

**Part 1 Programme details**

<b>Proposed title</b>	BSc in BIM (Digital Construction)
<b>Mode and duration of programme</b>	One year full-time/ one year part-time (see recommendation of the Panel)
<b>ECTS</b>	60
<b>TU Dublin award(s) sought</b>	Bachelor of Science in BIM (Digital Construction)
<b>Classifications of award(s)</b>	First Class Honours; Second Class Honours, First Division; Second Class Honours, Second Division; Pass
<b>School responsible</b>	School of Multidisciplinary Technologies
<b>Professional body accreditation and relevant dates (where applicable)</b>	NA
<b>External provider type (where applicable)</b>	NA
<b>Delivery location</b>	TU Dublin

**Part 2 Programme approval information**

<b>Date of initial approval (of Q1A) by ORC’s Academic and Research Committee</b>	<b>14<sup>th</sup> November 2018</b>
<b>Date of validation event</b>	<b>24/25 September 2019</b>
<b>Date of approval by Academic Council and Governing Body</b>	
<b>Proposed date of commencement</b>	<b>January 2020</b>

**Part 3 Programme background/structure**

***Background***

The School of Multidisciplinary Technologies has received Springboard funding for this one-year advanced entry Level Eight BSc.

This programme will service the increasing need for digitisation of the design, construction and operation of the Built Environment by strategically changing culture (people, lean and sustainability), standardising and continuously improving operations (lean process), and utilising advanced software, hardware, and systems (technology).

## ***Stated learning outcomes of the programme***

*Upon completion of the programme learners will be able to:*

- Create discipline-specific BIM models utilising industry-leading software and relevant standards;
- Utilise appropriate BIM standards and guidance materials within appropriate workflows;
- Co-ordinate BIM models between disciplines;
- Exploit BIM models for a range of co-ordination-, cost-, energy-, and design-related task;
- Define the requirements for low energy building construction;
- Utilise a range of digital and cloud-based technologies and tools to support multidisciplinary co-ordination and workflows.

*Through optional modules, some learners will also be able to:*

- Create BIM objects (families);
- Utilise BIM modelling software for the achievement of energy targets;
- Incorporate other information sources into BIM models, e.g. point clouds, existing building surveys, and facilities management information.

## ***Programme structure***

Both the full-time and part-time routes are one year in duration. The part-time mode recognises the importance of Work-Based Learning and challenges students to improve their practice in industry through the use of formalised reflection on learning and alignment, where appropriate, with the membership / Chartership requirements of relevant professional bodies. The full-time mode includes an Internship that takes place during the summer holiday period for five days per week and continues during the September – January semester with online support and release for three workshops to support the dissertation.

## ***Entry Requirements***

Minimum entry requirements for this advanced entry Level Eight programme are a Level Seven degree in construction-related areas. Applicants who have a relevant Level Six qualification with significant relevant experience will be considered through the TU Dublin RPL process, as will applicants with varying relevant qualifications who are employed in BIM-related roles or have a commitment from their employer that their role will encompass BIM within their duration of the programme.

## ***Student assessment***

In accordance with TU Dublin's General Assessment Regulations. Minimum thresholds of performance apply to all modules where there is more than one assessment component. The stated thresholds are 30%.

## ***Derogations from the General Assessment Regulations, including rationale for derogation and view of the Panel:***

None sought

## **Part 4 Validation Details and Membership of Panel**

### **Schedule of meetings**

***Day 1: Tuesday 24<sup>th</sup> September 2019***

***Venue: Boardroom, TU Dublin – City (Bolton Street)***

- 17.00 hrs Introductory meeting between Panel, Director of College of Engineering & Built Environment, Head of School of Multidisciplinary Technologies, Chairpersons and members of Programme Committees as appropriate. Presentation from School.
- 17.30 hrs Private meeting of Panel to discuss agenda.
- 18.45 hrs Panel meets with group of current students and graduates of the MSc in Applied BIMM.
- 19.15 hrs Tour of facilities available to students on both programmes.
- 19.30 hrs Dinner.

**Day 2: Wednesday 25<sup>th</sup> September 2019**

**Venue: Boardroom, TU Dublin – City (Bolton Street)**

- 09.00 hrs Refreshments (tea/coffee) served. Private meeting of Panel.
- 09.30 hrs Meeting with Head of School, Chairpersons and appropriate members of the Programme Committees for the proposed BSc and for the existing MSc, to discuss specific issues raised by the Panel.
- 11.15 hrs Meeting of Panel with staff teaching on both programmes to discuss such matters as syllabi, teaching methods and assessment issues.
- 12.45 hrs Lunch.
- 13.30 hrs Private meeting of Panel to consider draft reports.
- 16.00 hrs Final meeting of Panel with Director of College of Engineering & Built Environment, Head of School of Multidisciplinary Technologies, Programme Chairpersons and other staff as appropriate.

**Panel Membership**

**External Members**

- |                      |   |
|----------------------|---|
| Dr Sharon McClements | Lecturer, Belfast School of Architecture and the Built Environment, Ulster University |
| Gerard O’Sullivan    | Group BIM Manager, DPS Group, Cork  |

**Internal Members**

- |                         |   |
|-------------------------|---|
| Dr Fiona Murray (Chair) | Assistant Head of School of Mathematical Sciences, TU Dublin - City |
| Myles Keaveney          | School of Surveying & Construction Management, TU Dublin - City     |
| Dr Aileen Kennedy       | School of Marketing, TU Dublin - City                               |

## Quality Assurance Office

Jan Cairns

Quality Assurance Officer, TU Dublin - City

### Documentation submitted

The Panel received Background Information in relation to the programme proposal and module descriptors as well as access to online Student Handbook and other resources.

### Part 5 Summary of Panel findings against key questions

Note: the Panel's findings (ie yes/no) and any additional comments against each of the key questions should be recorded below. Where a 'no' is recorded, an associated condition or recommendation should be included in Part 6, Findings of the Panel.

Is the market demand and need for the programme clear and articulated?	Yes
Are the aims, objectives and learning outcomes of the programme well-founded and clearly formulated?	See conditions regarding the overall programme philosophy and programme aims and regarding NFQ descriptor template.
Are the entry requirements clear and appropriate?	Yes. See recommendation in relation to entry via RPL process
Are the arrangements for access, transfer and progression in accordance with University policy and NFQ?	Yes. This is an advanced entry programme that facilitates Level Seven graduates to obtain an Honours Degree in one year.
Are the programme learning outcomes at the appropriate level as set out by the NFQ requirements?	See condition regarding NFQ descriptor template.
Do the individual modules 'add up' to a coherent programme?	Yes
Are Graduate Attributes embedded within the programme?	No – see condition in this regard.
Will the accumulation of the module learning outcomes result in the attainment of the programme learning outcomes?	The Panel agreed a condition regarding the mapping of the programme learning outcomes to module learning outcomes and assessment methods.
Is there appropriate use of student-centred learning, teaching and assessment strategies, including the First Year Framework for Success checklist, which recognise the needs of diverse student groups?	Yes
Do the curricula and teaching schemes in each module descriptor give realisable substance to the module's aims, objectives and learning outcomes?	Yes
Are the assessment methods and criteria aligned to the learning outcomes in each module?	See condition regarding mapping of learning outcomes to assessments.
Are facilities and resources, including staff, in place to support the delivery of the programme at the standard proposed?	Yes
Is there parity between off-campus/on-campus delivery (if applicable)?	NA

Are the roles and responsibilities of each partner clearly specified (if applicable)?	NA
---	----

## Part 6 Recommendations of the Panel

The Panel recommends to Academic Council approval of the Bachelor of Science in BIM (Digital Construction), at Level Eight on the National Framework of Qualifications, subject to five conditions and with seven recommendations.

The Panel congratulates the School on its successful application for Springboard funding for this programme, and it considers there to be a demand for a programme such as this.

### Conditions

1. The overall philosophy underpinning this advanced entry BSc with students from diverse backgrounds and experiences should be made explicit within the programme documentation and throughout the modules. Themes emerging from the programme philosophy and aims should then feed into programme learning outcomes and module learning outcomes and content.

New section 1.1 (Supporting Information) & Student Handbook section added to explicitly state the Philosophy of the Programme

2. It should be demonstrated within the Student Handbook how TU Dublin Graduate Attributes are addressed within the programme. The Panel recommends that the programme aims, which are informed by the programme philosophy (see condition 1) should be developed alongside these Graduate Attributes.

New section 1.3 (Supporting Information) & Student Handbook section added on the Development of Graduate Attributes and replicated in the Student Handbook

3. The programme learning outcomes should be aligned with the headings in the National Framework of Qualifications award descriptor.

Section 1.2.2 (Supporting Information) & Student Handbook section has been added with full mapping from PLOs to NFQ via the NFQ award descriptor.

4. The programme learning outcomes should be mapped to module learning outcomes and assessment methods to demonstrate alignment, through a table or diagram as appropriate.

This has been tabulated in <https://sites.google.com/a/dit.ie/handbook-of-the-bsc-hons-in-bim-at-tu-dublin-2020/home/programme-aims-1> and Table 2 and Table 3 below, and in the student handbook: <https://sites.google.com/a/dit.ie/handbook-of-the-bsc-hons-in-bim-at-tu-dublin-2020/home/programme-calendar>.

5. Module descriptors should be revised as follows:
  - There should be greater consistency in the number of learning outcomes proportionate to the ECTS weightings of the modules.

This has been tabulated in Table 1 below:

Table 1 Number of Module Learning Outcomes versus ECTS credits

C/E/S	Module Title	Previous # LOs	New # LOs	ECTS	Comment
S	BIM Civil & Structural Engineering Modelling & Review	11	10	10	Within 10-12 norm for 10 credits on this programme
S	BIM Construction Model Exploitation & Review	15	10	10	
S	BIM Architectural Modelling & Review	13	11	10	
S	BIM MEP Modelling & Review	14	11	10	
C	BIM Federation & Validation	13	12	10	
C	Digital Construction – Principles and Standards	5	5	5	Within 4-10 norm for 5 credits (as per the recommendations of TU Dublin's M1 template) and typical of 5-credit modules on this programme where 5-7 LOs are used
E	Visual Programming for Engineering and Built Environment	6	6	5	
E	BIM Objects	6	6	5	
E	BIM and Off-Site Digital Construction	6	6	5	
E	Digital Construction and Low Energy Buildings	9	7	5	
E	Virtual and Augmented Reality for Digital Construction	7	7	5	
C	Research Methods at BSc Level	7	7	5	LOs are at the top of the requirements for level 8 and, therefore, focus is on quality not quantity
C	Dissertation including Agile Project Management	9	10	15	
E	Work-Based Learning at BSc Level	10	10	15	

Table 2 Programme Learning Outcomes

PLO Number	Programme Learning Outcome
1	Create discipline-specific BIM models utilising industry-leading software and relevant standards.
2	Utilise appropriate BIM standards and guidance materials within appropriate workflows.
3	Co-ordinate BIM models between disciplines.
4	Determine effectiveness of processes & standards associated with BIM co-ordination.
5	Exploit BIM models for a range of co-ordination-, cost-, energy-, and design-related task and validate the outcomes.
6	Define the requirements for low energy building construction and interpret the outcomes of decisions around building materials and methods.
7	Evaluate the utilisation a range of digital and cloud-based technologies and tools to support multidisciplinary co-ordination and workflows.
8	Create BIM objects (families)
9	Utilise BIM modelling software for the achievement of energy targets
10	Evaluate the incorporation of other information sources into BIM models, e.g. point clouds, existing building surveys, and facilities management information

Table 3 Module Learning Outcomes & Assessments mapped against Programme Learning Outcomes

Module Title	Assessment	Module Learning Outcomes	Programme Learning Outcomes
BIM Architectural Modelling & Review	Project	1-9	1,2,5,10
	Technical Report	9-11	1,2,5,10
BIM Civil & Structural Engineering Modelling & Review	Project	1-8	1,2,5,10
	Technical Report	8-10	1,2,5,10
BIM Construction Model Exploitation & Review	Project	1-8	1,2,5,10
	Technical Report	8-10	1,2,5,10
BIM MEP Modelling & Review	Project	1-9	1,2,5,10
	Technical Report	9-11	1,2,5,10
BIM Federation & Validation	Project: Federated model utilisation and validation (team)	1-10	2-5,7
	Presentation (team)	1-10	2-5,7
	Written Report (individual)	10-12	2-5,7
Digital Construction – Principles and Standards	Individual research paper	1-3	2, 4-7,9-10
	Team-based project	4-5	2, 4-7,9-10
Digital Construction and Low Energy Buildings	Project	4-7	2,5,6,9
	Technical Report	1-7	2,5,6
Visual Programming for Engineering and Built Environment	Tasks based on software application usage	1-4	1,3,5,7

	Software-based project with evaluation	5-6	1,3,5,7
Virtual and Augmented Reality for Digital Construction	Technical Report	1-6	1,3,5,7
	Application implementation project	7	1,3,5,7
BIM and Off-Site Digital Construction	Individual research paper	1-5	2, 4-7
	Team-based project	6	2, 4-7
Research Methods at BSc Level	ePortfolio	1-6	4-5,7,10
	Presentation	7	4-5,7,10
	Research Proposal	1-6	4-5,7,10
BIM Objects	Project	1-5	1-2,8
	Technical Report	5-6	1-2,8
Dissertation including Agile Project Management	Progress interview/critique	1-4	4-5,7,10
	ePortfolio (including paper drafts)	1-8,10	4-5,7,10
	Paper (final form)	9	4-5,7,10
Work-Based Learning at BSc Level	Work-Based Learning Proposal	5-6	All
	Journal Entries / Logs	1-10	All
	Site Visit	1-7,9-10	All
	Final Reflective Practice Report & Presentation	6-8	All

- Learning outcomes should reflect the level of learning required in the verbs used – currently many learning outcomes are task-related rather than to the learning achieved.

All LOs have been reviewed; task-based LOs removed; the majority of LOs on all module descriptors are now reflective of NFQ Level 8

- Reading lists should be complete and up-to-date.

As stated on every module descriptor, full and up-to-date reading lists are provided annually via the University's VLE. In a fast-moving field such as this, it is not feasible to maintain reading lists in the module descriptors as they change not only annually but during the delivery of each module i.e. every 2 – 3 months. Staff commit to sharing up-to-date reference materials on an ongoing basis throughout the delivery duration of all modules.

### The Panel also recommends that:

- a) The overall student learning experience per semester including learning and contact hours, delivery modes and assessment requirements should be clearly represented in a diagram/table, in order to indicate to students easily and clearly what is expected of them.

The programme team will add the assessment requirements to the existing mapping of the learning & contact hours and delivery mode information already available in the online Student Handbook. This will be prepared as part of the programme marketing materials and will be available as soon as possible for all potential applicants.

- b) A provisional schedule of assessments should be provided to ensure that the assessment strategy and deliverables are feasible and achievable by students and that time for feedback is embedded.

This will be jointly undertaken with the exercise for recommendation a) and as part of timetabling activities.

- c) In addition to the two points above, it should be indicated within the Student Handbook how independent learning and collaborative working are supported and enabled, including a clear indication of where formal collaboration is taking place.

Formal collaboration is the norm within all modules on the programme so the programme team intends to use the same method as has been successfully employed with the MSc suite where requirements for collaboration are articulated at Induction and in the materials supplied at that time. This will also be added to the Student Handbook. Additionally, students will be continuously reminded of their responsibilities in relation to independent learning and collaborative working during module delivery, particularly using the supports available within the Brightspace VLE.

- d) The current proposed full-time route should be subsumed within the part-time route. Should a full-time route be proposed this would require initial approval via the Q1A process.

The programme team have re-focused the delivery to address the needs of two categories of student: Upskilling – students already in BIM roles requiring additional education; Conversion – students not yet in BIM-related roles and who wish to change employment via a summer internship.

- e) For those students entering with Level Six qualification through the RPL process, decisions on entry should be made by a panel or committee rather than one individual, and the trajectory of this cohort's performance should be monitored over time.

This has always been the practice in the School. A note has been added to make this explicit within the Admissions information in the Student Handbook and Supporting Information.

- f) The Learning and Teaching strategy for the School / programme should be included within the Student Handbook.

The School has adopted the TU Dublin L&T strategy as it exists and has not created a School version. For this programme, only some of the items in the First Year Curriculum will apply to some students. When an updated L&T Strategy is produced, the School will connect this to the programme. Until then, a link will be provided to the existing strategy in the Student Handbook.

- g) Module overviews within module descriptors should not be aimed at particular disciplines and should be more broadly student focused.

This is not possible for the stream modules as they can only be taken successfully by students with the appropriate discipline-specific background. The statement of intended audience (i.e. specific discipline) must be used, as this is the only possible way to filter the students wishing to take the module. Without filtering students by discipline-specific background (and this is done via thorough consultation with students in respect of their prior academic and experiential learning), students would not be able to pass the modules and retention rates on the programme would be negatively impacted. The programme team has over 6 years of successful experience of utilising similar streaming on the MSc suite.

All other modules (core and elective) are “broadly student focused” and not aimed at particular disciplines, as aligns with the philosophy of the programme and of BIM.