1. **Title of the module**

ARCH8560 (AR856) – Morphogenetic Programming

1. **School or partner institution which will be responsible for management of the module**

Kent School of Architecture and Planning

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 7

1. **The number of credits and the ECTS value which the module represents**

30 credits (15 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Spring

1. **Prerequisite and co-requisite modules**

None

1. **The programmes of study to which the module contributes**

MSc Bio Digital Architecture

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to demonstrate:**
	1. A comprehensive understanding of biological morphogenesis and evolution and its abstraction and systematisation for computational modelling.
	2. A comprehensive understanding of the relationships between morphological models and parametric modelling.
	3. Ability to demonstrate knowledge and skills of geometrical and spatial understanding of digital morphogenesis and computational design processes.
	4. A comprehensive understanding of decentralised processes of configuration to speculate how processes of form making and pattern generation in nature may be applied to (re)formulate and (re)articulate how we think about space, architecture and the built environment.
	5. A comprehensive understanding of the computer as a tool to simulate bio-inspired spatial self-organisation.
2. **The intended generic learning outcomes.
On successfully completing the module students will be able to demonstrate:**
	1. Knowledge and skills in the analysis and evaluation of morphological systems for architectural design, and an ability to apply these skills appropriately.
	2. A comprehensive understanding of generative algorithms and their applications in creating space, form and structure.
3. **A synopsis of the curriculum**

The Morphogenetic Programming module introduces students to generative algorithms for creating structures to challenge traditional notions of designing architectural form and space, and (in tandem with the Discourse and Theory module) will cultivate a bio digital outlook to architectural design for the students research-oriented thesis project. Students will study various methods of simulating natural processes of growth and pattern formation using computational methods and explore how these may be utilised for design and the generation of architectural form and structure.

The module is taught through a blend of lectures and seminars that introduce and describe concepts and models of morphogenesis, and workshops in which students will develop their computer programming skills and exercise computational methods of form generation to explore their application to the generation of architectural space, structure and form.

Workshops will be studio based to emphasise a design ethos and promote exchange between learning concepts, methods, code and application. The module will shift from taught workshop demonstrations initially to tutorial/studio oriented sessions in which the students will exercise and adapt the modelling methods presented to develop architectonic propositions generated through bio-inspired spatial self-organisation.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Flake, G. W. (1998). *The Computational Beauty of Nature: Computer Explorations of Fractals, Chaos, Complex Systems, and Adaptation*. The MIT Press: Cambridge, Mass.

Frazer, J. (1995). *Evolutionary Architecture.* AA Publications: London.

Leach, N. (2009). Digital Morphogenesis, in *Architectural Design*, 79, 1, pp. 32–37

Reynolds, C.W. (1987). Flocks, Herds, and Schools: A Distributed Behavioural Model, in *Computer*

*Graphics*, 21(4), July 1987, p25-34.

Theraulaz G. (2014). Embracing the Creativity of Stigmergy in Social Insects, in *Architectural Design* 84, p54–59.

Tibbits, S., van der Harten, A. and Baer, S. (2011). [RhinoPython 101 Primer](https://www.rhino3d.com/download/IronPython/5.0/RhinoPython101).

1. **Learning and teaching methods**

Total contact hours: 36 hours

Private study hours: 264 hours

Total study hours: 300 hours

1. **Assessment methods**
	1. Main assessment methods

Report (100%) (3000 to 5000 words)

13.2 Reassessment methods

Like for like

1. ***Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 9.1 | 9.2 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |
| Private Study | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Lectures/seminars | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Workshops | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |
| Report | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Lectures, seminar teaching and tutorials will continue to draw on international source materials for historical and contemporary examples and theories of bio digital architecture.

**FACULTIES SUPPORT OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

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| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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