WM9PJ-15 Design for Excellence

24/25

Department
WMG
Level
Taught Postgraduate Level
Module leader
Jane Marshall
Credit value
15
Module duration
4 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module will enable participants to understand how organizations develop, manage and plan design processes to support policy and strategy and fully satisfy, and generate increasing value for customers and other stakeholders. It considers all aspects of design for excellence (Design for X) including topics such as reliability, design for manufacture and assembly , design for sustainability etc. it also brings in concepts of design for six sigma methodology as an approach to design for excellence. In particular it focuses on the management and reduction of risk as well as capturing customer requirements. It also considers all the factors affecting excellence in design. This module supports and aligns with the execution stage of the EFQM framework.

[Module web page](#)

Module aims

The aims of the module are:

- to introduce concepts of design for excellence and design thinking
- to introduce students to Design for Six Sigma (DFSS) and its methodology - Define, Measure, Analyse, Design and Verify and associated tools and for students to examine DFSS in the context of product excellence;

- to highlight the importance of capturing customer requirements to design excellent products and to provide students the opportunity to learn and critique tools such that aid translation of Voice of the Customer (VOC) to design requirements such as Quality Function Deployment;
- to introduce the concepts of eliciting expert judgement of engineering concerns and developing project risk registers and highlight how identification of Technical and business risk is paramount in product design;
- to provide students with the opportunity to apply and critique the use of analytical tools used in Design for X such as Failure Modes Effects Analysis, Fault Tree Analysis, safety analysis methods and Life time data analysis.
- to identify how technological solutions can be implemented to aid design for excellence, for example using virtual reality and simulation methods as well monitoring techniques in design for excellence.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

- Introduction to design for excellence
- introduce concepts and practice around design thinking
- Comparison of DFSS and LSS (via in-module work)
- Application of Design for reliability tools - FMEA, FTA, RBD
- Application of Safety tools HAZOP
- Reliability Testing and alternative approaches
- Life date analysis methods – Exponential and Weibull distribution fitting
- Reliability prediction
- Application of QFD
- Risk management

Learning outcomes

By the end of the module, students should be able to:

- Critique design for excellence approaches such as Design for Six Sigma (DFSS) to enhance product excellence
- Evaluate, select and demonstrate the use of data analysis to enhance product development
- Critically evaluate the use of analytical tools in approaches to enhance product development
- Achieve a detailed, conceptual understanding of how and why customer requirements are captured to support design for excellence

Indicative reading list

Design for X: Concurrent Engineering Imperatives. G Q Huang, 2012, Chapman and Hall
Design for Excellence in Electronics Manufacturing, Tulkoff and Caswell , 2021, Wiley
Engineering Systems reliability, Safety and Maintenance - An Integrated Approach, B S Dhillon, 2017

Design for Manufacturability: how to use concurrent engineering to rapidly develop low-cost high quality products for lean production. D M Anderson, 2020 Routledge
Product Lifecyle Management J Stark, 2022 Springer
Design high availability systems: design for six sigma and classical reliability techniques with practical real-life examples, Z Taylor and R Subramanya. 2014 Wiley
Design for Six Sigma: a prioduct approach through innovation, E Cudney and T Augustiady, 2017, Taylor and Francis
DFSS a roadmap for product development, Yang and El_Haik, 2003, Mc Graw-Hill

Subject specific skills

- knowledge of design for excellence concepts
- practical application of design thinking concepts
  Comprehensive knowledge and understanding of DFSS, it's methodology, tools and when to use it;
- Understand the power of QFD in capturing customer requirements and in context of DFSS and learn how to complete house of quality;
- Experience of doing Weibull analysis;
- Experience of applying key tools such as FTA and FMEA;
- Knowledge and practice of design for safety tools.

Transferable skills

Verbal and written communication, oral presentation, teamwork, reflective practice, adaptability, leadership, terminology literacy, research skills, analytical skills.

Study

Study time

Type	Required
Lectures	6 sessions of 1 hour (4%)
Practical classes	24 sessions of 1 hour (16%)
Online learning (scheduled sessions)	(0%)
Online learning (independent)	60 sessions of 1 hour (41%)
Assessment	58 hours (39%)
Total	148 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Specific questions assessing knowledge of concepts and techniques	70%	40 hours	Yes (extension)
PMA question to demonstrate knowledge of module content and meet learning outcomes including reflection on learning within context of business excellence.			
Reassessment component is the same			
Assessment component			
Review of Design for Six Sigma in design for excellence	20%	12 hours	Yes (extension)
Students are allocated to groups and given a topic to research which they present in-class. From the in-class discussion, the student will write an individual review of DFSS.			
Reassessment component is the same			
Assessment component			
Lifetime data analysis	10%	6 hours	Yes (extension)
data set given to be analysed by using lifetime distributions . Students will analyse the data, discuss the method and assumptions and provide recommendations on how to use the results from the analyses within the context of the question.			

	Weighting	Study time	Eligible for self-certification

Reassessment component is the same

Feedback on assessment

written feedback will be provided.

Availability

There is currently no information about the courses for which this module is core or optional.