WM9G5-15 Manufacturing Systems and Process Selection

27/28

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

Description

Introductory description

This module provides the theoretical grounding in manufacturing systems and the current practices associated with manufacturing process selection. It focuses on matching processes to product requirements across varying production volumes and operational contexts. Digital decision -support tools will be used for material and process selection to manage the complex competing requirements. Students will examine classical and data-driven selection models and consider the role of digital manufacturing systems in supporting such decision making.
When this module is delivered on any overseas programme, dual degree programme, it is delivered in a 2-week block rather than over 4 weeks.

Module aims

The aim of this module is to develop students' capability to critically evaluate the manufacturing systems and select processes by balancing time constraints, component quality, financial cost, product volume and environmental impact using analytical and data-driven approaches. The module prepares learners to engage with engineering professionals and managers, articulating and justifying process-selection decisions to evaluate the impact of process choices on

manufacturing effectiveness using quantitative evidence.

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.

Foundations of conventional manufacturing systems practices;
Process Planning: The Design to Manufacturing interface;
Manufacturing processes and their selection;
Process selection using Granta EduPack;
Advanced and Specialised Processing Techniques for Metal, Polymeric, Ceramic and Composite Materials
Technology Showcases: additive manufacturing, advanced composites, laser processing, ultrasonic machining;
Expert Systems Support for Process Selection ;
Introduction to digital-manufacturing.

Learning outcomes

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

- Critically analyse the conventional and digital manufacturing systems theories to inform evidence-based process selection decisions in complex industrial contexts.
- Apply structured process-selection methodologies using digital tools to justify materials and process choices under defined design and performance.
- Substantiate competing arguments for matching product requirements to new and existing materials and processes
- Critically assess the system-level implications of process choices for value based on time, cost, quality, volume, sustainability and environmental impact.
- Critically contrast the current and novel manufacturing routes for metals, polymers, ceramics, and composite materials.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

Analyse and describe different manufacturing systems. Use Granta EduPack to support material and process selection. Select suitable manufacturing processes for a given product, material and volume. Map and justify process chains for metals, polymers, ceramics and composites. Be able to classify manufacturing process maturity by Technology Readiness Level (TRL). Ability to address the real-world complex manufacturing problems.

Transferable skills

Self-direction and originality in tackling and solving problems.
Act autonomously in planning and implementing tasks at a professional or equivalent level.
Ability to advance their knowledge and understanding, and to develop new skills to a high level.
Independent learning ability required for continuing professional development.
Analyse quantitative data, including simple cost and performance models.
Communicate technical arguments clearly in written and oral form.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (14%)
Seminars	10 sessions of 1 hour (7%)
Online learning (independent)	10 sessions of 1 hour (7%)
Assessment	98 hours (71%)
Total	138 hours

Private study description

Further research into applications of taught material. Survey of the advancement in the engineering manufacturing market researching literature.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A1

Assessment component	Weighting	Study time	Eligible for self-certification

	Weighting	Study time	Eligible for self-certification
Process Selection Task	30%	18 hours	No

A set of process selection tasks involving the use of Granta EduPack to propose and justify appropriate manufacturing process routes for a range of product and market requirements. The activity requires students to evaluate competing material and process choices using defined design, cost, environmental, and production-volume constraints. Peer marking will be implemented as per departmental policy.

Reassessment component

Process Selection Report			No

A process selection task involving the use of Granta EduPack to make manufacturing process selection for a range of product and market requirements.

Assessment component

A Critical Evaluation of Technology Readiness Level Manufacturing	70%	42 hours	Yes (extension)

For a given problem involving advanced and digital-manufacturing technologies students will analyse the requirements for manufacture and critically evaluate the technical readiness, identifying areas of weakness and prioritising actions needed to resolve these.

Reassessment component

A Critical Evaluation of Technology Readiness Level Manufacturing			No

For a given problem (different from the original assessment) involving advanced and digital-manufacturing technologies students will analyse the requirements for manufacture and critically evaluate the technical readiness, identifying areas of weakness and prioritising actions needed to resolve these.

Feedback on assessment

Presentation - Group-level written feedback
Essay - Individual written feedback.

Availability

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