ENGI07076
Industry Module 3 (TK)

<table>
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<tr>
<th>Full Title</th>
<th>Industry Module 3 (TK)</th>
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<td>Status</td>
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<td>Start Term</td>
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<td>NFQ Level</td>
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<td>Module Code</td>
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<tr>
<td>Duration</td>
<td>Semester - (13 Weeks)</td>
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<td>Grading Mode</td>
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<tr>
<td>Department</td>
<td>Mechanical &amp; Industrial Eng</td>
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<tr>
<td>Module Author</td>
<td>Carine Gachon</td>
</tr>
<tr>
<td>Co Authors</td>
<td>Des OReilly</td>
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Module Description

This module is based on the theory of cognitive apprenticeship. In order to become engineers in the field of automation students need to learn about manufacturing processes and culture. In this module students are immersed in their company as a trainee engineer. Students attend around 80 hr of formal training session where they further develop their skills in programming and troubleshooting PLCs and robotic arms with the integration of vision systems. They reflect on the industry culture, learn about manufacturing processes and design an automated cell.

Learning Outcomes

On completion of this module the learner will/should be able to:

1. Design an automated cell integrating a robotic arm, PLC control, vision systems and safety features.
2. Participate in process planning according to company quality policies and system.
3. Undertake a six sigma project and communicate the findings to staff and management.
4. Apply management skills within their occupation as an engineer and describe their ethical obligations as an engineer.
5. Reflect on their experiential learning and their ability to solve problems using an engineering approach, identify gaps and devise self-learning strategies.

Indicative Syllabus

The employer will train the student on:

Process planning relevant to the workplace
Management skills
Project management

The company will organise approved formal training in PLC, Robotics, vision system and safety circuits. Indicative Content:

PLC
1. Set up of a simple machine network and configuration of the network components(nodes)
3. Writing advanced programs using various types of programming languages
4. HMI visualization, Historian trends and Alarm buffer.
5. Motor drive Configuration and integration into a control system
6. Program software error handling

Robotic
1. Bus systems
2. Profibus
   1. Robot parameterization as Master, Slave
   2. Profibus between robots, Robot Master -> Frequency inverter parameterization
3. Devicenet
   1. Robot parameterization as Master, Slave
   2. Devicenet between robots, Robot Master -> Beckhoff head unit parameterization
4. Profinet
   1. Controller (Master), Device (Slave)
   2. Profinet between robots, Robot Controller -> Beckhoff head unit parameterization
5. Ethernet/IP
   1. Scanner, adapter
   2. Ethernet/IP between robots, Robot Scanner -> Beckhoff head unit parameterization
6. Error messages of communication systems, troubleshooting

The company will allow students 4 hr/ week, as well as some technical support, to work on their technical projects.

### Teaching and Learning Strategy

The industry module’s learning strategy is centred around the Cognitive apprenticeship Theory framework, with the Industry supervisor providing modelling, coaching and scaffolding for the student. The student will learn best practice in automated cell design by attending a formal approved training. They will develop and integrate their skill through a project.

The GMIT supervisor will organise a 4hr workshop every September where both students and industry supervisors will be introduced to the programme and the responsibility of both students and industry supervisor. The industry module will be discussed and the type of projects expected for the industry module will be explored.

At the beginning of semester 2, the GMIT supervisor will conduct a 4hr workshop to train the industry supervisor in mentoring students.

Students, Industry supervisor and GMIT supervisor will then meet and agree a learning plan for the industry module. This will include the Company Certified Automation training to be attended, the type of work done for the employer, the project to be conducted and indicative weekly schedule of work to allow time to complete the project work. The industry supervisor will be expected to support the student in its project work.

### Assessment Strategy

Attendance at around 80 hr training in Automation is mandatory in this module. The module will be failed unless the student can provide evidence of attendance at the training programme as agreed with their Academic supervisor. The learning outcomes of the training will be assessed through the technical project.

The module will be marked on the following assessment submissions:

- Reflective logbook assessed by the academic supervisor.
- Process plan study verified by the industry mentor and assessed by the academic supervisor.
- A technical project where students design an automated cell.

#### Reflective Logbook

In order to facilitate this process, students will be expected to complete a weekly online reflective logbook as part of each Industry module assessment. One of their GMIT supervisor’s responsibilities will be to review their first two entries in the Logbook and give them feedback on where and how to incorporate reflection. The students will be expected to make a minimum of 13 entries in their logbook. The academic supervisor will mark 5 of the entries. The basis for the reflection being:

- How they meet the learning outcomes of the module
- What challenges they have encountered

The academic supervisor will assess the level of reflection achieved in the Logbook using a rubric.

#### Process Study

The scope of the study will range over an assembly line or value stream. The theme of this project will be *Problem Root Cause Elimination*. It is expected that the student will use the Six Sigma DMAIC approach to solving the problem. Even if Six Sigma is not used by others within the company, the rigour of applying the stages of Define, Measure, Analyse Improve and Control will help the student to structure their work and achieve their goal. Project management techniques, such as the development and updating of a gantt chart and tracking project resources will also be employed.

The student will be provided with a Process Study Description Document outlining the nature of the report. It will include formatting guidelines, marking scheme, and the required chapters.

#### Technical Project

The project will be specified by the student and the Industry Mentor before the end of the GMIT Block, and a Project Charter drawn up. This will then be reviewed by the GMIT Project Supervisor, and once approved, the student is expected to be ready to start the project as early as possible into the Industry Block. The output of the project will be the design of an automated cell that will comply with industry standards and safety regulations.
Repeat Assessment Strategies

The repeat opportunity will be reviewed by the programme board on an individual basis. The process study, reflective logbook and project work could be resubmitted, but the programme board will decide if all or only some of the assessments should be resubmitted. If the module is failed due to a lack of attendance at the training, then the student should take the training at the next opportunity and resubmit the project work.

Indicative Coursework and Continuous Assessment: 100%

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<th>Percent</th>
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<td>Technical Project</td>
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Blended Delivery Mode Average Weekly Workload: 0.30 Hours

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Recommended Reading Book List


Literary Resources

Industry-specific reading.

The Book List from each module will apply to this Industry Module.

Online Resources

Industry-specific website.

GMIT Moodle support learning system.

Other Resources

Industry Specific

Programme Membership

GA_EAURG_B07 202000 Bachelor of Engineering in Automation & Robotics