment methods and how to apply them to improve maintenance management, maintainability and reliability.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Apply the analysis methodologies to systems and sub-systems including both design and operation restrictions to determine the Availability, Reliability and Maintainability of these Systems
- 2 Critically review and balance the requirements of the design for ARM and safety
- 3 Logically deduce how ARM results for a system may be improved
- 4 Categorise and determine ARM requirements / processes for a project

## Learning Outcomes of Assessments

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

Essay	1	2
Online test and Reflection	3	4

## Outline Syllabus

*Introduction to Availability, Reliability and Maintainability:*

\* *Definition of Terms*

\* *Importance of ARM*

\* *Defining the Mission*

\* *ARM Targets and Target Apportionment*

*Availability and Safety – Potential Conflicts*

\* *Differences Between Safety and ARM*

\* *Claims on Repair*

*ARM Planning and Choice of Methodology*

\* *ARM Planning*

\* *Interpreting ARM Targets*

\* *Incorporating ARM Into the Design*

\* *Choice of Methodology*

\* *Dealing with ARM Shortfalls*

*ARM Assessment Methods – Deterministic*

\* *FMECAs*

\* *Categorising Component Failures*

\* *Limitations of FMECA*

\* *Functional Block Diagrams*

*Numerical ARM Assessment Techniques*

\* *Parts Counts*

\* *Fault Tree Analysis*

\* *Reliability Block Diagrams*

*Critical and Life Limited Items*

\* *Critical Items – Novel, Expensive, Difficult to Repair*

\* *Limited Life Items*

*Maintainability and Maintainability Demonstrations*

\* *Incorporation of Maintenance into Design*

*Reliability Centred Maintenance (RCM)*

\* *Definitions of RCM*

*\* Processes, Requirements and Limitations  
Methods of Improving Reliability*

## **Learning Activities**

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

## **Notes**

The module aims to enable students to apply the appropriate ARM methodologies to a project to ensure that ARM is included within the design and that the ARM targets are met by the correct application of ARM assessment methodologies.

The module also illustrates how ARM activities should be planned, and targets set. It also discusses the concept of critical and life limited items and the use of reliability centred maintenance strategies to reduce maintenance costs.

Finally the module considers the trade-offs between ARM and safety requirements, as well as discussing how ARM shortfalls may be addressed.

Assessment is in the form of an essay based on a case study combined with online activities (e.g. tests, discussions, etc.).