Course Syllabus

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Engineering

MECHENG 754: Industry 4.0 Smart Manufacturing (15 POINTS)

2022 Semester Two (1225)

Download as PDF (https://courseoutline.auckland.ac.nz/dco/course/pdf?courseOutlineId=81075)

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.

Teaching Details

Lecturer Details

Xun Xu (Course Director, Lecturer)
Office: 405.871
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Yuqian Lu (Lecturer)
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Jan Polzer (Lecturer)
Office: 405.855
Phone: 86494. Email: jan.polzer@auckland.ac.nz

Teaching Dates/Times

See timetable

Graduate Profile

[BEHON] Bachelor of Engineering (Honours) 2022

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

Learning Outcomes

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

Learning Outcome	Capability
Demonstrate an understanding of of Industry 4.0 and its technology profile for smart manufacturing	1, 2 and 4
Be able to undertake Industry 4.0 readiness assessment tools	1, 2, 4, 5 and 6
Understand and apply smart manufacturing technologies such as industrial IoT	1, 2 and 3

(Internet of Things) sensing and data analysis technologies, digital twins, RFID and data communication standards	
Critically evaluate and synthesise , independently, recent development work in Industry 4.0 through literature studies.	1, 2, 3, 4, 5 and 6

Assessments

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

Workload Expectations

This course is a standard 15 point course. For this course, you can expect 36 hours of lectures/tutorials, and 90 hours of independent study and preparation of assessments

Delivery Mode

Campus Experience

Attendance is expected at scheduled activities 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.

Where to Get Help

Please feel free to contact any lecturer in concern. If you have a question regarding the course in general, please contact Xun Xu. Piazza will be monitored but not as frequently as you may wish.

Class Representatives

Class Rep Name:

Class Rep Contact:

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.

Class Rep Information

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)**
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)** https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html.

Course Summary:

Date	Details	Due
Fri Aug 19, 2022	**Industry 4.0 Readiness Assessment tools for NZ SMEs** **(https://canvas.auckland.ac.nz/courses/77560/assignments/298401)**	due by 10am
Thu Oct 6, 2022	**IIOT** **(https://canvas.auckland.ac.nz/courses/77560/assignments/298402)**	due by 10am
Thu Oct 20, 2022	**Digital Twin** **(https://canvas.auckland.ac.nz/courses/77560/assignments/298403)**	due by 5pm