INTERNATIONAL QUALIFICATIONS

AND ASSESSMENT CENTRE (IQAC)

Approved:

2025 y. «___» _____

Programme	**Level 6 Diploma in Architecture**		
Unit Number/ Unit Title	**Unit 4 Parametric and Computational Design**		
Cohort Code:	L06PCD-U4		
Unit Level	6		
Total Credits/Hours	Total qualification time 200/ Total Guided learning hours 90/ Self-guided learning hours 110		
Credits	20 CATS/ 10 ECTS		
Lecturer			
Start Date		**End Date**	

Unit Aims	This unit introduces parametric and algorithmic design techniques, enabling learners to generate complex geometries and performance-driven forms using digital tools and computational logic.
Differentiation Strategies *(e.g. planned activities or support for individual learners according to their needs)*	Various approaches to addressing the various identified students' needs will be adopted throughout the lesson. Such will include: 1. Progressive tasks 2. Digital resources 3. Verbal support 4. Variable outcomes 5. Collaborative learning 6. Ongoing assessment 7. Flexible-pace learning
Equality & Diversity	Variety of teaching techniques will be employed to ensure that the needs of each individual learner are met.

Safeguarding & Prevent	Safeguarding policies and the Prevent duty are strictly observed to ensure the safety, well-being, and inclusivity of all students and staff.
Health & Safety	SIRM H&S policies will be maintained.
Learning Resources	**Teaching and Learning Materials** • Terzidis, K. (2006). Algorithmic Architecture. Routledge. • Peters, T. (2013). Inside Smartgeometry. Wiley. • Burry, M. (2011). Scripting Cultures. Wiley.

Learning Outcome (The learner will:)	**Assessment Criteria (The learner can:)**
LO1. Understand parametric design logic.	**1.1 Explain key concepts in algorithmic modeling and parametric thinking.**
LO2. Use computational design tools.	**2.1 Create geometries using software (e.g., Grasshopper, Dynamo).**
LO3. Analyze form-performance relationships.	**3.1 Evaluate digital models for daylight, energy, or material efficiency.**
LO4. Implement scripting in design processes.	**4.1 Apply Python/C#/visual scripts to automate or iterate design outcomes.**
LO5. Present parametric workflows.	**5.1 Document design progression and logic through visual and written media.**

No	Topic	Learning Outcomes for Each Topic	Which assessment criteria does the session relate to?	Day/month/ year/ signature
1	Introduction to Parametric Design	Explore the principles and benefits of parametric thinking in architecture.	LO1	
2	History and Evolution of Computational Design	Understand the development of algorithmic approaches in architecture.	LO1	
3	Parametric Thinking and Design Logic	Define design constraints and relationships.	LO1	
4	Getting Started with Grasshopper for Rhino	Learn interface navigation and basic operations.	LO2	
5	Creating Simple Parametric Models	Use basic components to model geometry.	LO2	

6	Understanding Data Trees and List Management	Manage complex data structures in parametric software.	LO2	
7	Modifying Geometry Through Parameters	Create variable-driven geometry.	LO2	
8	Mathematical Functions in Parametric Design	Use mathematical expressions to control forms.	LO2	
9	Geometry Analysis and Surface Subdivision	Explore how subdivision affects material use and performance.	LO3	
10	Daylighting and Solar Performance Studies	Use analysis tools to test sun exposure and daylighting.	LO3	
11	Using Ladybug Tools for Environmental Feedback	Integrate climate data into the design process.	LO3	
12	Adaptive Systems and Responsive Geometry	Model elements that adapt to inputs like sun or user behavior.	LO3	
13	Intro to Visual Scripting: Grasshopper	Understand visual logic connections.	LO4	

14	Working with Loops and Conditionals	Create adaptive systems using conditional functions.	LO4	
15	Custom Functions and Clusters	Build reusable and modular scripts.	LO4	
16	Midterm	**Midterm assessment** covering all learning outcomes (theory and practical elements)	LO1, LO2, LO3	
17	Integrating Python Scripting in Grasshopper	Learn basic Python syntax and logic.	LO4	
18	Using C# or Python to Extend Parametric Tools	Write custom components with code.	LO4	
19	Designing Parametric Facades	Develop a responsive façade system.	LO2, LO3	
20	Form-Finding Using Physics Simulations	Use Kangaroo or similar plugins to simulate forces.	LO3	
21	Animating Parametric Design Systems	Generate animations to communicate behavior.	LO2, LO5	

22	Exporting Parametric Models for Fabrication	Prepare files for CNC, 3D printing or laser cutting.	LO5	
23	Interactive Design with Sliders and User Input	Add user interface elements for design control.	LO2	
24	Using Parameters to Drive Structural Logic	Use design logic to inform performance outcomes.	LO3	
25	Topology and Mesh Modelling	Model with mesh and topological transformations.	LO2	
26	Scripting Geometry Evolution	Use generative algorithms to evolve forms.	LO4	
27	Genetic Algorithms in Design	Apply evolutionary solvers for optimization.	LO3, LO4	
28	Multi-objective Design Exploration	Explore trade-offs and design scenarios.	LO3	
29	Collaborative Parametric Workflows	Integrate versioning, documentation and team-based scripts.	LO5	

30	Case Studies in Parametric Architecture	Analyze real-world projects using computational tools.	LO1 – LO5	
31	Final Exam: Final Parametric Design Proposal and Presentation	Synthesize skills in a complete, iterative project.	LO1 – LO5	