Module Specification

Process Design and Simulation

Version: 2025-26, v2.0, Approved

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Part 1: Information

Module title: Process Design and Simulation

Module code: UFMEB7-15-M

Level: Level 7

For implementation from: 2025-26

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module offers a thorough exploration of principles and practices essential for effective process management and resource allocation. Students will learn to manage tasks, challenges, and decisions efficiently, focusing on demand and capacity fluctuations and strategies to address mismatches.

Key areas of focus include inventory management in various demand scenarios, and the relationships between capacity planning, aggregate planning, materials

requirements planning, and scheduling. Students will also enhance their analytical and problem-solving skills for decision-making in process management.

A significant component of the module is the application of discrete-event simulation techniques. Students will build and utilise simulation models using software like Simul8, enabling them to statistically analyse the impacts of model parameters on system performance, as well use it to mirror simulated scenarios in operations. This encourages a critical understanding of the strengths and limitations of discrete-event simulation methods and its application in real life operational scenario

By the end of this module, students will be equipped to manage processes and resources effectively and apply simulation techniques to real-world scenarios.

Features: Not applicable

Educational aims: This module aims to:

Enhance digital transformation readiness – Equip students with knowledge of smart data-driven techniques in process design and simulation, integrating Industry 4.0 technologies and cloud-based simulation tools such as Simul8

Develop real-world problem-solving skills – Foster students' ability to model, simulate, and optimise complex processes in industries such as manufacturing, logistics, healthcare, and services.

Strengthen decision-making capabilities – Provide students with an understanding of predictive analytics and scenario planning, helping them make data-informed decisions in volatile business environments.

Outline syllabus: The module covers the principles and applications of process design and discrete-event simulation (DES) in various industries. Students will engage with real-world case studies, hands-on simulation exercises, and data-driven decision-making techniques to optimize and improve operational efficiency.

Topics are likely to include, but not limited to:

- Foundations of Operations Management & Discrete-Event Simulation (DES)

- Process Mapping, Data Collection, and Flow Analysis

- Demand, Capacity, and Variability

- Inventory, MRP, and Basic Scheduling

- Verification, Validation, and Intro to Statistical Analysis

- DES and Experimentation

- Industry 4.0, Digital Transformation, and Real-Time Data

- Sustainability, Resilience, and Ethical Considerations

- Simulation Project Management & Communication of Results

Practical Components:

Case Studies: Analysis of real-world business and engineering scenarios.

Software Training: Hands-on experience with DES software such as Simul8.

Developing, testing, and validating simulation models

Part 3: Teaching and learning methods

Teaching and learning methods: This module employs a blend of theoretical instruction (lecture) combined with tutorials and lab learning sessions. These sessions are designed to deepen students' understanding of the theory and how

theory is applied in practice in computational scenarios. All activities are conducted in a mixed-use classroom and computer laboratory setting, allowing for integration of teaching and hands-on practice.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Apply process design concepts and simulation techniques to model, analyse, and optimise complex operational systems across various industries.

MO2 Critically assess and interpret simulation-driven insights to support data-informed decision-making, enhance operational resilience, and drive sustainable process improvements.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 115 hours

Face-to-face learning = 35 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/lists/62C57441-9908-C65F-AC9B-B33CA47EAA84.html

Part 4: Assessment

Assessment strategy: The assessment is designed to evaluate students' ability to apply process design and simulation techniques to real-world scenarios. It emphasises independent problem-solving, analytical reasoning, and the practical application of discrete-event simulation tools.

The strategy includes a single project portfolio that allows students to integrate theoretical knowledge with hands-on simulation modelling along with a reflective element on prior simulation decisions. This approach ensures students engage with relevant industry challenges, developing data-driven insights and decision-making skills.

Key elements of the assessment strategy:

- Encourages practical application using simulation software (e.g., Simul8, AnyLogic, or Arena).

- Emphasises critical thinking and analysis, requiring students to interpret simulation results and provide data-backed recommendations.

The referred assignment will involve a reworking of the original portfolio based on the feedback received from the initial submission. For those who did not submit initially, the referred assignment will involve preparing a portfolio incorporating the provided assessment brief and guidelines.

Assessment tasks:

Portfolio (First Sit)
Description: Individual Portfolio
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Portfolio (Resit)
Description: Individual report (2500 words)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study: