https://courseoutline.auckland.ac.nz/dco/course/MECHENG/754/1225

MECHENG 754 : Industry 4.0 Smart Manufacturing

Engineering

2022 Semester Two (1225) (15 POINTS)

Course Prescription

New information technologies and their applications in manufacturing enterprises, including introduction to Industry 4.0, product modelling technologies, smart manufacturing systems, industrial IoT sensing and data analysis technologies, digital twins and applications of RFID in a modern manufacturing setting.

Course Overview

This course aims to provide an overview of Industry 4.0 with a specific focus on manufacturing companies that are planning for, or on the path of, digital transformation. The offering will also introduce some tools and models for Industry 4.0 readiness assessment. Some local case studies will be presented. One focus is on how digital manufacturing can uplift SMEs capability, productivity and resilience.

The course introduces the basics of industrial communications, essential Industrial IoT sensing and data analysis technologies with a focus on industrial/manufacturing automation applications. Students are expected to gain basic knowledge of evaluating these technologies and designing a simple IoT application in an industrial context.

This course also explains the technology of "Digital Twins" and how Digital Twins can be used in industrial applications. Digital Twins are able to make decisions independently, use model simulations and communicate with other Digital Twins and the production plant. Digital Twins-enabled, decentralized and autonomous optimization will be covered.

The course is closely attached to the Laboratory for Industry 4.0 Smart Manufacturing Systems (LISMS) - the country's first Industry 4.0 Lab – where a Learning Factory is in operation.

Course Requirements

Restriction: MECHENG 709, 710, 753

Capabilities Developed in this Course

Capability 1:   Disciplinary Knowledge and Practice

Capability 2:   Critical Thinking

Capability 3:   Solution Seeking

Capability 4:   Communication and Engagement

Capability 5:   Independence and Integrity

Capability 6:   Social and Environmental Responsibilities

Graduate Profile: Bachelor of Engineering (Honours)

Learning Outcomes

By the end of this course, students will be able to:

1. Demonstrate an understanding of of Industry 4.0 and its technology profile for smart manufacturing (Capability 1, 2 and 4)
2. Be able to undertake Industry 4.0 readiness assessment tools (Capability 1, 2, 4, 5 and 6)
3. Understand and apply smart manufacturing technologies such as industrial IoT (Internet of Things) sensing and data analysis technologies, digital twins, RFID and data communication standards (Capability 1, 2 and 3)
4. Critically evaluate and synthesise , independently, recent development work in Industry 4.0 through literature studies. (Capability 1, 2, 3, 4, 5 and 6)

Assessments

Assessment Type	Percentage	Classification
3 Assignments	55%	Individual Coursework
Final Exam	45%	Individual Examination
2 types	100%	

Assessment Type	Learning Outcome Addressed			
	1	2	3	4
3 Assignments	✔	✔		✔
Final Exam	✔	✔	✔	✔

Students must sit the exam to pass the course. Otherwise, a DNS (did not sit) result will be returned.

Workload Expectations

This course is a standard 15-point course. You can expect 36 hours of lectures/discussions and about 114 hours of independent study and preparation of assessments.

Delivery Mode

Campus Experience

Attendance is expected at scheduled activities including labs/tutorials/studios/clinics to complete/receive credit for components of the course.

Lectures will be available as recordings. Other learning activities including tutorials/labs will not be available as recordings.

The course may include live online events including group discussions tutorials.

The activities for the course are scheduled as a standard weekly timetable.

Learning Resources

Course materials are made available in a learning and collaboration tool called Canvas which also includes reading lists and lecture recordings (where available).

Please remember that the recording of any class on a personal device requires the permission of the instructor.

Health & Safety

Students are expected to adhere to the guidelines outlined in the Health and Safety section of the Engineering Undergraduate Handbook.

Student Feedback

At the end of every semester students will be invited to give feedback on the course and teaching through a tool called SET or Qualtrics. The lecturers and course co-ordinators will consider all feedback and respond with summaries and actions.

Your feedback helps teachers to improve the course and its delivery for future students.

Class Representatives in each class can take feedback to the department and faculty staff-student consultative committees.

This is a new course.

Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting their learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the internet. A student's assessed work may be reviewed against online source material using computerised detection mechanisms.

Class Representatives

Class representatives are students tasked with representing student issues to departments, faculties, and the wider university. If you have a complaint about this course, please contact your class rep who will know how to raise it in the right channels. See your departmental noticeboard for contact details for your class reps.

Inclusive Learning

All students are asked to discuss any impairment related requirements privately, face to face and/or in written form with the course coordinator, lecturer or tutor.

Student Disability Services also provides support for students with a wide range of impairments, both visible and invisible, to succeed and excel at the University. For more information and contact details, please visit the Student Disability Services' website http://disability.auckland.ac.nz

Special Circumstances

If your ability to complete assessed coursework is affected by illness or other personal circumstances outside of your control, contact a member of teaching staff as soon as possible before the assessment is due.

If your personal circumstances significantly affect your performance, or preparation, for an exam or eligible written test, refer to the University's aegrotat or compassionate consideration page https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html.

This should be done as soon as possible and no later than seven days after the affected test or exam date.

Learning Continuity

In the event of an unexpected disruption, we undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions the University has contingency plans to ensure that access to your course continues and course assessment continues to meet the principles of the University's assessment policy. Some adjustments may need to be made in emergencies. You will be kept fully informed by your course co-ordinator/director, and if disruption occurs you should refer to the university website for information about how to proceed.

Student Charter and Responsibilities

The Student Charter assumes and acknowledges that students are active participants in the learning process and that they have responsibilities to the institution and the international community of scholars. The University expects that students will act at all times in a way that demonstrates respect for the rights of other students and staff so that the learning environment is both safe and productive. For further information visit Student Charter https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html.

Disclaimer

Elements of this outline may be subject to change. The latest information about the course will be available for enrolled students in Canvas.

In this course students may be asked to submit coursework assessments digitally. The University reserves the right to conduct scheduled tests and examinations for this course online or through the use of computers or other electronic devices. Where tests or examinations are conducted online remote invigilation arrangements may be used. In exceptional circumstances changes to elements of this course may be necessary at short notice. Students enrolled in this course will be informed of any such changes and the reasons for them, as soon as possible, through Canvas.