Academy of Visual Arts
Bachelor of Arts (Hons) in Visual Arts Programme

VART3227 Evolutionary Graphics

No. of units: 3
Pre-requisite: VART 2225 Experimental Imaging or **VART 2226 Design for Hypermedia**
Duration: 52 hours
Cluster: Experimental Imaging

I.1. Course Description & Rationale (200–300 words):

The course introduces the ideas and practices of evolutionary and generative methods to create complex visual imageries. In the context of procedural animation and computer graphics, the concepts of evolutionary biology can both simulate the form of nature and as well go beyond it by creating static or dynamic graphics with little reference in the physical world.

Students in the course learn to create complex computer graphics by specifying very simple rules. They will understand the notion of artificial nature where the seemingly complex behaviours are developed by a number of simple mutually interacting units.

Historical reference will be drawn from a variety of disciplines like machine theory, algorithmic graphics, chaos theory, and self-organizing systems.

The course will introduce the use of the graphical programming environment such as TouchDesigner[1] or Context Free Art[2] that the students can use to experiment with generative graphics and procedural animation without the need to write traditional text based computer programs. The artworks can both be shown on screen or output as computer paintings.

By using the commonly available graphic design software, students usually work on computer graphics with a top down planning approach. The variety of the visual imageries will often be limited to the background and exposure of the students' former visual training. This course offers a bottom up approach to facilitate students to overcome the former constraints. By purposely introducing rules and limitations, the generative or evolutionary processes can automatically produce imageries that challenge both the representational and abstract ways of two-dimensional visual creation.

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[1] A free authoring tool for creating interactive 3D art, http://www.derivative.ca/

[2] A free software that generates images from written grammar, http://www.contextfreeart.org/

The conceptual framework in the class is transferable and applicable to other subjects like 2D design, spatial design, and experimental painting. As computing software is becoming an important tool for visual art and design, the understanding of the codes, which are essentially rules, is a competitive advantage for students to expand their visual repertoire.

I.2. Course Content:

No.		Hours	%
1.	History and concept of generative/evolutionary art	8	15.4
2.	Approaches and types of generative/evolutionary art, e.g. algorithmic graphics, particle systems, fractals, etc.	12	23.1
3.	Mathematical foundation revisited	4	7.7
4.	Applications of generative/evolutionary art in other disciplines, e.g. graphic design, moving images, conceptual art, etc.	12	23.1
5.	Graphical programming	16	30.7
		52	100

I.3. Intended Course Learning Outcomes (CILOs):
(Please take note of the PILOs for the overall BA programme in the Programme Document.)

Upon successful completion of this course, students should be able to:

No.	Intended Course Learning Outcomes (CILOs)
1.	Enumerate the various approaches to produce generative/evolutionary graphics;
2.	Analyse and select appropriate methods for the creative tasks;
3.	Apply graphical programming techniques to generate visual content for creative projects;
4.	Reflect on relations between the visual outputs and the initial rules/codes so as to understand the generative nature of the creative processes;
5.	Communicate and present creative ideas and development processes; and
6.	Adhere to standards of professional practice and ethos.

* More may be added.

I.4. Alignment of CILOs with PILOs:

Learning Outcomes	Please indicate alignment by checking '√' the appropriate box					
	CILO1	CILO2	CILO3	CILO4	CILO5	CILO6
PILO1.1	✓					
PILO1.2		✓	✓			

PILO2.1				✓		
PILO2.2		✓			✓	
PILO2.3				✓		
PILO3.1						✓
PILO3.2						✓

* There may not be 6 CILOs, in which case, just leave columns empty.

I.5. Alignment of Teaching and Learning Activities with CILOs:

No.	Teaching and Learning Activities	CILO	Hours
1.	Collection and in-depth studies of visual structures from natural or artificial sources for the students to identify the rules/codes that build the structures.	1, 4, 6	4
2.	Screening of animations, music videos and other related visual content to expand the visual repositories of students.	1, 6	4
3.	Individual presentations require students to research into specific visual themes and to analyse in terms of the themes and topics of the course and consequently encourage them to evaluate with appropriate means and confidence.	2, 5, 6	4
4.	Formal lectures introduce students the history and development of the generative approach to create visual content within the contemporary art context.	1, 6	20
5.	Programming workshops provide the technical and conceptual skills for students to master the tools and media in order to apply them in their assignments.	3, 6	20

*More may be added.

I.6. Assessment:

No.	Assessment Methods/Activities	Weighting	Alignment with CILOs
1.	Generative graphics project: Students are required to identify and analyse the visual patterns from natural or artificial sources; and to use computer codes to interpret the structure as a mean to generate more sophisticated visual elements. Evaluation will be based on the quality of analysis, effectiveness of the codes and creativity in the generation process.	30%	1, 4

2.	Procedural animation: Students are required to interpret a short piece of music and use procedural animation to render the music in visual form. Evaluation will be based on the comprehension of the rhythm, visual complexity and temporal dynamics.	40%	1, 2, 3, 5
3.	Professional Attitude: Professional Attitude does not necessarily define its own learning outcomes, but takes a look at 'how' the other, non-attitudinal outcomes are achieved. Assessment will always be based on direct personal contact with the student. Assessment methods include personal conversations – formal and informal –, class observation, individual and group-tutorials, and such like. Assessment evidence is continuously produced through attendance and participation class-records, public presentations, peer-reviews, evaluation of sketchbooks or visual diaries, personal notes of students and teachers, etc. For more information, please refer to the BA (Hons) in Visual Arts' Programme Document.	30%	6

More may be added.

I.7. References *(up to 10 books):*

Flake, Gary William. *The Computational Beauty of Nature*. Cambridge: MIT Press, 1998.

Johnson, Steven. *Emergence: The Connected Lives of Ants, Brains, Cities and Software*. London: Penguin Books, 2001.

Kauffman, Stuart. *Origins of Order: Self-organization and Selection in Evolution*. Oxford: Oxford University Press, 1993.

Langton, Christopher G., ed. *Artificial Life: An Overview*. Cambridge: MIT Press, 1995.

Mandelbrot, Benoit. *The Fractal Geometry of Nature*. New York: W. H. Freeman, 1983.

Mitchell, Melanie. *Complexity: A Guide Tour*. New York: Oxford University Press, 2009.

Papert, Seymour. *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books, 1980.

Pickover, Clifford. *Computers, Patterns, Chaos and Beauty: Graphics from an Unseen World*. New York: St. Martin's Press, 1991.

Prusinkiewicz, Przemyslaw, Lindenmayer, Aristid, et al. *The Algorithmic Beauty of Plants*. New York: Springer-Verlag, 1990.

Reas, Casey, McWilliams, Chandler. *Form+Code in Design, Art, and Architecture*. New York: Princeton Architectural Press, 2010.

Roberts, Eric. *Thinking Recursively*. New York: Wiley, 1986.

Todd, Stephen, Latham, William. *Evolutionary Art and Computers*. London: Academic Press, 1992.

I.8. Academic Integrity:

Students will endeavour to only claim work that they have actually produced themselves. Claiming the work of others is considered plagiarism, and will be dealt with under the academic policies of the university.

I.9. Health and Safety:

Every effort will be made to comply with the intent of Hong Kong's law or acts and the University's policies to maintain a safe and healthy working environment.

I.10. Final Note:

The instructor reserves the right to modify the class and the syllabus or the schedule to adjust to the dynamics of the particular group or to take advantage of opportunities that may arise.