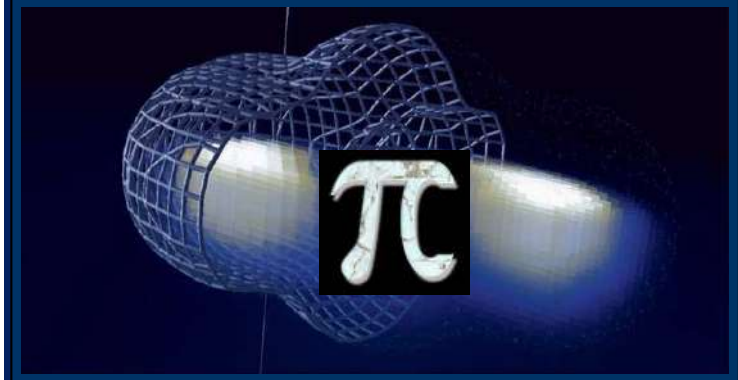


IACAP 2023 The International Association of Computing and Philosophy Conference, Prague, Czech Republic, 3-5 July 2023
https://www.iacap.org/iacap-2023-prague-czech-republic/
CEVAST, Czech Academy of Sciences, Prague, the Faculty of Arts, Charles University.
http://iacap2023.auletris.com
Symposium: Sketching Introductory Courses in the Philosophy of Computing

EXPERIENCES FROM THE SWEDISH NATIONAL COURSE IN PHILOSOPHY OF COMPUTER SCIENCE AND SUBSEQUENT INTERNATIONAL COURSE IN PHILOSOPHY OF COMPUTING 2004-2014

Gordana Dodig-Crnkovic
Mälardalen University & Chalmers University of Technology
Sweden
https://gordana.se

Points of Departure

My background

PhD in Physics & PhD in Computer Science

Research on Information Theory and Philosophy of Information and Philosophy of Computation

Investigations into Information Semantics and Ethics of Computing (PhD Thesis)

Development and teaching of courses (PhD/Masters:

Philosophy of Computer Science, Swedish National Course (Developed in collaboration with PI-network) 2004 http://www.gordana.se/PI_04/index.html

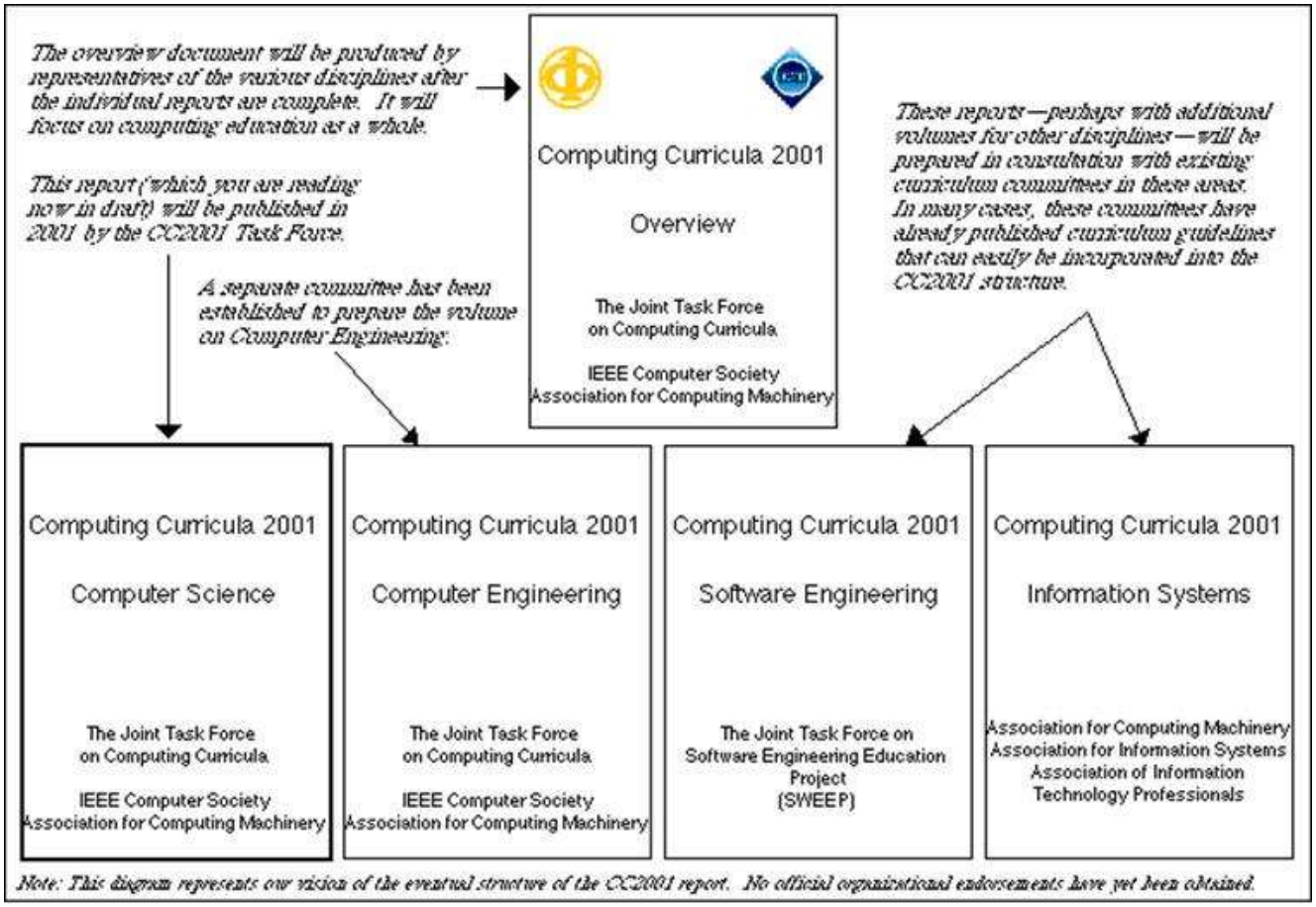
Computing and Philosophy, Global Course (with University of Illinois, Springfield, Insubria (Italy) and ACT (Thessaloniki, Greece)) (2008 – 2014)

Related Courses

- Research Methods in Natural Sciences and Engineering (CDT403) PhD & Masters course (with Jan Gustafsson) (2000 – 2017)
- Formal Languages, Automata and Theory of Computation, CD5560 (2002 – 2014)
- Advanced Computational Thinking and Writing Research Toolbox (2009-2012)
- Computational Thinking and Writing Research Toolbox (20012-2013)
- Information - Knowledge - Science - Ethics (in Swedish) (with Jan Gustafsson 2013-2015 & (2015-2019), in Swedish)
- Philosophy of Computer Science, Swedish National Course (with PI-network) 2004 (PhD/Masters)
- The Methodology of Science in Technology CDT212, (with Jan Gustafsson) (2002–2010)
- Scientific Methods in Computer Science CD5420 (with Jan Gustafsson) (2001-2002)
- Professional Ethics in Science and Engineering, CD5590 (2003 – 2017)
- Computing and Philosophy, Global Course (with University of Illinois, Springfield, and several European universities) (2008 – 2014) (PhD course)
- Research Thinking and Writing Toolbox (2009-2012)
- Computing and Philosophy was also given as a reading PhD course until 2014.

Inspiration For The First Course

http://www.sigcse.org/cc2001/ IEEE-CS and ACM Computing Curricula 2001



Computing

Discrete Structures (DS)
Programming Fundamentals (PF)
Architecture and Organization (AR)
Operating Systems (OS)
Net-Centric Computing (NC)
Software Engineering (SE)
Programming Languages (PL)
Computational Science (CN)
Graphics and Visual Computing (GV)
Algorithms and Complexity (AL)
Intelligent Systems (IS)
Information Management (IM)
Human-Computer Interaction (HC)
Social and Professional Issues (SP)

Computer Science

Discrete Structures (DS)
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Algorithms and Complexity (AL)
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Intelligent Systems (IS)
Information Management (IM)
Social and Professional Issues (SP)
Software Engineering (SE)
Computational Science and Numerical Methods (CN)

PI NETWORK - PREPARING PI - COURSE

SUPPORTED BY Knowledge Foundation

Ahonen-Jonnarth Ulla Senior Lecturer, CS/Biology, Gävle University
Dodig-Crnkovic Gordana Senior Lecturer, CS/Physics, Mälardalen University
Gustafsson Jan Senior Lecturer Computer Science, Mälardalen University
Funk Peter Senior Lecturer (docent) Artificial Intelligence Mälardalen University
Lager Torbjörn Professor of Computational Linguistics, Göteborg University
Lisper Björn Professor of Computer Engineering, Mälardalen University
Nivre Joakim Professor of Computational Linguistics, Växjö University
Odelstad Jan Senior Lecturer CS/Theoretic Philosophy Gävle University

External member: Gang Liu Deputy Director of Philosophy of Science and Technology DivisionInstitute of Philosophy, Chinese Academy of Social Sciences - PhD in Philosophy, Beijing

PHILOSOPHY
OF COMPUTER SCIENCE

CD5650

COURSE OUTLINE

http://www.idt.mdh.se/personal/gdc/pi-network.htm
http://www.idt.mdh.se/personal/gdc/PI_04/index.html

Gordana Dodig-Crnkovic
Department of Computer Science and Engineering
Mälardalen University, 23 January 2004

PHILOSOPHY OF COMPUTER SCIENCE

LECTURES – PART I

22 January

09-12 **Introduction to Philosophy of Information** – Luciano Floridi

13-14 Discussion on Introduction to PI

14-15 **Physics as an "Ideal Science"** -
Philosophical Foundations and Consequences
Lars-Göran Johansson

15-17 **The Function of Natural Laws in Physics**
Lars-Göran Johansson

23 January

09-12 **Philosophical Foundations of Computability**
Gordana Dodig-Crnkovic

13-14 Discussion on Philosophical Foundations of Computability

14-15 Planning for the Course and Mini-Conference
Closing Remarks (GDC)

PHILOSOPHY OF COMPUTER SCIENCE

LECTURES – PART II

04 March

09-12 **Methodological Foundations of CS**
Erik Sandewall

13-14 Discussion on Meth. Found. of CS

14-15 **Critical Analysis of CS Methodology**
Björn Lisper, Jan Gustafsson

15-16 Discussion on Critical Analysis of CS Methodology, Björn Lisper, Jan Gustafsson

05 March

09-12 **Modelling and Simulation**
Kimmo Eriksson, Lars-Göran Johansson

13-14 Discussion on Modelling and Simulation

14-15 DISCUSSION OF PAPER DRAFTS (GDC)

15-16 Closing Remarks

PHILOSOPHY OF COMPUTER SCIENCE

LECTURES – PART III

13 May

09-12 **Ethics and Professional Issues in Computing**
Gordana Dodig-Crnkovic

13-14 **Discussion on Ethics and Professional Issues in Computing**

14-15 **Ethics and AI** (Peter Funk)

15-16 Discussion on Ethics and AI

14 May

09-16 **MINI-CONFERENCE**

16-17 Closing Remarks

The Course Examination Form

The course was research-oriented and preparing the participants for collaborative research in this interdisciplinary area.

- 3 points: class attendance + class notes (at minimum 15 pages, at minimum 5 pages per course block)
- 2 points: research paper 6-10 pages (6000-8000 words), presented at mini conference

Conclusions & Lessons Learned
Why is Philosophy Important for Computing?

- Being well oriented in a philosophical context means having access to valuable "thinking tool-box" with:
  - Paradigms
  - Metaphors
  - Historical examples (knowledge capital)

- Communication within computing and philosophy communities and wider

- Context – conceptual nad cultural framework

- The relation between philosophy and computing is very much two-way – philosophy with its broader context helps define computing which in its turn helps generate new philosophy

Conclusions & Lessons Learned
Why is Philosophy Important for Computing?

- Humanist dimensions of higher education are important!
- Knowledge society with automated production, organization and even automated knowledge discovery.
- Genuine human thinking abilities including creativity will make the difference!

"Of all things the measure is (hu)man, of the things that are, that how they are, and of things that are not, how they are not."
(Protagoras, c. 490 - c. 420 BC)

Conclusions & Lessons Learned
Why is Philosophy Important for Computing?

Applying computational methods to philosophical matters:

Conceptual “experiments in silico”/ computational models/simulations
As an extension of an ancient tradition of thought experiment, a trend in philosophy is to apply computational modeling schemes to questions in logic, epistemology, philosophy of science, philosophy of biology, philosophy of mind, and so on.

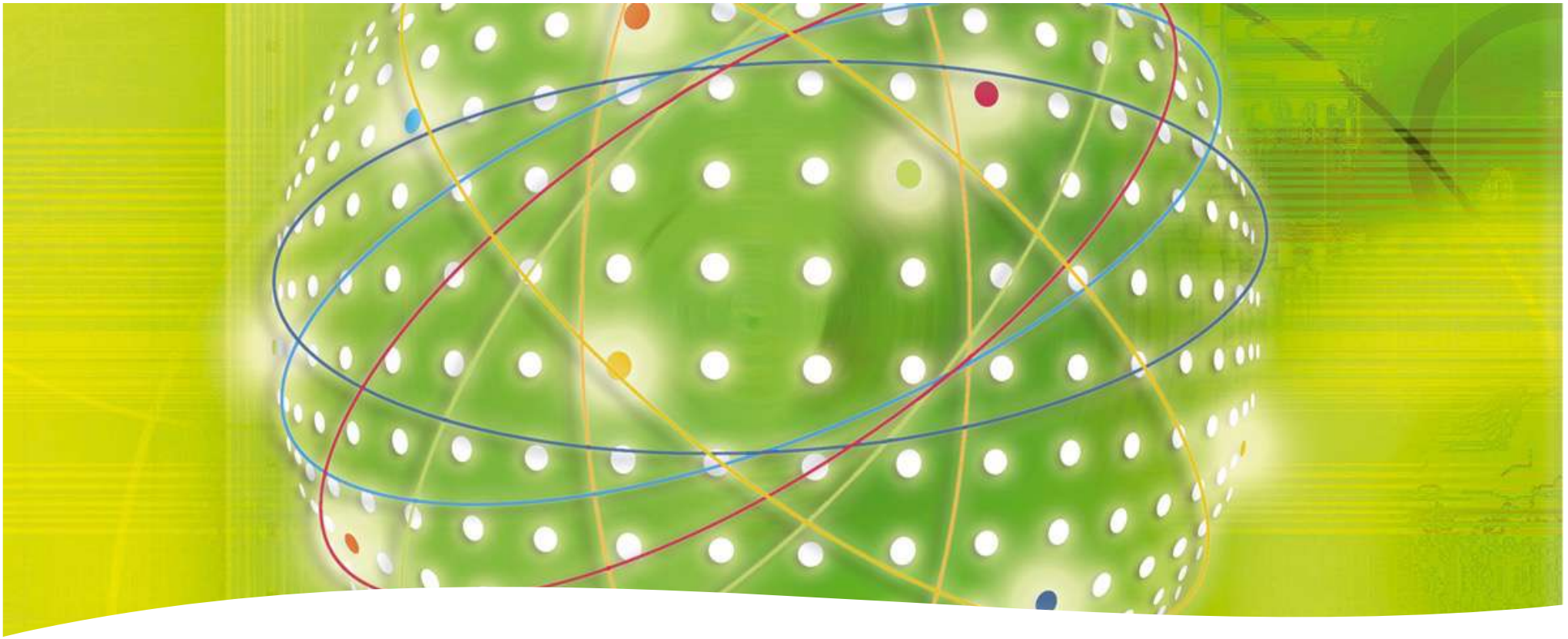
Conclusions & Lessons Learned
Why is Philosophy Important for Computing?

A universal computational modeling approach - pancomputationalism

computation = information processing

universe as a network of networks of computational processes

By this view, computational and informational concepts are considered to be so powerful that given the right level of abstraction, anything in the world could be modeled and represented as a computational (information processing) system [from the point of view of an observer], and any process could be simulated computationally.



Results from the PI Course

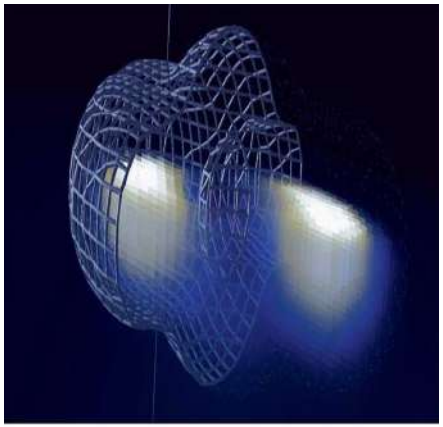
Participants from different universities (Blekinge, Dalarna, Mälardalen, Skövde, Uppsala, SICS Stockholm) have taken part in the course and have presented their research papers at the Mini-conference.

These have been documented in the Course Proceedings, http://www.idt.mdh.se/personal/gdc/PI_04/proceedings.pdf

As a result of the course ten papers have been published in journals and conference proceedings or included as chapters in PhD theses.

www.fraunhofer.de/.../ 2005/07gridcomputingg.jsp

Related book , journal SI & CAP 2005 conference at MDU



simulation of binary black hole inspiral based on computations done at NERSC. The simulation required 400,000 hours of CPU time on the 024 POWER3* microprocessors of the NERSC IBM SP system, 1.5 TB of RAM, and more than 2 TB of disk storage. From [4], with permission; © 2003 IEEE.

Computation, Information, Cognition – The Nexus and The Liminal

Gordana Dodig-Crnkovic and Susan Stuart Editors, CSP, Cambridge

tripleC journal issue dedicated to E-CAP 2005

Gordana Dodig-Crnkovic and Susan Stuart Editors

ECAP 2005 European Computing and Philosophy Conference. General chair: Gordana Dodig-Crnkovic

Conference web page: http://www.gordana.se/ECAP2005.html

Conference program PROGRAM BOOKLET

CONFERENCE REVIEW

Articles from the course Computing and Philosophy

Thomas Larsson: Ethics of the Hyperreal

Magnus Johansson: When Simulations Become Reality

Kim Anttila: Ethics in the Computer Profession

Mikael Sandberg: Gender Distribution Normalization in the Computer Game Development Arena

Omar Bagdadi: Is Big Brother a Human Necessity?

Virginia Horniak: Privacy of Computing – An Ethical Analysis

Christina Björkman (2005) **Feminist Theory in Computer Science** - Chapter as a part of the PhD thesis, Crossing Boundaries, Focusing Foundations, Trying Translations: Feminist Technoscience Strategies in Computer Science

https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A837505&dswid=1692

Articles from the course Computing and Philosophy

Christina Björkman (2005) Feminist Theory in Computer Science - Chapter as a part of the PhD thesis, Crossing Boundaries, Focusing Foundations, Trying Translations: Feminist Technoscience Strategies in Computer Science
https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A837505&dswid=1692

Two MSc students presenting at ECAP-2010 conference:

Ceren Ahiska (2010) Computer-Mediated Human Manipulation and Uniqueness of Computer Ethics, http://www.idt.mdh.se/kurser/comphil/2009/CAP-FINAL/CerenAhiska-final.pdf. ECAP-2010 conference

Robert Gawrylczyk (2010) Should Robots That Interact With Humans Look Like Humans? http://www.idt.mdh.se/kurser/comphil/2009/CAP-FINAL/GawrylczykRobert_final.pdf ECAP2010 conference

CONTINUATION

COURSE OUTLINE

COMPUTING AND PHILOSOPHY - CaP COURSE

Course organizer: Gordana Dodig-Crnkovic MDH
Course coordinator: Peter (Piotr) Boltuc UIS

Course Title:	COMPUTING AND PHILOSOPHY
Description:	An international distance course with pre-recorded video lectures given by Peter Boltuc, Geatano Lanzarone, Vincent Muller, Keith Miller and Gordana Dodig-Crnkovic in collaboration with the leading scholars in the field of philosophy of computing and information.
Duration:	At MDH - period 2 year 2008. During the last week of October until two first weeks in December courses at different universities will overlap and we plan for discussions between students.
Prerequisites:	At least 150 university course points.
Weight:	7.5 ECTS (4.5 points for taking part in the class activities, discussions, quizzes and for class-notes/logbook, while writing a research paper is worth 3.0 credits)
Level:	Specialized
Course Instructors:	Peter (Piotr) Boltuc Department of Philosophy, University of Illinois, Springfield, USA Keith W Miller Dept. of Computer Science, University of Illinois at Springfield Vincent C. Müller The American College of Thessaloniki, Greece Gaetano Lanzarone University of Insubria, Italy Gordana Dodig-Crnkovic, Mälardalen University, Sweden
Guest Professors:	Leading specialists within relevant fields.

Assignments:	Research paper and Lecture notes/Logbook.
Description-Objectives:	Course will give you insights in the fundamental problems of the field of computing and information philosophy, its ideas and relations to different sciences and its philosophical, ethical and societal/cultural relevance.
Teaching Methods	Combined distance and on-campus course with lectures, guest lectures and classroom discussions. The course is given in English. Teaching Team: [see Lecturers] + guest professors/recorded lectures Course Participants: PhD students and presumptive PhD students.
Reading Materials	No textbook covers the entire course, but the main textbook will be The Blackwell Guide to the Philosophy of Computing and Information (Blackwell Philosophy Guides), Luciano Floridi (Editor) and we also rely extensively on APA Newsletter on Philosophy and Computers Some parts of the course are not in any textbook yet. As additional reading materials, number of different other sources (textbooks, journal articles, and similar) will be used. The course proceedings will be published.
Syllabus	Computing and Philosophy Syllabus Kursplan Datorer och Filosofi (in Swedish)
ECTS description	ECTS-description

Similar courses (PhD/Masters)

- Philosophy of Computer Science, Swedish National Course (with PI-network) 2004

- Computing and Philosophy, Global Course (with University of Illinois, Springfield, and several European universities) (2008 – 2014)

- Research Thinking and Writing Toolbox (2009-2012)

- Computational Thinking and Writing Research Toolbox (20012-2013)

- Computing and Philosophy were also given as a reading Ph.D. course until 2014.

THE WILDFIRE SPREAD OF COMPUTATIONAL IDEAS

"Everyone knows that computational and information technology has spread like wildfire throughout academic and intellectual life. But the spread of computational ideas has been just as impressive.

Biologists not only model life forms on computers; they treat the gene, and even whole organisms, as information systems. Philosophy, artificial intelligence, and cognitive science don't just construct computational models of mind; they take cognition to be computation, at the deepest levels.

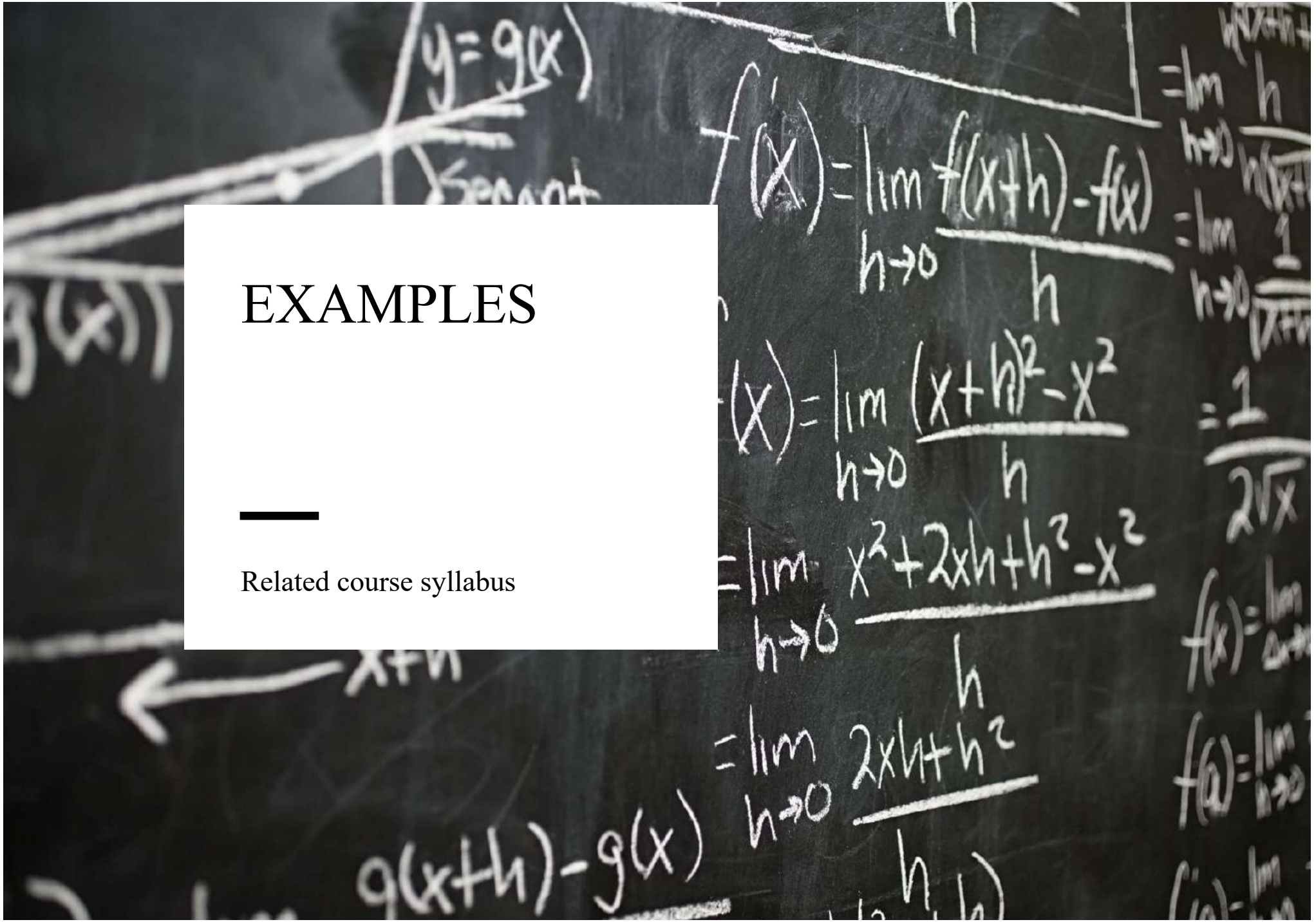
Physicists don't just talk about the information carried by a subatomic particle; they propose to unify the foundations of quantum mechanics with notions of information. Similarly for linguists, artists, anthropologists, critics, etc. Throughout the university, people are using computational and information notions -- such as information, digitality, algorithm, formal, symbol, virtual machine, abstraction, implementation, etc. -- as fundamental concepts in terms of which to formulate their theoretical claims."

Brian Cantwell Smith on "The Wildfire Spread of Computational Ideas", 2003

THE WILDFIRE SPREAD OF COMPUTATIONAL IDEAS

"Furthermore, modern practice is bursting with possibility, as designers, playwrights, artists, journalists, musicians, educators, are drawn into the act along with the original scientists and engineers, and now also anthropologists, linguists and sociologists. In fact few fields, if any, are being left behind. And to repeat something said earlier, it would be a mistake to think that these people are just users of computation. On the contrary, they are participating in its invention – creating user interfaces, proposing architectures, rewriting the rules on what it is to publish, disrupting our understanding of identity. Moreover, the line between specifically computational expertise and general computational literacy is fading ..."

Cantwell Smith, B. 1996., On the Origin of Objects, Cambridge, MA: MIT Press



EXAMPLES

Related course syllabus

Study Information

Mälardalen University, Department of Computer Science and Electronics

Computing and Philosophy 7.5 credits

Course code:	CDT415	**Level of education:**	Advanced level
Subject:	Computer Science	**Area of education:**	Engineering
Valid from semester:	20082		
Ratification date:	11/29/07	**Change date:**	
Progression:			

Objectives

We study the question of the nature of computing as information processing and its philosophical grounds.
The aim is to address the basic questions of scientific foundations of the research area, its methodology, applications and the value system - within the framework of the emerging Philosophy of Computing and Information.

Learning objectives

The student will after fulfilled course have insights into the broad philosophical significance of computers
and ICT as tools of production and communication of information, knowledge and ideas.

Course content

Information, Philosophical foundations of Computing, Mind and AI including selected topics from Cognitive Science, Real and Virtual, Computers in Society, Ethics, Computers and Arts.

Final: Mini-conference and article presentation.
The course is designed as a combination of a series of seminars based on the lectures of eminent guest lecturers and distance study. It presents an international collaboration between several European universities and the University of Illinois at Springfield, USA. That will give course participants a unique opportunity to communicate with colleagues from other universities in the world, as well as with our lecturers who are leading experts within the field.

Teaching methods

Lectures are combined with group discussions. The time between meetings is used for self study and paper writing.

Prerequisites
At least 150 credits from an institution of higher education and a TOEFL test result, minimum score 173(CBT), 500(PBT) or 61(iBT) or an IELTS test result with an overall band score of minimum 5,0 and no band score below 4,5. The English test is COMPULSORY for all applicants except citizens of Australia, Canada, Ireland, New Zealand, the United Kingdom, and the USA.

Examination
EXA1, 7.5 credits, marks 3, 4, or 5, Examination. Written exam (research paper), lecture notes, multiple-choice exam
Rules and regulations for examinations in undergraduate education at Mälardalen University

Marks 3, 4, or 5.

Advanced Computational Thinking and Writing Research Toolbox

Course code:	DVA417	**Level of education:**	Second Cycle
Subject:	Computer Science	**Area of education:**	Engineering
Valid from:	SS13	**Main field of study:**	Computer Science

Goals

The course focuses on computational aspects of reasoning and model-building in constructive research. The main objective is to give a student an improved understanding and knowledge of the state of the art in computational thinking techniques essential for contemporary research, from Software Engineering to Brain-inspired computing, and Cognitive computing. It includes academic writing and publication and the essentials of ethics. As a result the student will be able to write a publishable research article that demonstrates the ability to use computational thinking and exhibits high standards of writing.

Learning objectives

On successful completion of the course, the student should be able to: - identify and apply appropriate thinking tools from the state-of-the-art computational thinking toolbox - understand and take into account the paradigm shift taking place within the field of Computing - demonstrate understanding of the ideas presented in specialist lectures - improve skills in academic writing in English and publication - show an ability to use basic concepts of research ethics

Computational Thinking and Writing Research Toolbox

Course content:
The course deals with three main themes:

- The scientific way of thinking in research, with computational thinking in focus
- Writing and publication of research papers
- Values and ethical considerations in Research

Teaching methods:
The course consists of lectures given by specialists within different research fields combined with in-class discussions. The course is given in English.

Prerequisites:
At least 150 credits from an institution of higher education and a TOEFL test result (PBT) at least 530, TWE score 4, (iBT) at least 72, TWE score 17 or IELTS test score for academic purposes with an overall band score of minimum 5.5 and no band score below 5.0. The English test is COMPULSORY for all applicants except citizens of Australia, Canada, Ireland, New Zealand, the United Kingdom and the USA. The TOEFL code you must use is SWEDEN 9520.

Examination:

INL1, 2 credits, marks 3, 4 or 5, Lecture NotesTEN1, 1.5 credits, marks 3, 4 or 5,
Take-home exam

Rules and regulations for examinations in undergraduate education at Mälardalen University

Marks 3, 4, or 5.

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- The scientific way of thinking in research, with computational thinking in focus
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Examination:

INL1, 2 credits, marks 3, 4 or 5, Lecture Notes

SEM1, 1.5 credits, marks 3, 4 or 5, Seminar

TEN1, 1.5 credits, marks 3, 4 or 5, Take-home exam

Rules and regulations for examinations in undergraduate education at Mälardalen University

Marks 3, 4, or 5.

Computational Thinking and Writing Research Toolbox

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Subject:	Computer Science	**Area of education:**	Engineering
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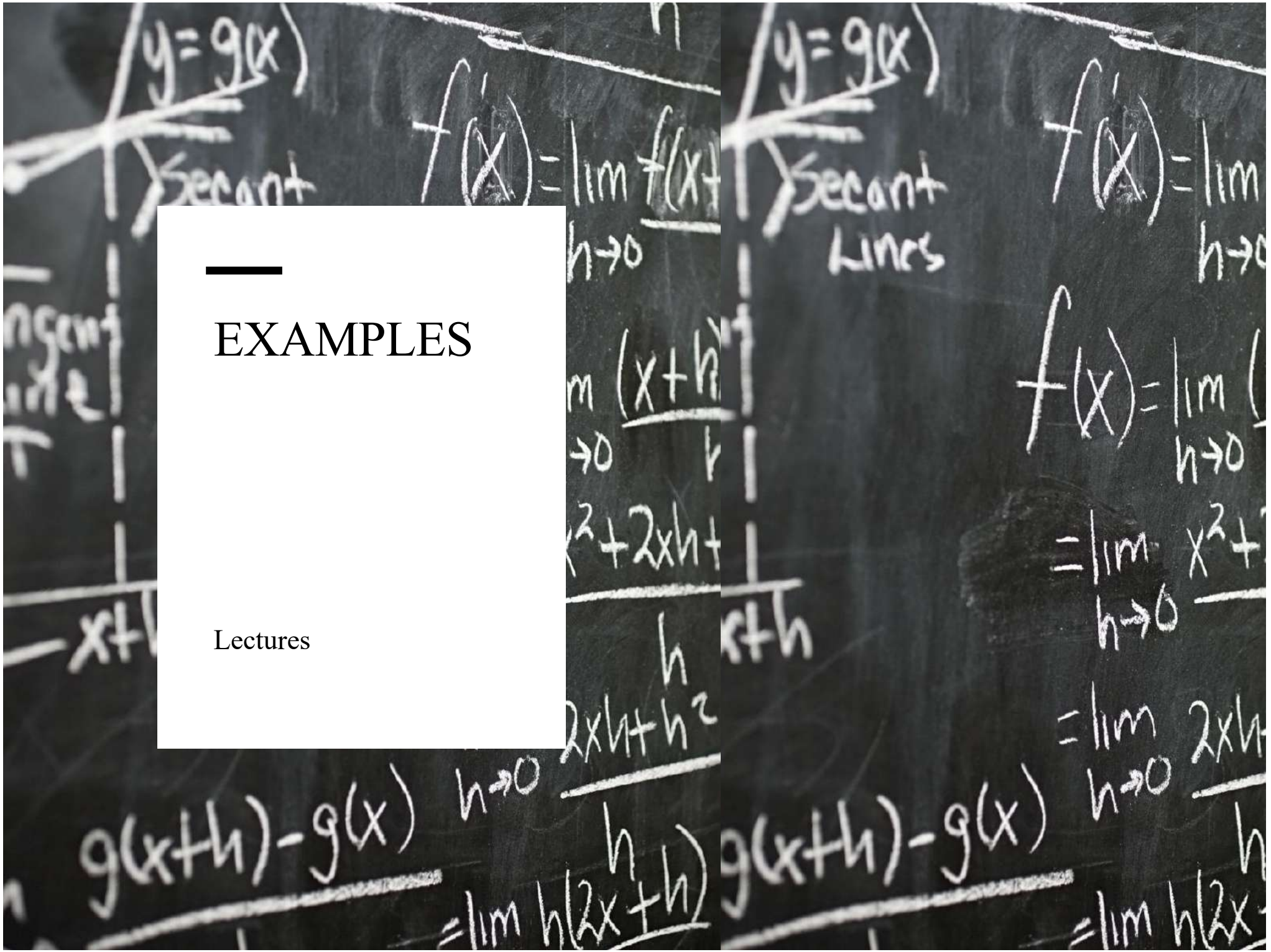


EXAMPLES

Lectures

PHILOSOPHY OF COMPUTER SCIENCE

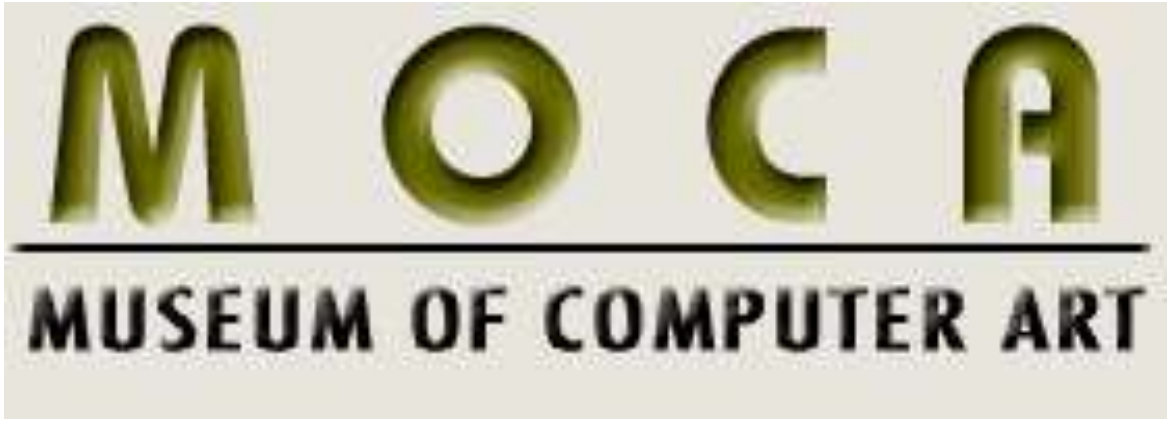
CD5650

COMPUTERS AND ARTS

Gordana Dodig-Crnkovic

Department of Computer Science and Engineering
Mälardalen University, 13 May 2004

COMPUTER ART



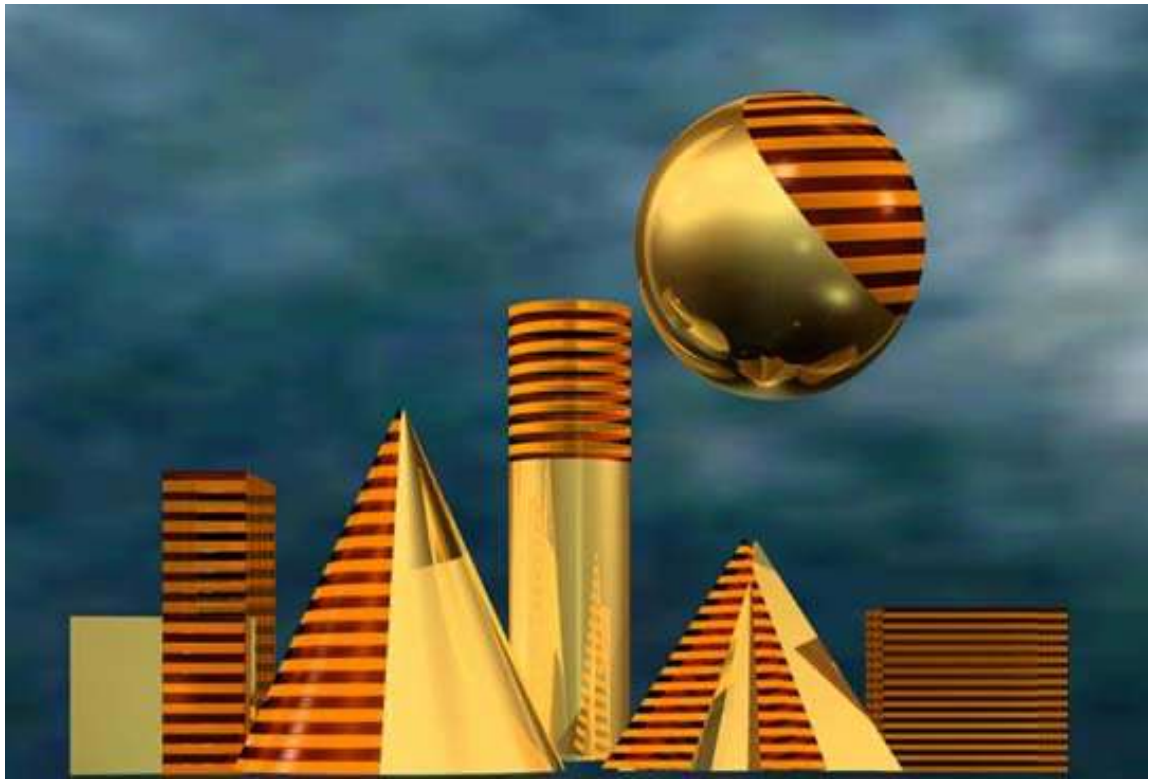
http://moca.virtual.museum/

Aesthetic Experience of Computer Art

- the interactive
- the immersive (virtual reality, etc)

3D Abstract Art

Amichai Shavit

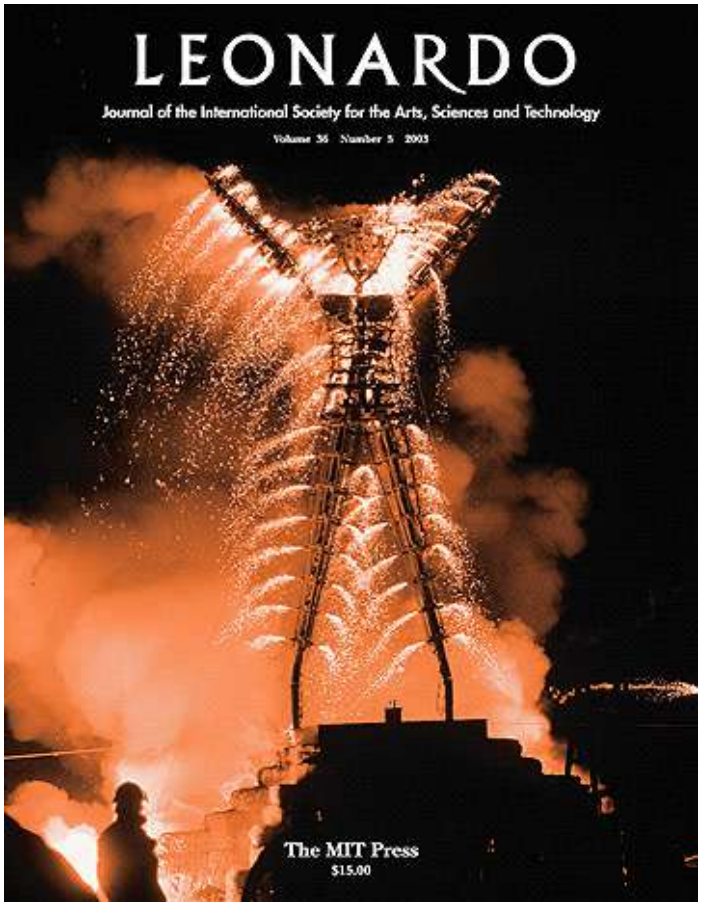


Title: Polished Spiral
Karin Kuhlmann 2003
Fractal,
Mathematical Art.

Technique: Computer generated Fractal, created with FraxPlorer, Layertechnique.

http://mitpress2.mit.edu/e-journals/Leonardo/isast/journal/currentiss.html

Leonardo is a journal, published five times a year, edited by Leonardo/the International Society for the Arts, Sciences and Technology, and published by the MIT Press.



Leonardo
Vol. 39, Issue 3 (2006), some articles

The Artists and the Scientific Research Environment
The Helium Stockpile A Collaboration in Mathematical Folding Sculpture
Extended Memory: Early Calculating Engines and Historical Computer Simulation

Gordana Dodig-Crnkovic Shifting the Paradigm of the Philosophy of Science: the Philosophy of Information and a New Renaissance, Minds and Machines: Special Issue on the Philosophy of Information, November 2003, Volume 13, Issue 4

E-Poetry

http://epc.buffalo.edu/e-poetry/

Interactive hyperpoetry & hyperimages

Were either of us
Icarus?

http://www.art.net/studios/visual/stowe/odea.htn

Computers and Music - Examples

- Algorithmic composition
- Artificial Creativity
- Band-in-a-Box
- http://en.wikipedia.org/wiki/Computer-generated_music
- Metamath Music Music generated from mathematical proofs
- Synestesia: Music generated from pictures
- Lexikon-Sonate: Karlheinz Essl's realtime composition for computer-controlled piano
- Randomusic Magnus Andersson's computer program that generates human like improvisations in the avant-garde genre of classical music. The site has samples with piano and cello.
- Music software