WM9H2-15 Smart Networked Manufacturing

22/23

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

Description

Introductory description

This module investigates the relationship between intelligent technologies and the manufacturing system, and how these affect the performance of new business models for how products are made. Students will be encouraged to consider factors beyond the purely technical in areas such as business policy, information security and social impact. They will be encouraged to investigate the critical role that computer-based models have on both the design and operation of such systems and will build and use simulation models to explore this with practical work.

Module aims

To distinguish between the roles and responsibilities of manufacturing system engineers in conventional manufacturing and those in cyber-manufacturing. To provide a vision of the future evolution of manufacturing systems that are based on cyber-technologies and how these refocus the work of a manufacturing systems engineer to deliver effective cyber-manufacturing solutions.

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.

Cyber-physical manufacturing systems;
Industry 4.0 concept;
Machine Intelligence;
Simulation and Analysis of Manufacturing Systems;
Information exchange and standardisation;
Cyber threats;
Collaborative manufacturing;
Human and social factors

Learning outcomes

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

- Distinguish between different levels of intelligent behaviour in Industry 4.0 and more general forms of cyber-manufacturing
- Evaluate the threats and potential impact of cyber-intrusions on cyber-manufacturing
- Evaluate the needs for behavioural models to support the design and maintenance of cyber-manufacturing networks
- Critically evaluate the role and effectiveness of information and communication standards in the domain of cyber-manufacturing
- Discuss the societal implications of cyber-manufacturing and its influence on organisational behaviour

Indicative reading list

Automation, production systems, and computer-integrated manufacturing / Mikell P. Groover, Pearson, 2019;
Foundations & principles of distributed manufacturing : elements of manufacturing networks, cyber-physical production systems and smart automation / Hermann Kühnle, Günter Bitsch, Springer, 2015;
Industrial internet of things : cybermanufacturing systems / Sabina Jaschke, Christian Brecher, Houbing Song, Danda B. Rawat, editors, Springer 2017;
Digital twin driven smart manufacturing / Fei Tao, Meng Zhang, A.Y.C. Nee Tao, Fei, Academic Press 2019

Subject specific skills

Ability to construct manufacturing models to simulate the behaviour of system designs;
statistical skills to analyse the output data from a stochastic model;
recognise and select appropriate devices to enable smart manufacturing capability.

Transferable skills

Apply a systems approach to tackling complex problems involving advanced technologies;

Gain a working knowledge and basic competence in using advanced technical information systems;
Continue to advance their knowledge and understanding, and to develop new skills to a high level;
the independent learning ability required for continuing professional development.

Study

Study time

Type	Required
Lectures	12 sessions of 1 hour (8%)
Seminars	3 sessions of 1 hour (2%)
Demonstrations	4 sessions of 1 hour (3%)
Practical classes	6 sessions of 1 hour 30 minutes (6%)
Supervised practical classes	8 sessions of 1 hour 30 minutes (8%)
Online learning (independent)	20 sessions of 30 minutes (7%)
Assessment	100 hours (67%)
Total	150 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

Assessment component	Weighting	Study time	Eligible for self-certification
Model-based comparison of conventional and cyber-manufacturing.	10%	10 hours	No

	Weighting	Study time	Eligible for self-certification

Use the modelling tools provided to develop a working simulation model for a given manufacturing problem and present your solution to the class.

Reassessment component

Model-based comparison of conventional and cyber-manufacturing.			Yes (extension)

Based on the literature, make an argument for postponing the adoption of a smart factory.

Assessment component

	Weighting	Study time	Eligible
Evaluation of a cyber-enabled manufacturing system	10%	10 hours	Yes (extension)

Using appropriate methods, identify the potential weaknesses of a cyber-manufacturing proposal and offer counter-measures to these, presenting this in a report or presentation to be submitted before the end of the module delivery. Assessment criteria will be provided for guidance.

Reassessment component is the same

Assessment component

	Weighting	Study time	Eligible
A Critical Assessment of the Implementation of Intelligent Technologies in Manufacturing Systems	80%	80 hours	Yes (extension)

Taking a broad view that covers the module content and meets learning outcomes 3, 4 and 5, assess the integration of intelligent technologies in manufacturing systems for the situation specified.

Reassessment component is the same

Feedback on assessment

For the in-module group presentation there will be verbal feedback at the time and a check-list. For the individual written report on work done during the module there will be short written feedback and a check list that indicates the level of achievement.
There will be written feedback for the post module essay.

Availability

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