22508VIC

Course in
Building Information Modelling (BIM)

This course has been accredited under Part 4.4 of the Education and Training Reform Act 2006

Accredited for the period: 1 March 2019 to 31 August 2024

THE EDUCATION STATE

VICTORIA State Government | Education and Training

Version History	
Version 1.1	• Accreditation period extended for six (6) months to 31 August 2024 • Copyright information updated to Department of Jobs, Skills, Industries and Regions (DJSIR) • CMM Building Industries replaces CMM Engineering Industries for course maintenance and day-to-day contact

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Section A: Copyright and course classification information

1. Copyright owner of the course	Copyright of this material is held by the Department of Jobs, Skills, Industry and Regions. © State of Victoria (Department of Jobs, Skills, Industry and Regions) 2018
2. Address	Executive Director Higher Education and Workforce Higher Education and Skills Department of Jobs, Skills, Industry and Regions GPO Box 4367 MELBOURNE Vic 3001 Organisational contact: Manager, Training and Learning Products Unit Higher Education and Workforce Higher Education and Skills Department of Jobs, Skills, Industry and Regions Telephone: 13 18 23 Email: course.enquiry@education.vic.gov.au Day-to-day contact: Curriculum Maintenance Manager (CMM), Building Industries Holmesglen Institute PO Box 42 Holmesglen VIC 3148 Telephone: (03) 9564 1987 Email: teresa.signorello@holmesglen.edu.au
3. Type of submission	Initial Accreditation
4. Copyright acknowledgement	Copyright of the following units of competency from nationally endorsed training packages is administered by the Commonwealth of Australia and can be accessed from Training.gov (see website here). © Commonwealth of Australia **CPP Property Services Training Package** – CPPBDN4004 Set up BIM-capable software and files for building design drafting projects – CPPBDN5013 Develop and collaborate on building design models for small-scale building design projects The following units of competency: VU22460 Design sustainable buildings VU22456 Apply structural and construction technology to the design of commercial buildings

	are from 22477VIC Advanced Diploma of Building Design (Architectural). © State of Victoria (Department of Jobs, Skills, Industries and Regions).	
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6. Course accrediting body	Victorian Registration and Qualifications Authority (VRQA)	
7. AVETMISS information	**ANZSCO** (Australian and New Zealand Standard Classification of Occupations)	312199 Architectural, Building and Surveying Technicians nec
	ASCED Code – 4 digit (Field of Education)	0403 Building
	National course code	22508VIC
8. Period of accreditation	1 March 2019 – 29 February 2024	

Section B: Course information

1. Nomenclature	*Standard 1 AQTF Standards for Accredited Courses*
1.1. Name of the qualification	Course in Building Information Modelling (BIM)
1.2. Nominal duration of the course	240 – 400 hours
2. Vocational or educational outcomes	*Standard 1 AQTF Standards for Accredited Courses*
2.1. Purpose of the course	The proposed Course in Building Information Modelling (BIM) provides an accredited training program and vocational outcomes for graduates at para professional level. The Course in Building Information Modelling (BIM) will develop the required skills and knowledge to apply Building Information Modelling (BIM) compatible software to facilitate the management of projects and contribute to the future expansion of BIM in building construction. On completion participants will have the skills and knowledge to: • Manage and use BIM workflow processes, including coordination, integration, commissioning and handover • Develop and establish effective intergrated project delivery techniques to aid collaboration, communication and workflows using BIM • Apply BIM to the planning, construction and completion of building projects.

3. Development of the course	*Standards 1 and 2 AQTF Standards for Accredited Courses*
3.1. Industry / enterprise/ community needs	The Victorian Government Strategy on Construction Technologies discussion paper identified Construction Technology as one of the current priority sectors. The Strategy lists Victoria as a destination for skills development and excellence in construction technologies, aiming to stimulate local construction opportunities and grow market share in the use of innovative building products. The Victorian construction technology strategy recognises the importance of Building Information Modelling (BIM) in driving up productivity, improving building optimisation and improved asset management. There has been a significant global focus on the adoption of BIM in driving up such improvements from design through to management of facilities over the lifecycle of the building project. There is substantial evidence to indicate that BIM will be the future of the building information industry (1). Building Information Modelling (BIM) can be defined as the digital description of every detailed activity of a construction or engineering project. The adoption of BIM technologies results in the creation of an entire 3D model with inter-related and cross-referenced information. The implementation of BIM on projects provides greater opportunity to analyse, improve and test designs against any number of project objectives with corresponding benefits realised by the supply chain, client, and building operators. There are well established objectives often referred to as 'dimensions' such as building simulation (4D), cost analysis (5D) and using BIM for Facilities Management (6D). However, there are many more objectives that may be relevant for a project such as energy efficiency and sustainable design (ESD). As such, BIM is now beginning to gain momentum in Australia (2). The proposed Course in Building Information Modelling (BIM) qualification is appropriately aligned to address the Victorian Government's priority sector requirements for Building Construction Technology in working with and applying modern building construction methods through such technologies. The proposed Course in Building Information Modelling (BIM) is designed to provide building practitioners and paraprofessionals with the necessary knowledge and skills in using BIM project workflow processes and working with BIM compatible software platforms to facilitate project development. The Course in Building Information Modelling (BIM) provides the relevant skill set to be able to work with and apply BIM across building projects. The course also develops the BIM technology skills of the participants without the need to enrol in a full training qualification. References:

	1. http://www.researchmoz.us/building-information-modeling-bim-market-global-industry-analysis-size-share-growth-trends-and-forecast-2015-2022-report. 2. Jacobi, J. PE. 4D BIM or Simulation-Based Modelling, Insights Structure, p 17 – 18, April 2011. A Project Steering Committee was established to advise on the industry need and development of the course and to confirm its alignment to industry current and future needs. **The membership of the committee is:** Will Joske (Chairperson) — BIM Academy Rachel Strauss — Bimco Polina Hadjimitova — Billard Leece Partnership Shannon Thomas — AMCA Blair Calvert — DKO Dr. Paul Kremer — Xlam Simon Gibbs — WSP Jimmy Bolger — Buchan Soroush Maghsoudi — OZ Build Construction Pty Ltd **In Attendance:** Tony Watson — Box Hill Institute Dr. Abdul Rauf — Box Hill Institute George Adda — Box Hill Institute Vince Rio — Box Hill Institute
3.2. Review for re-accreditation	Not Applicable

4. Course outcomes	*Standards 1, 2, 3 and 4 AQTF Standards for Accredited Courses*
4.1. Qualification level	The Course in Building Information Modelling (BIM) will meet an identified industry need, but does not have the breadth, depth or volume of learning of a qualification.
4.2. Employability skills	NA
4.3. Recognition given to the course	*Standard 5 AQTF Standards for Accredited Courses* Not Applicable
4.4. Licensing/ regulatory requirements	*Standard 5 AQTF Standards for Accredited Courses* No licensing, legislative, regulatory or certification requirements apply to these courses at the time of publication.

5. Course rules *Standards 2, 6,7 and 9 AQTF Standards for Accredited Courses*

5.1 Course structure

The Course in Building Information Modelling (BIM) consists of two core units of competency and eight elective units as indicated in tables 1 & 2.

To be awarded the Course in Building Information Modelling (BIM) participants must successfully complete all core and two elective units totalling 240 - 400 hours.

Participants, who exit the course without completing all the required units for the course will receive a Statement of Attainment listing those units that were successfully completed.

Table 1* – Course in Building Information Modelling (BIM) – *Core

Unit Code	Field of Education code	Unit Title	Pre-requisite	Nominal hours
VU22678	080905	Use building information modelling (BIM) technologies for a project	Nil	60
VU22708	040199	Manage projects using building information modelling (BIM) technology	Nil	120
			Sub Total nominal hours of core units	**180**

Table 2* - Course in Building Information Modelling (BIM) - *Electives:

Unit Code	Field of Education code	Unit Title	Pre-requisite	Nominal hours
VU22709	040199	Apply benefits of building information modelling (BIM) for a project	Nil	40
VU22710	040199	Apply sustainable design principles and practices for BIM projects	Nil	60
VU22711	040199	Utilise digital fabrication technology for BIM	Nil	60
VU22460	040199	Design sustainable buildings	Nil	90
VU22456	040199	Apply structural and construction technology to the design of commercial buildings	Nil	120
VU22679	020115	Use mixed or blended reality technologies	Nil	20
CPPBDN4004		Set up BIM-capable software and files for building design drafting projects	Nil	40
CPPBDN5013A		Develop & collaborate on building design models for small-scale building design projects	Nil	100
		Total nominal hours of core and elective units		**240-400**

5.2. Entry requirements	*Standard 9 for Accredited Courses* Learners wishing to enter this qualification will typically be building practitioners and paraprofessionals with project management and/or information technology skills. Learners are best equipped to achieve the outcomes of the Course in Building Information Modelling (BIM), if they have minimum language, literacy and numeracy skills that are equivalent to level 3 of the Australian Core Skills Framework (ACSF).
6. Assessment	***Standards 10 and 12 AQTF Standards for Accredited Courses***
6.1. Assessment strategy	All assessment, including Recognition of Prior Learning (RPL) must be compliant with the requirements of: • Standard 1 of the Australian Quality Training Framework (AQTF): Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers, or; • the Standards for Registered Training Organisations 2015 (SRTOs), or; • the relevant standards and guidelines for Registered Training Organisations at the time of assessment.

	Assessment strategies must therefore ensure that: • all assessments are valid, reliable, flexible and fair • learners are informed of the context and purpose of the assessment and the assessment process • feedback is provided to learners about the outcomes of the assessment process and guidance given for future options • time allowance to complete a task is reasonable and specified to reflect the industry context in which the task takes place Assessment strategies should be designed to: • cover a range of skills and knowledge required to demonstrate achievement of the course aim • collect evidence on a number of occasions to suit a variety of contexts and situations • be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners • be equitable to all groups of learners Assessment methods are included in each unit and include: • oral and/or written questioning • inspection of final process outcomes • portfolio of documented on-site work evidence • practical demonstration of required physical tasks • investigative research and case study analysis While the Evidence Guide in each unit provides information specific to the unit outcomes a holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice. Units maybe assessed on-the-job, of-the-job or a combination of both. Where assessment occurs off-the-job, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. Assessment of the imported endorsed or accredited units must reflect the Assessment Requirements for the relevant training package or accredited course.
6.2. Assessor competencies	*Standard 12 AQTF Standards for Accredited Courses* Assessment must be undertaken by a person or persons in accordance with:

	• Standard 1.4 of the Australian Quality Training Framework (AQTF): Essential Conditions and Standards for Initial/Continuing Registration and Guideline 3 of the VRQA Guidelines for VET Providers, or; • *Standards for Registered Training Organisations 2015 (SRTOs),* or; • the relevant standards and guidelines for RTOs at the time of assessment. Assessors of the imported endorsed or accredited units of competence must meet the requirements for assessors specified in the relevant training package or accredited course.
7. Delivery	***Standards 11 and 12 AQTF Standards for Accredited Courses***
7.1. Delivery modes	*Standard 11 AQTF Standards for Accredited Courses* Delivery strategies should be selected to reflect the nature of the industry specific competencies and the need of the learner. Due to the potential for a dispersed distribution of learners, course providers may wish to consider non-traditional strategies in the delivery of training. The facilitation of distance learning and the achievement of competencies through workplace activities or on-the-job training should be fostered and encouraged where possible. It is recommended that the courses be conducted using project based delivery and assessment methods involving the clustering of units, to maximise opportunities for learners to have learning experiences which are as close as possible to a real-work environment. Delivery methods may include, but are not limited to: • classroom presentation • work-based projects • case study analyses • practical work • project-based learning encompassing the clustering of units Delivery of the imported endorsed and accredited units of competency must be consistent with the guidelines in the relevant training package or accredited course.

7.2 Resources	*Standard 12 AQTF Standards for Accredited Courses* Successful delivery of these courses requires access to building information modelling (BIM) compatible software, technology and relevant hardware. For this to occur, providers and industry enterprises may form partnerships to deliver realistic and authentic training and assessment. The resources that should be available for these courses relate to normal work practice using procedures, information and resources typical of a workplace. This must include: • WHS/OHS policy and work procedures and instructions; • access to workplace environment • operational information technology hardware, BIM compatible software • internet • access to relevant building design plans, drawing facilities, relevant software and instructions • manufacturers' specifications/manuals • simulated projects & case studies • headsets & glasses Training must be undertaken by a person or persons with competencies compliant with: • Standard 1.4 of the Australian Quality Training Framework (AQTF): Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET providers, or; • The *Standards for Registered Training Organisations 2015* (SRTOs), or; • the relevant standards and guidelines for RTOs at the time of assessment.
8. Pathways and articulation	Applicants who have already successfully completed any endorsed or accredited unit of competency from previous study will receive direct credit transfer for the same unit/s in these courses. Likewise, graduates of these courses will also gain direct credit transfer of units successfully completed in any future courses containing the same units. There are no formal articulations arrangements negotiated and established for the Course in Building Information Modelling (BIM) with higher education courses. Providers intending to arrange articulation with other VET or higher education course should refer to the: *AQF Second Edition 2013 Pathways Policy*

9. Ongoing monitoring and evaluation	*Standard 13 AQTF Standards for Accredited Courses* The Curriculum Maintenance Manager – Building Industries is responsible for the ongoing monitoring and maintenance of the course during their accreditation period. The Curriculum Maintenance Manager - Building Industries will undertake a formal review of the course at the mid - point of the accreditation period. The review will involve consultation with: • course participants and graduates • architects, designers, engineers, builders & construction analyst representatives • teaching/assessing staff Any significant changes to the course resulting from the review will be reported to the VRQA through a formal amendment process. The review of the course may also indicate that the course should be expired if a suitable qualification becomes available through the continuous improvement of a relevant Training Package.

Section C: Units of competency

Imported units of competency from the relevant Endorsed Training Packages are available from the national register here.

CPPBDN4004	Set up BIM-capable software and files for building design drafting projects
CPPBDN5013A	Develop & collaborate on building design models for small-scale building design projects

Imported units of competency from 22502VIC Diploma of Project Management for Prefabricated Building Systems (Timber):

VU22678	Use building information modelling (BIM) technologies for a project
VU22679	Use mixed or blended reality technologies

Imported units of competency from 22477VIC Advanced Diploma of Building Design (Architectural):

VU22460	Design sustainable buildings
VU22456	Apply structural and construction technology to the design of commercial buildings

Newly developed units of competency:

VU22708	Manage projects using building information modelling (BIM) technology
VU22709	Apply benefits of building information modelling (BIM) for a project
VU22710	Apply sustainable design principles and practices for BIM projects
VU22711	Utilise digital fabrication technology for BIM

VU22708 – Manage projects using Building Information Modelling (BIM) technology

Unit Descriptor	This unit describes the skills and knowledge to manage a Building Information Modelling (BIM) project using relevant technologies, including planning and integrating BIM workflow. The unit covers a team approach to achieve project outcomes and applying effective communication and collaborative processes for a given project. No licensing or certification requirements apply to this unit at the time of publication.
Employability skills	Not Applicable
Application of the Unit	This unit is applicable to individuals managing BIM projects using relevant technology to facilitate project management through the design and implementation of effective collaborative models. The application of appropriate BIM processes will vary depending on the requirements of the relevant stakeholders, such as: architects, designers, engineers, quantity surveyors and developers.

ELEMENT	PERFORMANCE CRITERIA
1. Develop a BIM communication and delivery plan for a project	1.1 Identify key ***stakeholders*** and applicable ***technologies*** for project scope of works and contract(s) 1.2 Plan for relevant information sharing arrangements or solutions for various stakeholder requirements and their IT systems configurations 1.3 Design a communication and information sharing process within the BIM for integrating non BIM data from relevant stakeholders 1.4 Design a workflow to manage construction methodologies for a project 1.5 Assess internal organisational and broader delivery team capability against project requirements and contingency strategies to be applied for the project
2. Develop a BIM management strategy	2.1 Identify and map workflow using appropriate BIM processes for project objectives 2.2 Assess functionality of technology for project requirements 2.3 Identify key stakeholders, role responsibilities and risks for integrated project delivery 2.4 Design a risk mitigation strategy to ensure effective delivery of project deliverables in accordance with the scope of works and contract(s) 2.5 Identify strategies for establishing and creating positive outcomes within a collaborative model, in accordance with industry management standards relevant to the execution plan

3.	Establish work roles and responsibilities for a project	3.1	Confirm project workflow execution and communication processes in collaboration with stakeholders
		3.2	Assign work roles and responsibilities to ensure a team approach to achieving BIM deliverables
		3.3	Apply relevant risk mitigation strategies in accordance with the scope of works and contract(s) and in collaboration with key stakeholders and project requirements
4.	Apply BIM integration processes for a project	4.1	Coordinate and integrate project scope of works and contract(s) within the BIM processes in collaboration with key stakeholders
		4.2	Assign information sharing solution arrangements for various stakeholder requirements and their IT system configurations
		4.3	Implement appropriate ***IT system redundancy*** processes to ensure integrity of data is maintained, in accordance with project requirements and specifications
		4.4	Maintain relevant licensing, regulatory, certification and sign-off of construction methods and software applications
5.	Coordinate projects using BIM technology	5.1	Gather and analyse data to map and report on project performance in collaboration with stakeholders
		5.2	Maintain an effective communication platform for relevant stakeholders for the project life cycle
		5.3	Manage relevant BIM contract requirements, timelines and sequencing of project information exchanges, stages and deliverables and anticipated conflict
		5.4	Manage ***contingencies*** and solutions based processes in collaboration with stakeholders and project
		5.5	Apply ongoing continuous improvement and review processes for project duration
6.	Apply BIM software for project	6.1	Compare and adapt non BIM inputs to ensure functionality with relevant BIM technology applications and models
		6.2	Evaluate appropriate validation techniques and physical testing procedures for functionality with BIM software

7.	Commission and handover BIM project	7.1 Confirm terms and conditions of project handover, in accordance with contract(s) requirements and specifications
		7.2 Plan and map use of field tools applied during construction to validate as-built data and models
		7.3 Validate quality assurance and control checklists applied for the project with relevant stakeholders
		7.4 Extract, manage and collate relevant data and information from BIM project platform for commissioning and handover, in accordance with contract(s) requirements and specifications
8.	Evaluate BIM project process	8.1 Assess project workflow performance and effectiveness in achieving project deliverables
		8.2 Record and report on effectiveness and improvement areas in achieving planned deliverables
		8.3 Record relevant improvements to BIM workflow processes and management for future projects, including retraining.

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- communication and interpersonal skills to work with key project stakeholders
- operating and applying information technology systems and processes
- determining BIM functionality with a range of software programs
- team development and collaborative models
- implementing BIM data and information management requirements
- reading and accurately interpreting relevant design specifications and guidelines
- operating relevant information technology for project
- analytical and problem solving skills for project
- implementing BIM execution plans

Required knowledge:

- relevant industry and BIM technologies
- benefits and functionality of relevant BIM technology
- BIM workflow
- strengths and limitations of using BIM
- project management strategies
- risk mitigation
- information management requirements
- contract management
- compliance to BIM industry standards and protocols

Range Statement

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold / italicised wording in the Performance Criteria is detailed below

Stakeholders include but are not limited to:

- authorities, including local government/others
- engineers, including structural, mechanical, electrical, hydraulic, fire, civil, security etc
- architects & designers
- materials & product manufacturers/suppliers
- contractors, including trades, installer, fabricators - on/offsite & office roles
- building owners
- facilities management
- developers
- quantity surveyors
- design & construction analysts (including ESD, Acoustic, Traffic

Technologies include but are not limited to:

- BIM model authoring tools including:
  - Autodesk Revit
  - Graphisoft ArchiCAD
  - CADwork
  - hsbCAD
- Contributing non BIM authoring tools:
  - AutoCAD
  - SketchUp
- BIM model coordination and validation tools:
  - Navisworks
  - Solibri
- BIM data management tools:
  - dRofus
  - Zuuse
- Communication and Common data environment tools
  - Aconex
  - Viewpoint
- Analysis tools
  - CostX
  - Synchro
- version control

IT system redundancy includes but is not limited to:

- IT processes
- data back up processes
- redundancies
- storage
- cloud
- version control

Contingencies include but are not limited to:

- timeline blowouts
- changes to project design specifications
- contract management, including intellectual property
- software functionality
- communication problems
- supply chain/logical issues
- data transfer and/or information sharing issues

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission

Critical aspects for assessment and evidence required to assess competency in this unit

To be considered competent in this unit, the candidate must demonstrate all of the elements of competency to the level defined by the associated performance criteria and utilising the required skills and knowledge to:

- effectively manage projects using the range BIM compatible software
- design and implement BIM workflow processes for specific projects
- work collaboratively in achieving project requirements
- manage risk and develop suitable contingencies
- ensure effective project performance and handover at completion.

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of contexts. The candidate will have access to internet, information technology, BIM compatible software, simulated projects, case studies, related technologies, equipment, and relevant building design documentation.

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the assessment reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Method of assessment

Evidence can be gathered through a variety of ways including the following, however two forms of evidence are required for competency to be determined:

- observation of processes and procedures;
- oral and/or written questioning on required knowledge and skills;
- testimony from supervisors, colleagues or clients;
- inspection of the final product or outcome;
- portfolio of documentary evidence.

VU22709 – Apply benefits of Building Information Modelling (BIM) for a project

Unit Descriptor	This unit describes the skills and knowledge to apply benefits of BIM technologies for a given project. The unit covers the benefits of using BIM technologies and designing the relevant tools to suit the project or context. No licensing or certification requirements apply to this unit at the time of publication.
Employability skills	Not Applicable.
Application of the Unit	This unit is applicable to individuals exploring and analysing the feasibility of applying BIM technologies to support project management and adding value to project deliverables through the design and implementation of effective collaborative models.

ELEMENT	PERFORMANCE CRITERIA
1. Determine economic benefits	1.1 Compare traditional methods projected against cost efficiencies using BIM for relevant ***stakeholders***
	1.2 Create BIM ***value proposition***, including relevance to a project
	1.3 Consider operational context and environmental factors in determining economic impact
2. Design a BIM tool for a project	2.1 Determine client needs and align with data requirements to define project BIM objectives and be supported by the BIM tools and methods
	2.2 Identify and establish key stages and performance indicators for building project in the context of investment decision and the scope of works
	2.3 Identify and collaborate with stakeholders impacted by project BIM objectives to ensure competency and effective strategies on the use of the BIM tools
	2.4 Identify the range of BIM tools and functions to satisfy project BIM objectives
	2.5 Develop risk mitigation strategies in accordance with the scope of works

3.	Apply a BIM tool for a project	3.1 Establish effective cost and procurement model based on project type 3.2 Navigate relevant BIM software in accordance with project requirements 3.3 Implement and manage data transfer in accordance project and stakeholder requirements 3.4 Apply relevant contingency or risk mitigation strategies
4.	Review application of BIM tool for project	4.1 Assess BIM tool compliance with performance indicators 4.2 Record and report on effectiveness of BIM tool in achieving project BIM objectives 4.3 Record and incorporate relevant improvements to BIM tool function and management for future projects

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- conducting cost analyses and determining projected benefits and issues
- determining BIM functionality with a range of software programs
- reading and accurately interpreting relevant design specifications and guidelines
- operating relevant information technology for project
- navigating and operating BIM software
- analytical and problem solving skills for project

Required knowledge:

- relevant industry and BIM terminology
- cost and procurement models
- BIM documentation requirements
- strengths and limitations of using BIM
- project management strategies

Range Statement

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold / italicised wording in the Performance Criteria is detailed below

stakeholders include but is not limited to:	• engineers • architects • manufacturers • suppliers • installers • contractors • consultants • customers/clients
Value proposition includes but is not limited to:	• stakeholders • efficiencies • cost implications • time management • branding & marketing • BIM functionality • project management

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission

Critical aspects for assessment and evidence required to assess competency in this unit

To be considered competent in this unit, the candidate must demonstrate all of the elements of competency to the level defined by the associated performance criteria and utilising the required skills and knowledge to:

- promote the advantages of BIM technologies through the effective application of technologies on specific projects
- manage the effectiveness of BIM tools through strategic implementation of projects
- monitor project progress through key performance indicators.

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of contexts. The candidate will have access to internet, information technology, BIM compatible software, simulated projects and case studies, related technologies, including mixed or blended technologies, and headset and/or glasses.

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the assessment reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Method of assessment

Evidence can be gathered through a variety of ways including the following, however two forms of evidence are required for competency to be determined::

- observation of processes and procedures;
- oral and/or written questioning on required knowledge and skills;
- testimony from supervisors, colleagues or clients;
- inspection of the final product or outcome;
- portfolio of documentary evidence.

VU22710 – Apply sustainable design principles and practices for BIM projects

Unit Descriptor	This unit describes the skills and knowledge required to use BIM applications to achieve sustainable design outcomes. It includes the ability to determine methods and principles of sustainable practices to develop and manage BIM project outcomes. No licensing or certification requirements apply to this unit at the time of publication.
Employability skills	Not Applicable.
Application of the Unit	This unit is applicable to individuals working in construction industry to facilitate achieving sustainable outcomes in various life cycle stages of a BIM project.

ELEMENT	**PERFORMANCE CRITERIA**
1. Research the impacts of BIM on buildings and on the natural environment	1.1 Assess BIM tools and their impacts to ensure compliance with BIM on environmental sustainable design 1.2 Plan and apply ongoing monitoring processes to ensure effectiveness of performance of BIM technology in achieving planned outcomes 1.3 Determine ***Triple Bottom Line approaches*** for consideration for the design, construction and use of buildings 1.4 Interpret impact of current ***government and industry responses*** to Environmentally Sustainable Design (ESD) 1.5 Identify ***energy efficient design principles,*** in accordance with current legislation and the Building Code of Australia (BCA) 1.6 Identify environmental design rating tools in relation to current legislation and the BCA
2. Analyse project requirements to determine outputs	2.1 Assess project brief to determine the level of detail and data requirements within the project scope 2.2 Identify relevant BIM contract requirements to use BIM for environmentally sustainable design outcomes 2.3 Identify BIM tools and protocols for integrated evaluation, analysis, comparison and compliance 2.4 Determine equipment requirements for ongoing monitoring and verification of performance of environmentally sustainable outcomes

3. Incorporate environmental sustainability criteria into BIM projects	3.1 Use BIM tools and protocols for environmental sustainability evaluation, analysis, comparison and compliance in projects 3.2 Use BIM for environmental sustainability design practices related to life cycle assessments (LCA) applicable to the project 3.3 Use ***real world contexts*** to apply BIM for sustainable outcomes 3.4 Use collaboration and effective coordination to ensure ***stakeholder*** engagement to achieve sustainable outcomes for construction projects 3.5 Apply BIM for resource optimization and waste minimisation 3.6 Plan and apply ongoing monitoring processes to ensure effectiveness of performance of BIM tools and technology in achieving environmentally sustainable design (ESD) related objectives for building operations
4. Evaluate environmental sustainability for BIM projects	4.1 Assess compliance to ESD criteria and waste minimisation practices, in accordance with ***organisationa***l and project design requirements and specifications 4.2 Record and analyse data collected from real time monitoring, supported by BIM tools and protocols, to measure effectiveness of ESD related building performance benchmarks as defined for the building lifecycle 4.3 Record and report on review findings to ensure continuous improvement processes are implemented on further projects, in accordance with organisational and ESD requirements

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- communication and interpersonal skills to work with key project stakeholders
- teamwork skills for collaboration and consultation with both external and internal personnel
- determining BIM functionality with a range of software programs
- reading and accurately interpreting relevant design specifications and guidelines
- operating relevant information technology for project
- analytical and problem solving skills for project
- learning skills in self directed approach to updating skills in software use and knowledge of emerging technologies
- technology skills to use software applications suitable for production of documentation required for the project

Required knowledge:

- Principles of sustainability
- Mandatory disclosure
- Green star
- Building adaptation for catastrophic events responding to climate change
- Indoor environmental quality (air quality, thermal comfort, acoustics)
- Impacts of national strategies on building design
- Principles of designing buildings for durability and adaptability
- Life cycle assessment
- Nature of construction materials and effect on building performance
- R values (overall thermal resistance) for construction material
- Energy auditing principles
- NCC Section J
- Energy consumption relative to construction processes and building use
- Tools and applications used to predict building performance
- strengths and limitations of using BIM
- Recognition of BIM file structures
- Organisational and legislative requirements for documentation in all stages of building design project

Range Statement

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold / italicised wording in the Performance Criteria is detailed below

Triple Bottom Line approaches are:	• the impacts on natural and human capital, as well as financial capital. They focus on decision making and reporting which explicitly considers economic, environmental and social performance
Government and industry responses include but are not limited to:	• Brundtland Report • Emissions Trading Green Paper • Environmental Management Systems • ISO 14000 Standards from International Organization for Standardisation • Kyoto Protocol • National Greenhouse Response Strategy • National Strategy for Ecologically Sustainable • Development (NSESD) • UN Local Agenda 21 – the Rio Declaration on Environment and Development • Commonwealth, state and local government Acts, Regulations and development • carbon trading • codes of practice • State environment protection policies.

Energy efficient design principles include but are not limited to:

- application and assessment of the BCA performance-based solutions
- relevant international standards as LEED/Passive/WELL
- best practice to conserve energy:
  - appliance usage
  - building location and orientation
  - choice and product performance
  - compliance with legislation pertinent to conserving energy
  - living practices that maximise benefit
- climate conditions:
  - climate zones in Australia specified in the BCA
  - micro climates associated with a specific area
- energy consumption:
  - low energy lighting
  - solar hot water systems
  - star rated appliances
  - window coverings and glazing
- energy efficient construction:
  - construction methods
  - durability and adaptability
  - efficient design briefs
  - geography and topography of site
  - location
  - materials used which maximise re-use potential
  - method of application
- Building Information Modelling (BIM)

Real world context includes but is not limited to:

- architectural design
- mechanical design
- hydraulic design
- fire design
- structural design
- electrical design
- landscape design
- infrastructure design
- design options in BIM applications
- construction coordination
- fabrication
- environmental analysis
- energy analysis
- environmental certifications
- commissioning manufacturing
- prefabrication
- procurement

stakeholder includes but is not limited to:

- authorities, including local government/others
- engineers, including structural, mechanical, hydraulic, electrical, fire, civil, security
- architects & designers
- ESD consultant
- quantity surveyors
- materials & product manufacturers/suppliers
- contractors, including trades, installer, fabricators - on/offsite & office roles
- building owners
- facilities management
- developers
- design & construction analysts (including, Acoustic, Traffic)

Organisational includes, but is not limited to:

- Australian Building Codes Board
- Australian Greenhouse Office (AGO)
- Environment Australia
- Environmental Protection Agency (EPA)
- Green Building Council (GBC)
- Leadership in Energy and Environmental
- Design (LEED)
- Living Building Challenge

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission

Critical aspects for assessment and evidence required to assess competency in this unit

To be considered competent in this unit, the candidate must demonstrate all of the elements of competency to the level defined by the associated performance criteria and utilising the required skills and knowledge to:

- assess the economic impact in applying environmental sustainability criteria into BIM projects
- apply environmental sustainability criteria into BIM projects
- work collaboratively to incorporate sustainability design and waste management in BIM projects.

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of contexts. The candidate will have access to internet, information technology, BIM compatible software, simulated projects, related technologies, equipment, and relevant building design documentation.

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the assessment reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Method of assessment

Evidence can be gathered through a variety of ways including the following, however two forms of evidence are required for competency to be determined:

- observation of processes and procedures;
- oral and/or written questioning on required knowledge and skills;
- testimony from supervisors, colleagues or clients;
- inspection of the final product or outcome;
- portfolio of documentary evidence.

VU22711 – Utilise digital fabrication technology for Building Information Modelling (BIM)

Unit Descriptor

This unit describes the skills and knowledge to utilise and manage digital fabrication requirements using relevant Building Information Modelling (BIM) technology. The unit covers the planning and preparation process, and managing the scheduling and production of the digital fabrication for a given project.

No licensing or certification requirements apply to this unit at the time of publication.

Employability skills

Not Applicable.

Application of the Unit

This unit is applicable to individuals managing digital fabrication for BIM projects using relevant technology. The application of appropriate BIM processes will vary depending on the requirements of the relevant stakeholders, such as: architects, manufacturers, designers, engineers, quantity surveyors and developers.

ELEMENT	PERFORMANCE CRITERIA
1. Prepare to use BIM technology for digital fabrication	1.1 Identify compatible software for BIM to facilitate digital design to fabrication workflow for relevant project 1.2 Plan for relevant IT systems configurations to suit BIM software functionality requirements 1.3 Develop a digital fabrication production schedule for project, in accordance with design requirements and specifications 1.4 Design a risk mitigation strategy to ensure effective fabrication of project, in accordance with the design requirements and specifications and contract(s) 1.5 Identify and plan for design changes and scheduling ***variations*** for project 1.6 Assess functionality of relevant BIM technology for fabrication requirements
2. Develop digital fabrication production sequencing of activities for project	2.1 Identify and map workflow using appropriate BIM processes for digital fabrication 2.2 Identify relevant industry performance standards and quality benchmarks for the project 2.3 Confirm project specifications and determine most suitable fabrication methodology for project requirements and specifications

3. Manage digital fabrication production process projects using BIM technology	3.1 Extract relevant digital information for fabrication from applied BIM platform for communication and confirmation of brief with stakeholders
	3.2 Select and prioritise fabrication production processes, in accordance with design requirements and specifications and contract(s)
	3.3 Apply appropriate tolerance adjustments for machine fabrication, in accordance with project requirements and specifications
	3.4 Apply relevant risk mitigation strategies in accordance with the project specification and contract(s)
	3.5 Manage changes and contingencies and solutions based processes in collaboration with stakeholders and project
	3.6 Maintain quality processes for the duration of the digital fabrication project
4. Evaluate BIM fabrication production process	4.1 Review fabrication rollout and performance, in consultation with key ***stakeholders***
	4.2 Assess compliance to project design requirements and specifications, including quality assurance processes
	4.3 Record and report on review findings to ensure continuous improvement processes are implemented on further projects, in accordance with organisational and design requirements and specifications and/or contract(s).

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- operating and applying information technology systems and processes
- extracting and analysing data, productivity and scheduling
- planning and managing digital fabrication
- numeracy skills to interpret statistical analysis of data
- time management
- operating and applying information technology systems and processes
- determining BIM technology functionality for digital fabrication
- implementing BIM data and information management requirements
- reading and accurately interpreting relevant design requirements and specifications
- analytical and problem solving skills for project

Required knowledge:

- digital production and scheduling
- relevant industry and BIM technologies
- sustainable practices and waste management processes associated with digital fabrication methods
- nature of the contract(s) upon which project is based
- relevant legislative and OHS/WHS requirements, codes and practices
- relevant legislative environmental protection
- interpretation of architectural, engineering and/or project plans, working drawings and assembly specifications and guidelines
- functionality of relevant BIM technology associated with digital fabrication
- BIM production workflow
- project management strategies

Range Statement

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold / italicised wording in the Performance Criteria is detailed below

variations include but are not limited to:	• changes to project design specification • adjustments to tolerances • functionality of technologies • timelines • application
stakeholders include but are not limited to:	• engineers • architects • fabricators • manufacturers • suppliers • contractors • consultants • customers/clients • site managers

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission

Critical aspects for assessment and evidence required to assess competency in this unit

To be considered competent in this unit, the candidate must demonstrate all of the elements of competency to the level defined by the associated performance criteria and utilising the required skills and knowledge to:

- manage digital fabrication quality assurance processes in accordance with project requirements and specifications
- develop and implement digital fabrication processes to achieve project outputs using BIM technology
- review effectiveness of digital fabrication production using BIM platforms.

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of contexts. The candidate will have access to internet, information technology, BIM compatible software, simulated projects, related technologies, equipment, and relevant building design documentation.

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the assessment reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

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- portfolio of documentary evidence.