

Total Plant Automation (E005770)

Course size (nominal values; actual values may depend on programme)

Credits 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019

Offering	Language	Teaching Method	Hours
A (semester 2)	English	project	20.0 h
		lecture	25.0 h
		practicum	15.0 h
B (semester 2)	Dutch	project	20.0 h
		practicum	15.0 h
		lecture	25.0 h

Lecturers in academic year 2018-2019

Demasure, Thibaut	TW18	staff member
Hoedt, Steven	TW18	staff member
Cottyn, Johannes	TW18	lecturer-in-charge

Offered in the following programmes in 2018-2019

Programme	crdts	offering
Bridging Programme Master of Science in Industrial Engineering and Operations Research	6	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Business Engineering (main subject Data Analytics)	6	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A
Master of Science in Business Engineering (main subject Finance)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Master of Science in Business Engineering (main subject Operations Management)	6	A
Master of Science in Industrial Engineering and Operations Research	6	B
Master of Science in Industrial Engineering and Operations Research	6	A
Master of Science in Sustainable Materials Engineering	6	A

Teaching languages

Dutch, English

Keywords

Manufacturing operations management software, intelligent sensors, automation, manufacturing excellence, Lean assembly

Position of the course

An overview is given of all software systems and other technological support in order to optimize manufacturing operations, in the field of as well production, quality, inventory as maintenance. Different applications – such as MES, LES, LIMS, WMS, ERP, APS and PLM – and principles – such as tracking&tracing, KPI's and standardization – are

discussed. Knowledge about intelligent sensors – such as vision, RFID and RTLS – is necessary in order to integrate real-time production information.

Contents

Topics that are covered in the lectures, are:

- Industrial automation: PLC, SCADA
 - Tracking & tracing: Principle, intelligent sensors
 - Manufacturing Operations Management: Principle, standardisation, software solutions, industrie 4.0
 - Manufacturing Excellence: Improvement techniques, KPIs, production reporting
- Practica and workshops:
- Workshop PLC: TwinCAT3
 - Workshop MOM: Automatic control and monitoring of an assembly line
 - Workshop Manufacturing excellence: KPI selection and calculation through SQL queries
 - Optimization of picking assignments through pick-to-light technology
 - Vision systems for quality control
 - Robotics: configuration of a traditional (FANUC) and collaborative (Baxter) version
 - Production optimization through resource tracking (RFID, RTLS)

Initial competences

- Has a basic knowledge of production and logistics
- Is familiar with production control systems and principles

Final competences

- 1 Can apply scientific-disciplinary insights on complex engineering problems
- 2 Can study, assimilate, implement and use new technologies
- 3 Is capable of designing, researching, analyzing and diagnosing logistic and production processes
- 4 Can differentiate and integrate the different layers of the CIM pyramid
- 5 Can set up different software systems in order to support and optimize operations management on the production floor

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, practicum, project

Extra information on the teaching methods

The main principles are introduced through lectures. The focus lies however on the practical applications. The students can apply the theory on different demonstrators within the XiaK lab through rotating assignments. An assembly line is constructed and evaluated in different teams through a project assignment.

Location for the lectures: Technopark 903, Zwijnaarde

Location for the practical assignments: lab XiaK - UGent campus Kortrijk, Graaf Karel de Goedelaan 5, Kortrijk

Learning materials and price

- Course notes 'Total Plant Automation', PDF version free on Minerva
- Additional lab notes

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of permanent evaluation

Participation, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

For the permanent evaluation, students will be scored on their performance during the practica, the project and their reports

Calculation of the examination mark

Final score (/20) = $C1 \times P1 + C2 \times P2$

Cx are coefficients and Px are scores with:

P1 : score periodic evaluation (/20)

P2 : score permanent evaluation (/20)

C1 = 50%

C2 = 50%

First examination period

To succeed the student must have at least 8/20 for each part. If this condition is not fulfilled, there is deviation from the calculated figure if it is 10 or more. In this case, the final score will be reduced to 9/20.

Second examination period

Half of the P2 score is transferred to the second examination period. The other half will be determined by some additional open questions of the practica on the written exam. To succeed the student must have at least 8/20 for each part. If this condition is not fulfilled, there is deviation from the calculated figure if it is 10 or more. In this case, the final score will be reduced to 9/20.