

Masters of Science in
**Construction
Informatics (IT)**
Part Time



Designed by
CITA Limited



University of Maribor,
Slovenia



Accredited by
Dublin Institute of Technology

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Overview of the Programme



CITA was formed in 2001 by academics in the Dublin Institute of Technology (DIT) and the Waterford Institute of Technology (WIT). The key driver in the development of this organisation was the need to increase the extent of Information and Communications Technology (ICT) knowledge within the Irish construction sector. The founders along with key construction industry professionals had a vision that CITA would develop a formal programme of education and training that would assist in harnessing the potential of ICT for the Irish Architectural, Engineering and Construction (AEC) sectors.

The Construction IT Alliance (CITA) M.Sc. in Construction Informatics (IT) is a fully accredited 90 ECTS programme by the Dublin Institute of Technology (DIT).

The programme was developed as part of the deliverables to be achieved under the CITA Skillnet Programme for 2008-2009, *The CITA Skillnet is funded by member companies and the Training Networks Programme, an initiative of Skillnets Ltd. funded from the National Training Fund through the Department of Education and Skills.* CITA was greatly assisted by academics from the University of Maribor and Ljubljana in Slovenia in the design of the programme.

The programme is intended to both educate students who have finished their undergraduate studies with a University Degree in civil, building, architecture, structural engineering or construction management, as well as IT graduates. Alternatively, those with suitable relevant work experience can also be considered.

The programme comprises of two and half years (five semesters) part-time study comparable in duration to similar postgraduate courses in the DIT.

CITA was greatly assisted by academics in University of Maribor and Ljubljana in Slovenia in the design of the programme.





Live Anywhere, Study from Anywhere

The programme is a distance learning programme with a flexible structure. All candidates will have to complete 10 modules, of which there are four obligatory modules; Introduction to Construction Informatics; Research Methods; Integrated Project and Dissertation. The remaining 6 modules are elective comprising basic modules and extended project modules. All modules will run sequentially in 5 week intervals, with the exception of the integrated project and dissertation modules which involve a full semester of study.

The idea of the extended projects is that a student who is interested in a module can continue working on it, but in a pure project oriented way. By this we mean a way of learning that originates from a given problem and where students discover their own way to a solution using the knowledge and the skills that they have gathered during the basic module and the literature that they researched and found for themselves.

In the final semester the students will complete a dissertation, where each student is allocated a supervisor.

This flexible structure allows students to choose their preferred mix of modules and extended. For example 5 basic modules + 1 extended project modules or 4 basic modules + 2 extended project modules. The extended project modules can only be chosen after the relevant basic module is completed. Students can gather 15 credits per semester between semesters 1 to 4, totalling 60 credits and 30 credits on the completion of their dissertation in semester 5.

Third Level Expertise



This programme is designed in co-partnership with CITA and an experienced educational and research group specialising in the delivery of ICT to the construction industry. The programme involves a very unique co-operation between experts in four principal and respected third level institutions, namely:

- [Dublin Institute of Technology](#)
- [University College Cork](#)
- [University of Maribor, Slovenia](#)
- [University of Ljubljana, Slovenia](#)

CITA in partnership with the Department of Construction Economics in DIT will integrate this programme into the DIT suite of postgraduate programmes for 2010/2011. The Department of Construction Economics is one of two departments in the School of Real Estate in DIT Bolton Street which has gained considerable experience and expertise in delivering postgraduate programmes in recent years.

UCC currently offer an MEngSc (Information Technology in Architecture, Engineering and Construction). The programme enables civil engineers and engineers from other related disciplines (mechanical, electrical, etc.) to sustain sophisticated ICT in Architecture, Engineering and Construction (AEC) and Facilities Management (FM) organisations.

The University of Ljubljana is the largest University in Slovenia with over 56,000 students. The Construction IT group, participating in this programme, is a part of the Institute of Structural Engineering, Earthquake Engineering and Construction Information Technology at the Faculty of Civil and Geodetic Engineering. Computer Integrated Construction (CIC) has been systematically researched at the University of Ljubljana since the late 1980s.

The University of Maribor has over 25,000 students per year and almost 2,300 students were registered in 2009 for post graduate courses. The University graduated 210 master degrees and 48 doctoral students in 2008. The university employs 1,800 people and had an annual budget of €84.2 million in 2008.

The academics that will teach on this programme have been actively participating in the work of the International Council for Research and Innovation in Building and Construction's (CIB) working group W78 on Computer Integrated Construction (CIC), W102 on Information and knowledge Management, and its particular application in the construction industry.



Introduction to Construction Informatics

Module Author

Žiga Turk (Ljubljana)

Module Description

This module will introduce the field of Construction Informatics and its role in the AEC sector.

Module Aim

To provide students with an understanding of the purpose of construction informatics and more specifically to outline the optional modules available to the student on the programme in more detail.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Define the role of informatics in society in general and in AEC in particular.
- Describe the strategic importance on the informatisation of the AEC sector.
- Explain the potentials of construction informatics in general and of various specific application areas.
- Discuss critically the specific problems of construction informatics.

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).

Module content:

- What is construction informatics?
- History of construction informatics
- Paradigms of designing; role of technology
- Technical, scientific and life-cycle framework for information technologies
- Strategic perspective of informatisation in the construction industry
- Role of IT in a construction company and society
- Business and technical process-reengineering and IT
- Programme roadmap, optional modules and resources
- Specific problems of construction informatics
- Data, information, knowledge, wisdom
- ITC as a career opportunity
- What computers can't do?
- Project



CAD Information Systems

Module Author

Nenad Cuš Babić (Ljubljana)

Module Description

This module will introduce the concepts and the practice of 3D modelling of buildings and the interoperability of CAD (Computer Aided Design) applications.

Module aim

To provide students with an understanding and the ability to use 3D CAD, BIM (Building Information modelling) and application interoperability.

Learning Outcomes:

On successful completion of the module, the students will be able to:

- Describe the concepts and aims of 3D CAD and BIM.
- Recognise the potentials of 3D CAD and BIM.
- Describe interoperability problems and solutions.
- Distinguish and describe 3D model representations.
- Recognise and describe CAD model elements, functions and operations.
- Prepare data and integrate the data into 3D model.
- Construct or modify models in 3D.
- Share the models and work collaboratively.
- Evaluate and present the models.
- Describe technologies and standards related to BIM.

Module content

- Introduction (course background and objectives)
- The process of design and modelling
- Types of models and components
- Modelling operations
- 3D conceptual modelling and tools
- 3D architectural design and tools
- 3D geographic modelling and tools
- Building information modelling
- CAD application interoperability
- Project

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).



eBusiness in Construction

Module Author

Alan Hore (DIT)

Module Description

This module will introduce the concepts and technologies of eBusiness with an emphasis on Architecture, Engineering & Construction (AEC) and Facilities Management (FM).

Module aim

To provide students with a broad understanding of the different aspects of e-business in Architecture, Engineering & Construction (AEC) and Facilities Management (FM)

Learning Outcomes

On successful completion of the module, the students will be able to:

- Describe the importance of eBusiness in the AEC sector.
- Define the fundamental supporting IT methods and technologies that are required to support a successful eBusiness strategy.
- Prepare Business Process Modelling (BPM) maps of existing business processes and identify potential areas for improvement.
- Prepare re-designed business process maps which seek to re-engineer business processes.

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).



Module content

- Introduction to eBusiness
- Mapping the Supply Chain
- Change Management
- Technology and eBusiness
- Extranets, eCommerce Hubs, AS2, EDI, XML
- Interfaces to eBusiness
- Technical Aspects
- Billing, charging, invoicing, account management
- Save data transmission and digital signatures
- Privacy and data mining
- Project

Building Collaborative Technologies

Module Author

Tomo Cerovšek (Ljubljana)

Module Description

This module will introduce the concepts of web based collaborative technologies and the use of collaboration systems in AEC.

Module aim

To provide students with an understanding of web communication technologies and the ability to use web based collaboration systems.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Thoroughly understand the Internet and the web (www) concepts and technologies.
- Evaluate various modes of Web communication.
- Appraise various systems for Web communication and collaboration.
- Appraise the use of project portals.

Module content

- Building collaborative technologies
- Technical issues
- Teamwork issues
- Introduction to engineering communication
- Communication model
- Types of communication
- Collaborative communications
- Context for the exchange
- Systems thinking methodologies
- Taxonomy of collaborative and RTC technologies
- Network topologies
- Interaction type
- Groups size
- Ownership models
- Collaborative practices
- Case Studies
- Examples of working systems
- Development, use, and integration
- Adoption and implementation
- Project

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).

Applied Knowledge Management



Module Author

Andrej Tibaut (Maribor)

Module Description

This module will introduce the concepts of knowledge management and its use in AEC. Understanding of knowledge management concepts (tacit knowledge, explicit knowledge) helps to identify knowledge related problems, such as the need for knowledge sharing and the understanding of knowledge assets in organisations business processes. Process and knowledge modelling techniques enable finding, selecting, organizing, distilling and presenting data, information and knowledge. AEC is an extremely knowledge intensive industry where different knowledge management technologies can be applied.

Module aim

To understand fundamentals of knowledge management and knowledge technologies and apply it in AEC.

Learning Outcomes


On successful completion of the module, the students will be able to:

- Critically explain the role of knowledge in organisations.
- Appraise knowledge related problems and knowledge assets in organisations.
- Evaluate ways for better knowledge sharing in/between organisations.
- Work as part of a team for analysis and proposal of appropriate software solutions for knowledge management.
- Create expressive forms of knowledge that support business processes.

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).

Module content

- Knowledge Management and Strategy
 - Measuring and Managing Knowledge
 - Knowledge Management Techniques and Tools
 - Knowledge Management Standards
 - Implementing Knowledge Management
 - Knowledge Management Examples
 - * Project
- 



Project Planning and Scheduling

Module Author

Luke Allen (UCC)

Module Description

This module will introduce the concepts of building process models and the use of project planning and scheduling software.

Module aim

To provide students with the skills necessary to plan, prepare and update construction project schedules utilising Microsoft Project software.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Define schedule activities and assign reasonable durations to the activities.
- Know how to sequence the activities for logical project flow.
- Explain schedule float and understand how float can be used to delay or lengthen activities and to smooth manpower requirements.
- Evaluate computerised scheduling and understand both its limitations and advantages.
- Apply constraints, sorts and filters to a computer generated schedule.
- Develop a thorough understanding of what resources are needed and how they can be coordinated with the schedule.
- Appraise methods for monitoring, comparing and updating the project schedule.

Module content:

- Pre-construction Planning
- Construction Planning and Scheduling
- Cost Construction Scheduling
- Planning and Scheduling Process
- Scheduling methods
- Creating the schedule
- Refining
- Monitoring
- Project

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).



Mobile Computing in Construction

Module Author

Danijel Rebolj (Maribor)

Module Description

Mobile computing is one of the new information technologies with the highest potential for the construction sector, as it can extend the information systems support from offices to the field. This module will introduce mobile technologies and their applications in the AEC sector with the emphasis on the technologies application in the construction industry.

Module aim

To provide students with an understanding of the potential and the importance of mobile computing in construction, the basic technologies of mobile computing and the ways of utilising it in construction projects.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Critically evaluate the basic technologies and potentials of mobile computing for the AEC sector.
- Evaluate the trends of mobile computing development and their impact on AEC.
- Evaluate mobile computing applications in construction.
- Formulate requirements for a mobile computing application in a chosen specialised area in the AEC sector.

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).



Module content

- Information flow in construction projects and its spatial dimension
- Basic technologies of mobile computing
- Mobile information systems (applications) and their characteristics
- The concept of context sensitivity in mobile information systems
- Ubiquitous computing
- Project

Energy Integrated ICT Applications

Module Author

Ken Beattie (DIT)

Module Description

This module is designed to ensure candidates are capable of using Irish national calculation methods (DEAP & NEAP) to produce Building Energy Rating Assessments in accordance with the Energy Performance of Buildings Directive (EPBD) for domestic dwelling types.

Module aim

As a result of completing this module candidates shall be suitably qualified and competent to become a registered BER assessor through successful completion of domestic assessment accreditation programmes.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Explain the objectives, background and legislative enforcement of the EPBD in Ireland.
- Undertake to limit the use of primary energy and CO₂ emissions according to building regulations.
- Be capable of collecting BER data for domestic surveys from specifications and plans.
- Input data to the relevant assessment procedure software (DEAP & NEAP) to accurately produce BER labels and in the case of commercial buildings to check Building Regulations Part L Compliance.
- Produce advisory reports for BER and general energy consumption improvement.

Extended Project (Option)

A separate extended project module may be chosen following the completion of this module (subject to demand).

Module content

- The Energy Performance of Buildings Directive (EPBD)
- Building Regulations Part L
- Plans & surveys
- DEAP Software
- Project



Research Methods

Module Author

Alan Hore

Module Description

This is a specialised module intended for participants proceeding to conduct a masters' dissertation within an applied construction setting. The module is structured to give participants an understanding of contemporary research paradigms, methodologies and methods.

Module aim

The aim of this module is to provide an understanding of the nature of, and the different approaches to contemporary research and support participants in planning and writing a research proposal and literature review within an applied construction context at postgraduate level.

Learning Outcomes

On successful completion of the module, participants will be able to:

- Define research and the aims of research.
- Identify issues and problems which are of professional concern and which are capable of further exploration and research.
- Formulate research objectives and questions.
- Critically appraise a range of different research methodologies and select appropriate options to apply in construction research settings.
- Make decisions about quantitative and qualitative approaches to research.
- Formulate/draw-up an acceptable research proposal suitable for a dissertation topic and carry out a comprehensive literature review at postgraduate level.
- Carry out a critical review of selected papers.

Module content

- Introduction to research methods
- Research quality
- Research methodologies
- Information literacy and handling
- Data collection techniques
- Analysing the research data





Integrated Project

Module Author

Danijel Rebolj (Maribor)

Module Description

This module will upgrade gained knowledge from previous modules in an integrative way through a realistic team project, which will cover all major design and planning activities.

Module aim

To consolidate and to better understand knowledge and skills gathered in previous modules in the programme by applying it in an integrative way on a selected case study project.

Learning Outcomes

On successful completion of the module, the students will be able to:

- Better understand the potentials, the value, and the limitations of Construction Informatics
- Integrate and deepen the already acquired knowledge and skills in the area of Construction Informatics
- Learn to use and integrate the knowledge in a team environment.
- Master the use of web collaboration tools



Module content

- Project Briefing
- Development of Models & Plans
- ICT System Solutions
- Project Presentations
- Critique of Proposals



Dissertation

Module Author

Alan Hore

Module Description

The Dissertation Module is a mandatory requirement for the award of a Masters Degree. This is largely a self-directed learning module that is reported in an appropriate dissertation format of approximately 25,000 words. The dissertation is an original piece of work by the participant on an ICT topic of particular interest to the construction profession.

Module aim

The aim of this module is to give the student a chance to focus on independent enquiry. It is self-directed and self-motivated which substantially differs to the learning experience. This allows the student, with the support of an assigned supervisor, the opportunity to integrate the various dimensions of knowledge acquired, as well as utilising the skills obtained in the research methods literature. It also offers the chance to concentrate on and specialise in a subject which may be of interest to the student and which may subsequently become a focus of career aspiration. This module also aims to encourage students to develop a commitment to independent research.

Learning Outcomes

On completion of this module the student will have:

- Critically assessed research methods and make an informed decision on the most appropriate method to use.
- Implemented an appropriate methodology in the completion of the dissertation.
- Engaged in a self-directed piece of research.
- Critically reviewed current relevant literature.
- Formulated research objectives and/or hypotheses.
- Designed and undertaken appropriate primary research.
- Evaluated research findings in the context of the existing literature.
- Managed regular meetings with a nominated supervisor.
- Structured and presented in a complex argument or a hypothesis in an appropriate manner.
- Demonstrated clarity and rigour in writing.
- Reported on the full research process in the dissertation which is submitted for academic review.

Module content

The assessment of the dissertation is based on the following criteria:

- Relevance, Presentation and Organisation (25%)
- Literature Review (25%)
- Research Methodology (15%)
- Presentation and Analysis of Findings (25%)
- Conclusion (10%)

Overall Structure of the Programme

Semester 1

Introduction to Construction Informatics
5ECTS

CAD Information Systems
5ECTS

eBusiness in Construction
5ECTS

Introduction to Construction Informatics -EP
5ECTS

CAD Information Systems -EP
5ECTS

Semester 2

eBusiness in Construction -EP
5ECTS

Building Collaborative Technologies
5ECTS

Building Collaborative Technologies -EP
5ECTS

Applied Knowledge Management
5ECTS

Applied Knowledge Management -EP
5ECTS

Project Planning and Scheduling
5ECTS

Semester 3

Project Planning and Scheduling -EP
5ECTS

Mobile Computing in Construction
5ECTS

Mobile Computing in Construction -EP
5ECTS

Energy Integrated ICT Applications
5ECTS

Energy Integrated ICT Applications -EP
5ECTS

Research Methods
10ECTS

Semester 4

Integrated Project
15ECTS

Semester 5

Dissertation
30ECTS



EP - Extended Project (elective)
(can only be elected after basic model is completed successfully)

Fees and Application Procedures

Fees

€3,600 per year (2 semesters)
Individual Modules €600 per module

Applications

CITA intend to adopt DIT policy in respect to entry requirements for Post Graduate Diploma level programmes. The minimum entry level is an honours 2.2 undergraduate Level 8 degree or its equivalent. Selection will be made on a combination of the interview and by using the following criteria:

Selection criteria	Weighting
Academic achievement	40%
Relevant employment experience	20%
Interest in and critical awareness of the particular application of ICT in the construction and FM process. Evidence of interest in postgraduate construction research.	40%

Applicants who do not meet the minimum academic entry standards may be admitted on an exceptional case basis after thorough assessment of their work experience or the like.

For further details on the programme please contact Dr Alan Hore via alan.hore@cita.ie or phone (086) 386 7352 or visit www.cita.ie

All students will be registered as DIT students and will avail of all DIT student resources and entitlements



Programme Schedule

Semester 1							
Module	Total Learning	ECTS	No. of	No. of	Assessment Marks	Exams	Total
Title	Hours	Credits	Projects	Exams	Course work		
Introduction to construction Informatics	123	5	1	1	60	40	100
CAD Information Systems	123	5	1	1	60	40	100
eBusiness in Construction	123	5	1	1	60	40	100
Introduction to Construction Informatics - EP	123	5	1	0	100	0	100
CAD Information Systems - EP	123	5	1	0	100	0	100

Semester 2							
Module	Total Learning	ECTS	No. of	No. of	Assessment Marks	Exams	Total
Title	Hours	Credits	Projects	Exams	Course work		
eBusiness in Construction - EP	123	5	1	0	100	0	100
Building Collaborative Technologies	123	5	1	1	60	40	100
Building Collaborative Technologies - EP	123	5	1	0	100	0	100
Applied Knowledge Management	123	5	1	1	60	40	100
Applied Knowledge Management - EP	123	5	1	0	100	0	100
Project Planning & Scheduling	123	5	1	1	60	40	100

Programme Schedule

Semester 3

Module	Total Learning	ECTS	No. of	No. of	Assessment Marks	Exams	Total
Title	Hours	Credits	Projects	Exams	Course work		
Project Planning & Scheduling - EP	123	5	1	0	100	0	100
Mobile Computing in Construction	123	5	1	1	60	40	100
Mobile Computing in Construction - EP	123	5	1	0	100	0	100
Energy Integrated ICT Applications	123	5	1	1	60	40	100
Energy Integrated ICT Applications - EP	123	5	1	0	100	0	100
Research Methods	244	10	2	0	200	0	200

Semester 4

Module	Total Learning	ECTS	No. of	No. of	Assessment Marks	Exams	Total
Title	Hours	Credits	Projects	Exams	Course work		
Integrated Project	375	15	1	0	300	0	300

Semester 5

Dissertation	732	30	1	0	600	0	600
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CITA Skillnet Programme



Skillnets is an enterprise-led support body whose mission is to enhance the skills of people in employment in Irish industry to support competitiveness and employability.

Skillnet supports networks of enterprises to engage in training under the Training Networks Programme (TNP). Since 1999, Skillnets has facilitated over 10,000 Irish enterprises, in over 150 networks to improve the range, scope and quality of training and enable over 50,000 employees to improve their skills.

The CITA Skillnet is promoted by the Construction IT Alliance Limited (CITA) which has a constituent membership in excess of 140 companies representative of all the major sub sectors of the Construction Industry. The network focuses on ICT training needs within the Irish Construction sector and target organisations include Architects, Clients, Engineers, IT firms, Quantity Surveyors, Main Contractors, Sub Contractors and Suppliers.

Courses on offer range from Basic IT Skills to Building Information Modelling. Availability of funding means CITA Skillnet can offer significant savings on training courses. Training courses are available with flexible timetables. Training can be provided in-house or at training centres.

CITA Skillnet is a training network of the Construction IT Alliance. CITA Skillnet is funded by member companies training fees and the Training Networks Programme, an initiative of Skillnets Ltd. funded from the National Training Programme through the Department of Education and Skills.

For further information, see www.cita.ie/skillnet.

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