SFU

MEMO

Dean of
Graduate Studies

STREET ADDRESS
Maggie Benston Student
Services Centre 1100
Burnaby   BC   V5A 1S6
Canada

MAILING ADDRESS
8888 University Drive
Burnaby   BC   V5A 1S6
Canada

TO: Senate

TEL

FROM   Wade Parkhouse, Dean, Graduate Studies

RE   Faculty of Communication, Art and Technology

[GS2010.02]

CC   Tom Calvert

DATE   February 9, 2010

For information

Acting under delegated authority at its meetings of 8 February 2010, the SGSC approved the following curriculum revisions:

School of Interactive Arts and Technology   [GS2010.02]
New course: IAT 847-3 Metacreation: Endowing Machines with Creative Behaviours

Senators wishing to consult a more detailed report of curriculum revisions may do so on the Web at http://www.sfu.ca/senate/Senate_agenda.html following the posting of the agenda. If you are unable to access the information, please call 778.782.3168 or email bgrant@sfu.ca.

NEW GRADUATE COURSE PROPOSAL FORM

Subject: ___IAT_____ *(max. 4 chars)* **Catalog Number:** _847_____

Course Title: __Metacreation:Endowing Machines with Creative Behaviors_____ *(max. 80 char.)*

Short Title *(appears on transcripts etc.)* __Metacreation_____ *(max. 25 char.)*

Course Description for Calendar: *(append a course outline as a separate document)*

> Theory and practice of the metacreation as a contemporary approach to generative art and design that involves using tools and techniques from artificial intelligence, artificial life, and machine learning to develop software that is creative on their own. Through the project students will build software that exhibits behaviour that would be considered creative if performed by humans. Students who completed IAT 811 in 2008 or 2009 or IAT 888 in 2010 are ineligible to take this course for further credit.

Units: _3_____

Available Course Components: *(select all that apply)*

☑Lecture   ☐Seminar   ☐Laboratory   ☐Practicum

Prerequisites: *(if any)* ___IAT 800_____

Campus at which course will be offered: ___Surrey_____

Estimated Enrolment: _12_____ The term course will first be offered: __Spring 2011_____

Frequency of course offering: __yearly_____

Grading Basis: ☑Graded   ☐Satisfactory/Unsatisfactory   ☐In Progress/Complete

Justification:

> This is a project-based course to which the usual grading system is well suited.

Resources:

Faculty member(s) who will normally teach this course:
(append information about their competency to teach the course)

__Philippe Pasquier, Steve diPaola_____

Number of additional faculty members required in order to offer this course: _0_____

Additional space required in order to offer this course: *(append details)* __none_____

Additional specialized equipment required in order to offer this course: *(append details)*

_none_____

Additional Library resources required: *(append details)* Annually $ _0_____ One-time $ _0_____

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Upon approval of the course proposal, the Dean of Graduate Studies office will consult with the department or school regarding other course attributes that may be required to enable the proper entry of the new course in the student record system.

IAT 847-3 Metacreation: endowing machines with creative behaviors

NOTE: Students who completed IAT 811 in 2008 or 2009 or IAT 888 in 2010 are ineligible to take this course for further credit.

Course Description

Metacreation is the idea of endowing machines with creative behaviour. Metacreation, as the contemporary approach to generative art/design, involves using tools and techniques from artificial intelligence, artificial life and machine learning (themselves inspired by cognitive and life sciences) to develop softwares that are creative on their own. In other words, a software is a metacreation if it exhibits behaviors that would be considered creative if performed by humans.

This graduate course will provide you with the opportunity to study the theory and practice of metacreation. Tools and techniques from artificial intelligence, artificial life and machine learning will be introduced and exemplified through the study of existing metacreations using them. The course will be organized so that making a project by exploring metacreation in your area of research becomes the primary focus. The interweaving of related theoretical and practical issues will help you situate your work within a larger perspective on art, science and technology.

Pre-requisites and course enrollment

This is an elective course in which all SIAT graduate students can enroll. While it is not a formal pre-requisite, students will benefit from having completed a foundational multimedia programming computation course (e.g. java, processing) such as IAT 800 or have good knowledge of at least one prototyping environment (MAX/MSP/JITTER, Isadora or PureData/GEM). Students without a strong background in computer science need to contact the instructor prior to enrollment.

Topics

- **Artificial intelligence** (autonomous agents, cognitive and reactive agent architectures, multi-agent systems, agent communication)

- **Artificial life** (evolutionary computing, cellular automata, swarm intelligence)

- **Machine learning** (artificial neural networks, instance-based learning, reinforcement learning)

- Related issues: theory of creativity, history of generative art, philosophy of science/technique (technophobia vs technophilia), philosophy of mind, cognitive sciences, validation techniques.

Outcomes

The goal of this course is to introduce theories and approaches to metacreation, that is, the design of machines endowed with creative behavior. Each student will exploit some of the techniques introduced in the course through a project. By doing so, the students will deepen their understanding of a variety of techniques from the fields of artificial intelligence, artificial life and machine learning as well as exercise their research skills. The concrete goal of the course is to produce a research paper presenting the student's work (theoretical background, system and/or experiments, results, discussion and related work and conclusion) that is as ready as possible for submission in a high profile conference or journal.

Evaluation and Grading

30% Theoretical research (includes a presentation in class)

30% Project (10% process, 10% result, 10% in-class presentation and demonstration)

30% Research Paper (refining and presenting all of the above)

10% Participation

References

This is a graduate course. In addition to the reference material, students will be responsible for finding research papers and texts suitable for the work undertaken.

<u>Art and Science:</u>

Metacreation: Art and Artificial Life, Mitchell Whitelaw, MIT Press, 281 pp., 2004, ISBN 0-262-23234-0

Information Art: Intersections of Art, Science and Technology, Stephen Wilson, MIT Press, 2002, 945 pages.

Artificial Life Models in Software, Andrew Adamatzky, Maciej Komosinski (Eds.), 2005, Springer, 344 p. ISBN: 978-1-85233-945-6

Creative Evolutionary Systems (With CD-ROM), by David W. Corne, Peter J. Bentley, The Morgan Kaufmann Series in Artificial Intelligence, 2002, 684 pages, ISBN: 978-1558606739

Proceedings of the Second Artificial Intelligence and Interactive Digital Entertainment International Conference (AIIDE 2006), Edited by John laird and Jonathan Schaeffer, 172pp, 2007, ISBN 978-1-57735-280-8

Music and Artificial Intelligence, Christina Anagnostopoulou, Miguel Ferrand, Alan Smaill (Eds.), Proceedings of the Second International Conference, ICMAI 2002, Edinburgh, Scotland, UK, September 12-14, 2002, Lecture Notes in Computer Science, vol. 2445, Springer, 2002, ISBN 3-540-44145-X.

Interactive Drama, Art and Artificial Intelligence. Mateas, M. Doctoral Thesis. UMI Order Number: AAI3121279, Carnegie mellon University, 2002

Evolutionary Computer Music, Miranda, Eduardo Reck; Biles, John Al (Eds.), 2007, Springer, 259 p. With CD-ROM., ISBN: 978-1-84628-599-8.

Artificial Life For Computer Graphics, Terzopoulos, D., (1999), in Communications of the ACM, Vol 42, No. 8, p32-42

Science:

Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, Gerhard Weiss, The MIT Press, *1999, 643 pages, ISBN:* 978-0262232036

Machine Learning, Tom Mitchell, McGraw Hill, 1997.

Introduction to Evolutionary Computing, Eiben, A.E. and J.E. Smith, Springer, Berlin, 2003.

An Introduction to Genetic Algorithms, Mitchell, M., MIT Press, Boston, Mass., 2002.

Computational Intelligence: an introduction, Engelbrecht, A.P., John Wiley & Sons, Chichester, England, 2002.

Artificial Life: The Quest for a New Creation, Stephen Levy, Random House Value Publishing, 1994, ISBN: 978-0517118085

Swarm Intelligence, Russell C. Eberhart, Yuhui Shi, James Kennedy, Morgan Kaufmann; The MIT Press, 2001, 272 pages, ISBN: 978-0262041942