



CENTRE FOR ADVANCED MANUFACTURING AND MANAGEMENT SYSTEMS (CAMMS)



COURSE HANDBOOK

The Centre for Advanced Manufacturing & Management Systems (CAMMS) is attached to the Department of Mechanical, Biomedical and Manufacturing Engineering at Cork Institute of Technology (CIT). CAMMS is a Continuing Professional Development Centre (CPD) within CIT dedicated to providing opportunities for workforce development and personal upskilling. The centre capitalises on the extensive expertise within CIT together with external professionals to deliver up to date education and training programmes in Automation and Control, Lean Sigma, Project Management, and Manufacturing Engineering. CAMMS aims to provide career-focused education for the benefit of the personal, intellectual and professional development of students and to solve problems directly related to skills required by industry.

Many CAMMS programmes are validated awards by CIT under delegated authority of Quality Qualifications Ireland (QQI) leading to European Credit Transfer and Accumulation System (ECTS) credits on the National Framework of Qualifications (NFQ). The Centre offers preparatory courses for the Society of Manufacturing Engineers (SME) professional exams and also serves as an official exam site.

CAMMS is currently delivering thematic knowledge areas that reflect the strengths of the Department.

Please note fees quoted relate to the academic year 2019-2020 only and are subject to change on an annual basis. Except where stated, course fees cover the cost of tuition only.



Courses

- 1.0 Mechanical, Electrical and Plumbing – BIM Applications
- 2.0 Lean & Six Sigma Programmes
 - 2.1 Introduction to Lean & Six Sigma
 - 2.2 Lean Sigma Yellow Belt
 - 2.3 Lean Sigma Green Belt
 - 2.4 Lean Sigma Black Belt
 - 2.5 Lean Sigma Master Black Belt
 - 2.6 Continuous Improvement for Production Teams
- 3.0 Project Management Programmes
 - 3.1 Diploma in Project Management
 - 3.2 Project Management Techniques
- 4.0 Automation & Control Systems Programmes (Level 7)
 - 4.1 Certificate in Automation & Control Systems
 - 4.1.1 Mechatronics
 - 4.1.2 SCADA and Automation Systems
 - 4.1.3 Robotics
 - 4.2 Certificate in Advanced Mechatronics (Level 8)
 - 4.2.1 Advanced Mechatronics Part 1
 - 4.2.2 Advanced Mechatronics Part 2
- 5.0 Manufacturing Engineering
 - 5.1 Certified Manufacturing Engineer (CMfgE)
 - 5.2 Metrology Training (AUKOM Level 1)
 - 5.3 Certificate in Intelligent Manufacturing Systems
 - 5.4 Certificate in Biomedical Device Manufacture
- 6.0 Bachelor of Engineering Degrees
 - 6.1 Bachelor of Engineering (Honours) in Process Plant Technology
 - 6.2 Bachelor of Engineering (Honours) in Advanced Manufacturing Technology

1.0 Certificate in Mechanical, Electrical and Plumbing – BIM Applications

(Level 7)



Course Fee
€1,950

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_EMEPB_7

Course & Module Information, and to apply online, visit
www.cit.ie/CREMEPB7



This programme aimed at those who wish to enhance their 3D drawing and design skills in order to operate within a Building Information Management (BIM) regulated environment. It is suitable for those employed or seeking employment with design consultants or engineering/facilities departments within the pharmaceutical, biopharmaceutical, medical device, food manufacturing and water treatment sectors.

The programme has been specifically designed in response to industry needs for upskilling as identified by the South West Regional Skills Forum (SWRSF). The SWRSF (made up of manufacturing, mechanical and MEP consultancy companies) has identified BIM and Revit as two of their top three priority areas for upskilling.

Content

Participants will be provided with the skills necessary to contribute effectively through the use of BIM related software applications, specifically Autodesk Revit for Mechanical, Electrical and Plumbing (MEP), in conjunction with a specialised module dedicated to piping design.

Students will develop the ability to use modern computer-based engineering tools to solve well defined building services design problems and communicate effectively with the engineering community. They will learn to create and place equipment, route and coordinate pipework, add electrical components and use P&ID data all within a multidiscipline 3D environment. The programme will also incorporate the use of Piping Standards (BS, DIN, ANSI, etc.) and engineering symbols standards.

Modules

Revit Introduction – introduction to the BIM environment
Revit-MEP – multidisciplinary services design
3D Piping Design – detailed piping design in a virtual environment

Specific content includes

- Intelligent P&ID generation linked to 3D Piping Packages
- 3D Piping and Equipment Modelling
- Estimating pipe sizes and duct sizes using Revit software
- 3D Isometrics and BOM generation
- Utilising Project Browser to generate and manage useful views
- Generating reports and schedules using Revit software

Admission Requirements

Applicants should have a minimum of a Level 6 qualification (or equivalent) in an engineering discipline such as mechanical, electrical or building services engineering. Equivalent recognition may be given through the Recognition of Prior Learning (RPL) process on an individual case-by-case basis to candidates who have not achieved this academic standard but who can demonstrate significant relevant professional experience in the Built Environment discipline, visit www.cit.ie/rpl.

Duration

September – May, one evening per week.

Awarding Body

Special Purpose Award - 15 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

2.0 Lean & Six Sigma Programmes

2.1 Introduction to Lean & Six Sigma

Course Code
CR_EILSS_X

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CREILSSX

Lean is a generic process management term referring to the identification and steady elimination of waste. It is closely linked with Six Sigma because of the methodology's emphasis on reduction of process variation. Lean Sigma introduces the methods and tools used in both techniques.

Note: Introduction to Lean/Lean Sigma is not a pre-requisite to attending the Lean Sigma Yellow Belt, Lean Sigma Green Belt.

Content

- **Day 1:** Introduction to Lean: Introduce the participants to the background to Lean and the concepts behind reducing waste.
- **Day 2:** Introduction to Six Sigma: Explains how Six Sigma targets variation and introduces the concepts.

Admission Requirements

This programme requires no prior knowledge or experience of Lean or Lean Sigma. The programme is suitable for all personnel working within the design, manufacturing, transactional, sales or support environment. It is suitable for management and team leaders through to shop floor personnel and employees directly involved in the process.

Duration

Two full-time days.

Certification

CAMMS, CIT. Please contact CAMMS directly for more details.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

Note: Delivery of this programme is subject to sufficient number of applicants.

**Lean Sigma Master
Black Belt**
CR_ELSMB_9

Lean Sigma Black Belt
CR_ESSBB_8

Lean Sigma Green Belt
CR_ESSGS_7

Lean Sigma Yellow Belt
CR_ELEAP_6

Lean Sigma Introduction
CR_EILSS_X

2.2 Lean Sigma Yellow Belt

(Level 6)



Course Fee

€995* (includes course notes and exam fees)

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_ELEAP_6

Course Information, and to apply online, visit
www.cit.ie/course/CRELEAP6



Lean Sigma is a very successful methodology for Service Design and Operational Productivity Improvement. Lean Sigma is based on the elimination of waste and the reduction of variability in processing through engagement and respect for all staff. The Lean Sigma Yellow Belt course introduces the methods and tools for interpretation of customer requirements for service design and operations in all industry sectors. These include Public Service, Healthcare, Biopharma, Insurance, Hospitality, Charities, Software, Call Centre Service, and Manufacturing.

A certified **Lean Sigma Yellow Belt** is a professional who will be capable of applying Lean and basic Six Sigma principles and tools as part of a team to drive improvements and show measurable results. The programme consists of assessment of theory by examination, as well as assessment of practice by portfolio. The portfolio is based on the achievement of class project assignments by candidates. The course draws on both the basic problem solving tools and waste identification in processes.

Content

- Introduction to Lean Sigma principles
- Lean Sigma Concepts
- Improve service processes
- Understand Voice of the customer
- DMAIC Methodology
- Continuous Improvement Tools
- Tools for eliminating waste
- In class project work
- Workplace identification of improvement opportunities

Admission Requirements

Candidates must have a total of at least four years combined academic and industrial experience in a suitable working environment with proven ability. It is suitable for all staff.

Duration

Five days over three months.

Awarding Body

Single Module Award
10 ECTS Credits at Level 6 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts for groups of three or more and Corporate discounts are available. Please contact CAMMS to enquire. External support funding may also be available for this course.



2.3 Lean Sigma Green Belt

(Level 7)

Course Code
CR_ELSGB_7

Course Fee
€2,250* (includes course notes and CIT exam fees)

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CRELSGB7

The course is aimed at all personnel working within the design, manufacturing, transactional, sales or support environment.

Lean Sigma is a very successful methodology for Service Design and Operational Productivity Improvement. Lean Sigma is based on the elimination of waste and the reduction of variability in processing through engagement and respect for all staff.

A certified **Lean Sigma Green Belt** is a professional who has expertise in Lean Sigma principles, including supporting systems and tools. A Green Belt will demonstrate project team leadership ability. Green Belts understand the application of DMAIC/DMADV models for Service Design and Operational Management in accordance with Lean Sigma principles. They are able to identify non-value added elements and activities and are able to use specific tools. The course draws on both the basic problem-solving tools and basic statistical principles.

Content

- Introduction to Lean and Lean Sigma, DMAIC Methodology
- Coordinating Project Teams
- Defining the Project and setting goals
- Variation and Measurement Techniques
- Analysis of Process Data, Introduction to Statistical Tools
- Cause and Effect, FMEA (Failure Mode & Effect Analysis)
- Process Capability using SPC
- Lean Concepts and Tools
- Project Control, Measuring Success Factors

Admission Requirements

Level 6 qualification preferred. At least three years' experience in a suitable working environment with proven ability. It is suitable for management and team leaders, shop floor personnel and employees directly involved in the office or service process.

Duration & Delivery

Nine full days over three months. CIT Awarded Lean Sigma Green Belt (includes course notes and CIT exam fees).

Awarding Body

15 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts for groups of three or more and Corporate discounts are available. Please contact CAMMS to enquire. External support funding may also be available for this course.

"SR Technics Airfoil Services in Cork repair commercial jet engine airfoils for some of the world's most prestigious airlines and overhaul shops. The work carried out at the facility is exacting, critical and highly skilled. When we began our lean journey we were fortunate to team up with CIT CAMMS. They have provided our staff with training and education on their courses including Yellow Belt, Green Belt and Black Belt in the past ten years."

Damien Carroll, Human Resources Manager, SR Technics Airfoil Services

2.4 Lean Sigma Black Belt

(Level 8)



Course Fee

€4,750* (includes course notes and exam fees)

Enquiries

T: 021 432 6264

E: camms@cit.ie

W: www.camms.ie

Course Code
CR_ESSBB_8

Course Information, and to apply online, visit

www.cit.ie/course/CRESSBB8



Lean Sigma is a very successful methodology for Service Design and Operational Productivity Improvement. Lean Sigma is based on the elimination of waste and the reduction of variability in processing through engagement and respect for all staff.

A certified **Lean Sigma Black Belt** is a professional who is an expert in Lean Sigma philosophies and principles, including supporting systems and tools. A Black Belt will demonstrate team leadership, understand team dynamics, and assign team member roles and responsibilities. Black Belts have a thorough understanding of all aspects of the DMAIC/DMADV models for Service Design and Operational Management in accordance with Lean Sigma principles. They have a thorough knowledge of Lean enterprise concepts, are able to identify non-value added elements and activities and are able to use specific tools. The course draws on both the basic problem-solving tools and advanced statistical principles.

Content

- Introduction to Lean and Lean Sigma, DMAIC Methodology
- Change Management, Team Building, Facilitation, Conflict Resolution
- Project Control, Return on Investment, Critical Success Factors
- Statistical Techniques
- Measurement System Analysis
- Hypothesis Testing, Regression, Control Charts, Process Capability
- Design of Experiments
- Lean Sigma Supply Chain

Mentoring

A work-based project is undertaken as part of the course. Students will receive project support and mentoring from their tutors. Student projects can deliver savings of more than €100,000 per project. As part of the course online support data is provided for all students.

Admission Requirements

Level 6/7 qualification preferred. Green Belt qualified or a demonstration of several years of work experience in a supervision role in service or manufacturing industry is required. Experience in Lean or Six Sigma principles is desirable.

Duration & Delivery

21 full days over six months.

Awarding Body

30 ECTS Credits at Level 8 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts for groups of three or more and corporate discounts are available. Please contact CAMMS to enquire. External Support funding may also be available for this course.

2.5 Lean Sigma Master Black Belt

(Level 9)

Course Code
CR_ELSMB_9

Course Fee
€5,750

Enquiries
Mark Stockil
E: mark.stockil@camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CRELSMB9

Lean Sigma is a very successful methodology for continuous improvement in all organisations. Lean Sigma is based on the elimination of waste and the reduction of variability in processing through engagement and respect for all staff.

A certified Lean Sigma Master Black Belt is the go to person for deployment of Lean Sigma systems in the organisation. They hold a key role within or in support of the management team for business achievement of goals utilising improvement and problem-solving techniques. They may mentor and educate others in the organisation and determine best practice adaptation within the organisation for Operational and Design success. MBBs provide everyday leadership to the Lean Sigma effort. MBB's establishing and maintaining the long term Lean Sigma Environment.

Content

The course is delivered by industry practitioners with active case studies and hands on experience. It includes live case study review and will include discussions with the case study experts.

The main module topics are

Semester One

- Creating and Measuring the Lean Sigma Environment (Site visit)
- Lean Sigma MBB Deployment Research Project

Semester Two

- Lean Sigma Analytics (Site visit)
- Lean Sigma MBB Deployment Application Project

Project mentoring and support

A work-based project and a Research project are undertaken as part of the course. Students will receive project support and mentoring from their tutors.

Online support

Online resources are provided for students to support classroom learning.

Admission Requirements

Black Belt or equivalent required. Demonstrated experience in leading Lean Sigma Projects is required.

Duration & Delivery

12 Days

Awarding Body

Special Purpose Award - 30 ECTS Credits at Level 9 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Discount

Funding is available through some Skillnet groups

2.6 Continuous Improvement for Production Teams

Company Based Group Training



Application

Please email camms@cit.ie for further information.

Course Fee

Price will vary on specific company needs.

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_EC IPT_X

Course Information, visit
www.cit.ie/course/CRECIPTX



Continuous improvement is an on-going effort to improve products, services or processes. These efforts can seek “incremental” improvement over time or “breakthrough” improvement all at once. Continuous improvement for production teams involves company based training, concentrating on the forming and development of teams, selecting projects, and then mentoring the operators and facilitators to the completion of these projects.

Content

In general, the course content and delivery is tailored to suit the company’s needs. The course content is a combination of delivered lecture material and actual project focused work. Participants will be introduced to continuous improvement practice using basic quality analysis tools and how to apply them in a team environment on company targeted improvement areas. The sessions will include:

Team members and Facilitators

- Quality concepts and basic quality tools
- Small team project management process
- Project focused work

Facilitators Only

- Mentoring and Facilitation techniques for Facilitators

Having completed the course, candidates will be able to apply quality tools and to interpret information and data. In addition, they should be able to apply team concepts both as a member and leader. The Facilitators should be able to understand their role in the process and experience being a Facilitator on a given project.

Duration & Delivery

Two or four days delivery, four or six weeks mentoring.

Certification

CAMMS, CIT. Please contact CAMMS directly for more details.

3.0 Project Management Programmes

3.1 Diploma in Project Management

(Level 8)

Course Code
CR_EPMAN_8

Course Fee
€3,850* (includes CIT exam fees
and PMI exam preparation)

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CREPMAN8

With the emergence of Project Management as a standalone profession, international accreditation that is accepted across industries is becoming increasingly important. The course is suitable for individuals who may have practical experience of **either being involved in projects or managing and leading projects** but need to supplement this with the necessary education. This course is aimed at those who seek to employ professional project management methodologies in the Initiation, Planning, Execution, Control and Close-Out of their Projects.

This CIT accredited Special Purpose Award in Project Management uses a combination of external experts and in-house lecturers to provide a broad scope of industrial and academic expertise. Our panel of lecturers and experts includes those with PMI® (Project Management Institute), 'Registered Education Provider' (REP®) Approval. The content and delivery is applicable to all industrial sectors (not just technical projects).

The Program covers all knowledge areas of the internationally recognised professional standard for the practice of Project Management, the PMBOK® (Project Management Body of Knowledge) which is administered by the PMI (Project Management Institute). CIT's Award includes a detailed 2-day preparatory 'boot-camp' course for those candidates who intend to sit for the PMI credentials, the PMP® or CAPM®.

The Special Purpose Award combines advanced Project Management techniques and methodologies with the real-life experiences of an expert panel of leading project management lecturers from a wide range of industrial sectors. The course consists of a combination of lectures, seminars, case studies, guest speakers, simulations and practical projects. Course delegates complete various assignments in the class, as project teams and individual assignments.

The course is designed for those involved in a wide range of projects. Participants come from a broad range of sectors and backgrounds and are typically involved in the planning, control and execution of project work in the broadest sense.

Duration & Delivery

Attendance is 15 full-time days, consisting of one weekend per month (Friday and Saturday), delivered over 8 months. The Award also contains a 2 day 'boot camp' preparation course for the Project Management Institute (PMI) credentials (PMP Project Management Professional or CAPM – Certified Associate of Project Management).

Certification

Students who complete all three modules, will be entitled to an accredited Diploma in Project Management (Special Purpose Award– 15 ECTS Credits at Level 8 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

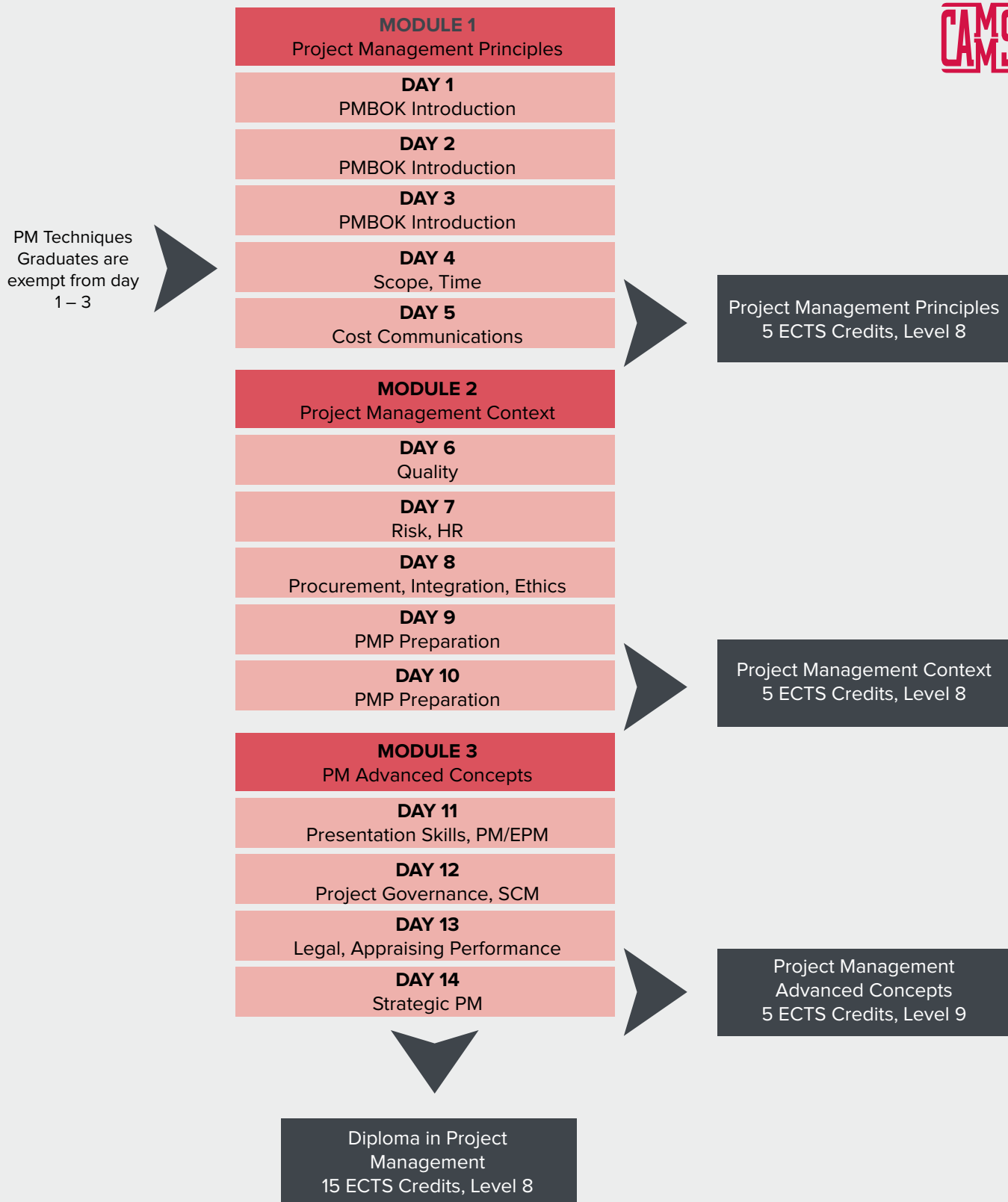
Project Management Institute (PMI): Candidates who complete the SPA in Project Management will be encouraged to sit the Project Management Institute (PMI) exams. PMI exam fees are not included.

To maintain your PMI credential, you must earn 60 PDUs (Professional Development Units) over 3 years. If a student successfully passes their PMI exam prior to the last 2 sessions on the Diploma, that student will earn 36PDUs whilst simultaneously completing their Diploma qualification.

*€3,850, includes CIT exam fees, and PMI exam preparation (PMI exam fee **not** included). Course price includes manuals, soft copies of PMBOK® Compliant Templates and lunch each day. A discount structure is available for groups: 5% for 2 people, 10% for 3 or more.

Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

Please note: Delivery of this programme is subject to sufficient number of applicants.



3.2 Project Management Techniques

(Level 7)

Course Code
CR_EMBXX_7

Course Fee
€925*

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CREMBXX7

This course is a comprehensive and practical introduction to Project Management. **The content and delivery is applicable to all industrial sectors (not just technical projects).** The content is based on the Project Management Body of Knowledge (PMBOK®) which is administered by the Project Management Institute (PMI) in the USA. The PMBOK is a worldwide recognised professional standard for the practice of Project Management.

The course is aimed at those involved in a wide range of projects. Participants come from a broad range of sectors and backgrounds and are typically involved in the planning, control and execution of project work in the broadest sense. Lectures are combined with case studies, workshops, simulations and practical projects. Course delegates complete various assignments in the class, as project teams and individual assignments. There are also hands-on computer practical sessions which will be used to instruct participants in the key areas of project planning and control. Candidates should have basic computer skills.

The course focuses on two main areas, primarily learning new tools and techniques to manage projects more effectively. Secondly, to gain increased awareness and learning in the area of 'soft skills' (e.g. leadership, team management, motivation, communication, negotiation, etc.) that are essential to effective project management.

Content

Participants are expected to work on a project of their own choosing. Some short course assignments to be submitted to achieve certification.

- Introduction to Project Management and the fundamentals
- Project selection & initiation. Defining the Project Charter and Project Scope
- Project Planning and defining the Work Breakdown Structure (WBS)
- Managing Project Scope and Change in projects

- Project Time Management – Activity Definition, Activity Duration Estimating, Activity Sequencing, Schedule Development, Schedule Control
- Project Scheduling Software – MS Project version to 2016
- Progress measurement and reporting
- Managing Project Quality and Risk management
- Managing Project Finance and Resources
- Managing People – Team development and the Project Managers Role
- Improving personal effectiveness as a project manager
- Leadership Styles, Communication, Negotiating
- Project Closeout and Evaluation

Duration & Delivery

One evening per week for 12 weeks, Thursday, 6.30pm – 9.30pm.

Awarding Body

5 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Successful participants from the evening class will be eligible to two days exemption from the Diploma in Project Management and a reduced price from €3,850 to €3,250.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* A discount structure is available for groups: 5% for 2 people, 10% for 3 or more.

4.0 Automation and Control Systems Programme

4.1 Certificate in Automation & Control Systems

Special Purpose Award – 20 ECTS Credits at Level 7

Course Code **CR_EACSY_7**

Students who successfully complete the modules Mechatronics; SCADA & Automation Systems; and Robotics will be entitled to a Certificate in Automation & Control Systems (Special Purpose Award) Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Course Fee

Overall Fee: €3,100 (Only applicable when ALL three modules are taken in one academic year)

Enquiries

T: 021 432 6264 E: camms@cit.ie W: www.camms.ie



Course Information, and to apply online, visit www.cit.ie/course/CREACSY7

These modules can also be taken and certified individually. Please see course code, fee, and online application for each module.

4.1.1 Mechatronics



Course Fee

€1,950*

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code

CR_EACSY_7

Content

Practical

- Pneumatic design and implementation
- Electro-pneumatic design and implementation
- PLC design and implementation
- Mechatronic design and implementation

Theory

- Principles of the “Total Engineering Approach” to production systems
- Principles of typical sensors
- Principles of pneumatic, mechanical and electrical actuation systems
- Principles of embedded control (PLCs, controllers)
- Design, build and fault find on mechatronic systems

This course covers the practical and theoretical requirements for certification by CIT. Certification requires that a candidate provides evidence of competence in the construction, operation and maintenance of pneumatic and electro-pneumatic systems through practical tasks and by meeting knowledge criteria.

Course Information, and to apply online, visit www.cit.ie/course/CREACSY7



The course also covers PLC programming to a high standard of achievement allowing students to programme training rigs and develop knowledge of industrial Mechatronic installations.

Admission Requirements

Candidates must have at least two years relevant industrial experience and should have obtained their Leaving Certificate or an appropriate craft/technician qualification.

Duration & Delivery

One evening per week for one academic year, one module per semester.

Awarding Body

10 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of three or more.

4.1.2 Scada & Automation Systems


(Level 7)

Course Code
CR_EACSY_7

Course Fee
€925*

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



 Course Information, and to apply online, visit
www.cit.ie/course/CREACSY7

Automation has been an essential tool in enhancing productivity and competitiveness for manufacturing industries. Automation is used to improve manufacturing performance, reduce operational costs and improve quality. Most industrial plants now have some form of automation, which is controlled and monitored by SCADA systems. This course enables participants to adjust, service, maintain, and design modern equipment, and to design and develop SCADA control systems.

During the course, real data from a process control rig and flexible assembly line will be utilised in the design of applications.

Content

- Computer based automation systems
- Control systems
- Connection and circuit technology for transducers
- PLC configuration and control
- Safety systems
- SCADA (Supervisory Control and Data Acquisition)

Admission Requirements

Candidates must have at least two years relevant industrial experience and should have obtained their Leaving Certificate or an appropriate craft/technician qualification.

Duration & Delivery

One evening per week for 12 weeks in Semester 1. Additional programme may run in Semester 2, subject to demand.

Awarding Body

5 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of three or more.



(Level 7)



Course Fee
€925*

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_EACSY_7

Course Information, and to apply online, visit
www.cit.ie/course/CREACSY7



An industrial robot is defined as “an automatically controlled, reprogrammable, multipurpose device, for use in industrial automation applications”.

This course gives participants an understanding in Industrial Robotics programming and design, and an indepth knowledge of Robotic Sensors.

Content

- Robotic cell design
- End effectors
- Robotics programming
- External sensors

Admission Requirements

Candidates must have at least two years relevant industrial experience and should have obtained their Leaving Certificate or an appropriate craft/technician qualification.

Duration & Delivery

One evening per week for 12 weeks in Semester 2.
Additional programme may run in Semester 1, subject to demand.

Awarding Body

5 ECTS Credits at Level 7 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of three or more.



4.2 Certificate in Advanced Mechatronics Special Purpose Award – 10 ECTS Credits at Level 8

Course Code
CR_EAMEC_8



Course Information, and to apply online, visit
www.cit.ie/course/CREAMEC8



Students who successfully complete the modules Advanced Mechatronics Part 1; and Advanced Mechatronics Part 2 will be entitled to a Certificate in Advanced Mechatronics (Special Purpose Award).

Course Fee

Overall Fee: €1,850 (Only applicable when BOTH modules are taken in one academic year).

Enquiries

T: 021 432 6264 E: camms@cit.ie W: www.camms.ie

These modules can also be taken and certified individually. Please see course code, fee, and online application for each module.

We have seen a dramatic change in the complexity of programming and control of modern day machines, where for example controllers use languages like C++ now instead of Ladder Diagram and Soft Motion for more complex machine movements and faster changeovers.

With the integration of Mechanical, Electrical and Electronic equipment in modern day industry, there is a need for an integrated approach to the training requirements for personnel to be able to adjust, service, maintain, programme and design modern equipment. This would include the advanced programming of PLCs, servo drives, machine safety systems, networking, mechanical setup and adjustment of sensors.

The aim of this Special Purpose Award is to address the short fall in the needs of training at this level of automation.

4.2.1 Advanced Mechatronics Part 1

(Level 8)

Course Code
CR_EAMEC_8

Course Fee

€980* (Includes course notes and exam fees)

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit www.cit.ie/course/CREAMEC8

Module Content

- Principles of the five IEC languages, Ladder, Instruction List, Sequential Function Chart, Function Block & Structured Text.
- Principles surrounding BUS systems, including CAN, Profibus, ProfiNet, Ethernet, describing addressing, PLC settings, Tag names etc.
- Principles of Analogue sensors, showing resolution, scaling, wiring, types of input 0-10V 4-20mA etc.
- Principles of safety systems up to category 4 machine safety, Safety Relays, Safety PLC's, interlocking devices.
- Principles of Servo Drive systems, Homing methods, signaling methods i.e. Digital or Bus signalling. Speeds, acceleration etc.

Admission Requirements

Candidates must have successfully completed the CIT Level 7

Mechatronics Module or equivalent and some relevant work experience working in in the area of Mechatronics.

Duration & Delivery

One evening per week for 12 weeks in Semester 1.

Awarding Body

5 ECTS Credits at Level 8 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of two or more.

4.2.2 Advanced Mechatronics Part 2

(Level 8)



Course Fee

€980* (Includes course notes and exam fees)

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_EAMEC_8

Course Information, and to apply online, visit
www.cit.ie/course/CREAMEC8



Module Content

- **Industrial Networking**
Programme PLCs to control Servo Drives, Vision systems & Robotic interaction with mechatronic systems across CAN Open, ProfiBus, ProfiNet and Ethernet.
- **Integration of PLCs and Servo Drive systems**
Programme Servo Drive Controllers to communicate with a PLC in a discrete manner. Programme the PLC to give positional control data to the Servo Drive controller.
- **Vision systems**
Programme Vision Systems to determine location, shape and orientation of objects. Programme PLCs and Robotic systems to use the information from the vision system.
- **Soft Motion Control**
Introduce Soft Motion Control for the control of Servo Drive positioning, demonstrating the use of CNC code embedded within a PLC function block.

Admission Requirements

Candidates must have successfully completed the CIT Level 7 Mechatronics Module or equivalent and some relevant work experience working in the area of Mechatronics.

Duration & Delivery

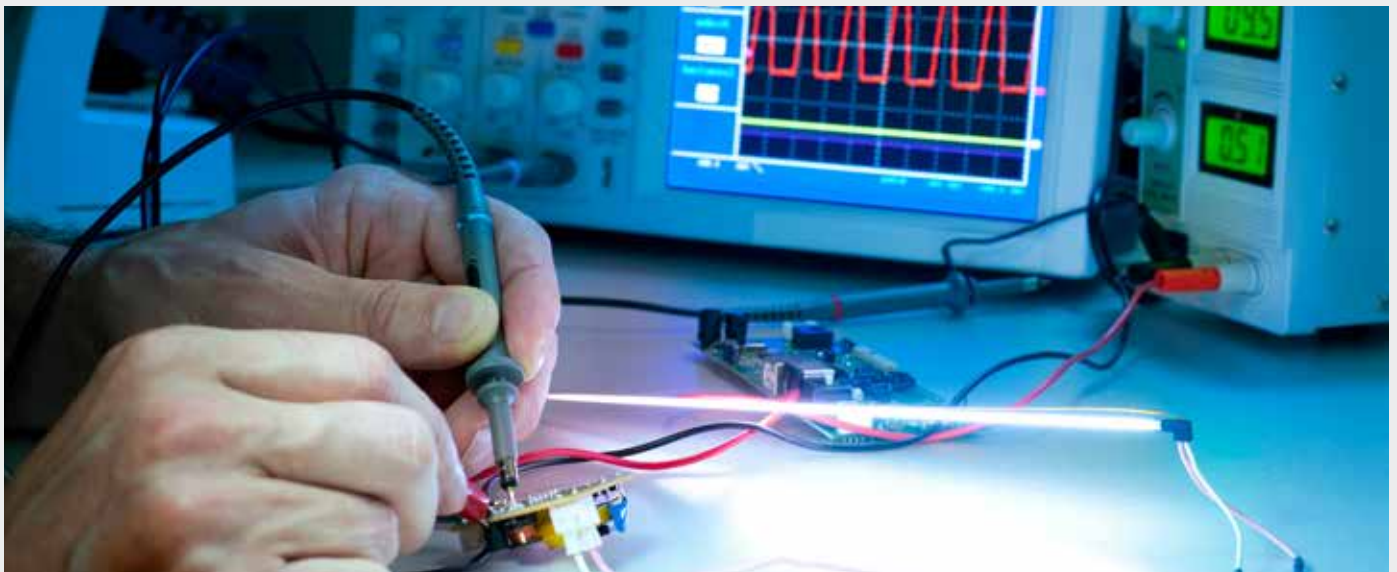
One evening per week for 12 weeks in Semester 2.

Awarding Body

5 ECTS Credits at Level 8 on the National Framework of Qualifications, awarded by Cork Institute of Technology.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of two or more.



5.0 Manufacturing Engineering

5.1 Certified Manufacturing Engineer (CMfgE)

(Level 6)

Course Code
CR_ECMEN_6

Course Fee

€975 includes course textbook.
(Course Fee does not include exam fee, payable to the SME).

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CRECMEN6

The course is based on a body of knowledge specified for certification by the Society of Manufacturing Engineers (SME) which is based in the USA. Its prime aim is to provide recognition for candidates who have several years manufacturing experience but no qualification to show for their work-based expertise.

Content

- Manufacturing Planning and Control
- Quality Management and Quality Tools
- Analysis of Manufacturing Processes
- Facility Layout and Planning
- Computer Integrated Manufacturing
- Occupational Health and Safety

Admission Requirements

Candidates must have a minimum of eight years manufacturing-related work experience and/or education (a maximum of five years of education may be applied toward the eight years experience/education requirement).

Duration & Delivery

One evening per week for the academic year.

Awarding Body

Society of Manufacturing Engineers (SME).

Note: CIT is not the examining body for this programme but acts as an official exam site.

Delivery of this programme is subject to sufficient numbers of applicants.





5.2 Metrology Training (AUKOM Level 1)



Course Fee

€1,950 (covers tuition,
AUKOM Level 1 Handbook
and exam fees)

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_SMETR_6

Course Information, and to apply online, visit
www.cit.ie/course/CRSMETR6



Duration

One evening per week over one semester

Admission Requirements

No specific entry requirements but applicants should have a background in CNC/CMM operations. The programme is aimed at production metrologists and consolidates fundamental principles and knowledge catering from beginners through to those with more experience.

Overview

AUKOM is an acronym for the German phrase ausbildung koordinatenmesstechnik, which translates to “coordinate metrology training.” AUKOM was developed in Germany to establish a global training standard for production coordinate measurement practice. Its methodology is vendor-neutral, meaning the skills gained and procedures learnt during certified training are applicable to any brand of measuring equipment and software.

AUKOM training is currently offered in 19 countries and CIT is the only approved training centre in Ireland. Three levels of certification are available; this Level 1 programme concentrates on fundamental concepts, such as dimensional tolerancing, basic programming, and common measuring equipment. Full course details are available at <https://www.aukom.info/en/aukom-training-courses/content-level-1.html>.

Topics covered in AUKOM Level 1 are

- Principles of coordinate metrology
- Basic definitions, tolerancing, and geometric elements
- Measuring preparation, including stylus selection, part cleaning, and temperature control
- Documentation & quality management

Candidates will be prepared to take the AUKOM Level 1 test which will be administered by CIT personnel at the end of the programme; AUKOM certificates will be issued to those who successfully complete the programme and the test.

Delivery

The programme is largely classroom-based but will involve practical demonstrations of Coordinate Measuring Machine (CMM) equipment and software.

Award

Metrology Training: AUKOM Level 1 Certificate



5.3 Certificate in Intelligent Manufacturing Systems

Course Code
CR_EINMS_9

Course Fee
€4,200

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course Information, and to apply online, visit
www.cit.ie/course/CREINMS9

Duration & Delivery

2 semesters. At least two evenings per week, partly class room based, partly blended (online).

Admission Requirements

Candidates will require a Level 8 qualification in one of the following: Mechanical, Electrical, Electronic, Chemical Engineering, Applied Physics and Instrumentation, Mechatronics or cognate discipline. Candidates with sufficient experience which in the judgement of CIT may be deemed equivalent to this qualification will be considered following the principles/procedures set out the Institute's Recognition of Prior Learning service in CIT (see www.cit.ie/rpl).

Overview

The Certificate in Intelligent Manufacturing Systems is a Level 9 programme which aspires to bridge the gap between the engineering operations and information technology paradigms in the manufacturing sector. Smart Manufacturing has been

described as the synthesis of advanced manufacturing capabilities and digital technologies to produce highly customisable products faster, cheaper, better, and greener. A smart factory will integrate data from system-wide physical, operational, and human assets to drive manufacturing, maintenance, inventory tracking and the digitisation of operations in order to achieve this goal.

Participants will acquire the skills necessary to contribute effectively to operate in the factory of the future, bringing manufacturing through to the next level envisaged by Industry 4.0. They will acquire specific knowledge of the new and emerging areas and how to integrate IT with Manufacturing Technology. Specific topics include Machine Learning, Data Science and Information Analytics, Robotics and Autonomous systems, Maintenance and machine Prognostics.

Award

Certificate in Intelligent Manufacturing Systems (Level 9 on the National Framework of Qualifications).



5.4 Certificate in Biomedical Device Manufacture

(Level 7)



Course Fee

€1,450* (includes course notes and exam fees)

Enquiries

T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie

Course Code
CR_EBMDM_7

Course & Module Information, and to apply online, visit

www.cit.ie/course/CREBMDM7



This programme was developed for anyone seeking employment in or transferring into the Biomedical Devices Sector as well as anyone wishing to enhance their general knowledge of the industry. The programme is structured around common medical disorders which are treated by biomedical devices manufactured in Ireland. On completion, participants will be familiar with a range of disorders, the anatomy and physiology associated with these disorders, the devices used in their treatment, and the processes involved in the manufacture of these devices.

The programme also familiarises participants with the engineering requirements and standards that apply to cleanrooms employed in the manufacture of medical devices. The programme looks at the specification of appropriate cleaning, packaging and sterilisation operations for medical devices, the assessment of the safety risks associated with manufacturing operations and the requirements for guaranteeing a safe working environment.

The programme also examines the detailed requirements of a Good Manufacturing Practice (GMP) system and the operation of regulatory bodies such as FDA/IMB.

Content

- **Anatomy**
General anatomy, Neuro Anatomy, Cardiovascular anatomy, Orthopaedics.
- **Medical Devices**
Devices used in the treatment of neurovascular, cardiovascular, orthopaedic disorders and product development history.
- **Manufacturing Processes**
Introduction to manufacturing processes; injection moulding, extrusion, wire drawing; catheter coating process, embolic coil manufacturing.
- **Cleanroom Technology**
Cleanroom classification; particle size and counting; filter design and performance, cleanroom layout, materials & standards, cleanroom commissioning and qualification.

• Cleaning and Sterilisation Technology

Requirements for cleaning, soil types, cleaning systems (organic/aqueous/semiaqueous), cleaning equipment. Ethylene oxide. Gamma sterilisation, electron beam. Saturated steam – gravity displacement, porous load, ballasted cycles. Dry heat sterilisation/depyrogenation. Microbial inactivation/ endotoxin inactivation.

• Packaging

Functions of packaging, packaging requirements for sterilisation, physical & chemical properties of packaging, labelling and packaging control, distribution hazards, production of packages, forming materials and methods, lidding, sealing.

• GMP

Introduction to GMP, GMP documentation – SOPs/regulatory documentation/submissions, Role and requirements of the FDA/IMB/Notified Bodies, introduction to 21 CFR820/Medical Devices Directive, planning for audits. Classification of devices. FDA/IMB submissions – 510k/PMA applications.

• Validation

Validation protocols – Installation, operational and performance qualification. Process validation, design qualification, validation of sterilisation system, design verification, design validation. URS/FDS/FAT/SAT master validation plans. Change control.

Admission Requirements

This course is open to anyone with a minimum of two years industrial experience.

Duration & Delivery

One evening per week for 13 weeks.

Awarding Body

CIT: Certificate in Biomedical Device Manufacture, Special Purpose Award 10 ECTS credits at Level 7 on the National Framework of Qualifications.

Note: Places are limited for this course. Eligible candidates will be considered on a first come first served basis.

* Discounts available for groups of three or more.

6.0 Bachelor of Engineering Degrees

6.1 Bachelor of Engineering (Honours) in Process Plant Technology

(Level 8)

Course Code
CR_EPPTN_8

Course Fee
See module listing

Enquiries
T: 021 432 6264
E: camms@cit.ie
W: www.camms.ie



Course & Module Information, and to apply online, visit
www.cit.ie/course/CREPPTN8

This course aims to produce graduates who can make a significant contribution to the design, operation, maintenance and management of process plant. The course concentrates on the mechanical aspects of process engineering design and selection, plant construction, condition monitoring, productive maintenance, plant safety, automation and control systems, project management and investment appraisal. This honours degree programme will help participants to develop the skills and knowledge to implement change and to undertake key operational management roles.

Admission Requirements

Merit or better in a relevant Diploma course or equivalent. Are you eligible for Recognition of Prior Learning (RPL)? For details, see the information section at the beginning of this Handbook.

Duration & Delivery

Three evenings per week, 7pm – 10pm, and one Saturday per month, 10am – 5pm. The course can be completed in two academic years.

Award

Bachelor of Engineering (Honours) in Process Plant Technology (Level 8 on the National Framework of Qualifications).

Modules Annual Fee per Module

Mandatory

Project	€1350
Quality Engineering	€510
Engineering Project Management	€510
Process Automation & Control	€510
Mathematics and Statistics	€510
Process Plant Services	€510
Process Plant Equipment	€510
Maintenance & Reliability	€510
Facilities	€510
Electives (choose 1)	
Automation Systems	€510
Advanced Materials and Processes	€510

6.2 Bachelor of Engineering (Honours) in Advanced Manufacturing Technology

(Level 8)



Course Fee

See module listing

Enquiries

T: 021 432 6264

E: camms@cit.ie

W: www.camms.ie

Course Code
CR_EAMTN_8

Course & Module Information, and to apply online, visit
www.cit.ie/course/CREAMTN8



All industries involved in the production of goods, whether biomedical, pharmaceutical, chemical, process, electronic or aeronautical require manufacturing engineers. These industries invest heavily in the most up to date automation, software and process control equipment as well as utilising the most modern of training and management techniques.

This honours degree programme aims to produce graduates who can make a significant contribution to the design, operation, and management of manufacturing systems, as well as to the quality and reliability of manufactured products, parts and equipment.

Admission Requirements

Merit or better in a relevant Diploma course or equivalent. Are you eligible for Recognition of Prior Learning (RPL)? For details, see the information section at the beginning of this Handbook.

Duration & Delivery

Three evenings per week, 7pm – 10pm, and one Saturday per month, 10am – 5pm. The course can be completed in two academic years.

Award

Bachelor of Engineering (Honours) in Advanced Manufacturing Technology (Level 8 on the National Framework of Qualifications).

Modules

Annual Fee per Module

Mandatory

Project	€1350
Quality Engineering	€510
Engineering Project Management	€510
Automation Systems	€510
Mathematics and Statistics	€510
Product Development	€510
Manufacturing Systems	€510
Maintenance & Reliability	€510
Facilities	€510

Electives (choose 1)

Process Automation & Control	€510
Advanced Materials and Processes	€510




Course themes include:

- Quality, Lean Sigma
- Project Management
- Automation & Control
- Advanced Mechatronics
- Manufacturing Engineering
- Biomedical Device Manufacture
- Process Plant Technology

The Centre is a recognised training provider for Continuing Professional Development (CPD) to Engineers Ireland. Tailored courses can be delivered at your place of work or at CIT across a wide range of disciplines through consultation with the Centre's multidisciplined staff.

 021 432 6264

 camms@cit.ie

 www.camms.ie