My points of departure

• Bildning – why is it important?

Courses
• Philosophy of Computing
• Theory of Science – Scientific Cultures
• Professional Ethics – Question of Values

• Personal interest in formal and free artistic and literary expression

Bildning

• skolbildning o.d. education;
• [själ]kultur culture;
• belevenhet [good] manners pl., breeding
• fin bildning refinement;
• vetenskaplig bildning [a] scientific training

• formation el. bildande formation

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 (CS)
Graphics and Visual Computing (GV)
Algorithms and Complexity (AL)
Intelligent Systems (IS)
Information Management (IM)
Human-Computer Interaction (HC)
Social and Professional Issues (SP)

Classical roots: Paideia

- To the ancient Greeks, Paideia was "the process of educating (wo)man into the true form, the real and genuine human nature."

- It also means culture. It is the ideal in which the Hellenes formed the world around them and their youth.

- Since self-government was important to the Greeks, Paideia combined with ethos (habits) made a man good and made him capable as a citizen or a king. (1a) This education was not about learning a trade or an art, which the Greeks called banausos (mechanical) unworthy of a citizen, but was about training for liberty (freedom) and nobility (The Beautiful).

- Paideia is the cultural heritage that is continued through the generations.

Harmony as an Ideal Virtue

- In philosophy (especially that of Aristotle), the golden mean is the felicitous middle between two extremes, one of excess and the other of deficiency.

- Golden mean (golden ratio, golden section, golden number, or divine proportion), the irrational number approximately 1.61803..., which is: the smaller is to the larger as the larger is to the sum of the two. This ratio has applications in several fields including mathematics, aesthetics (especially art, architecture, and design), and science.

- The Doctrine of the Golden Mean (Chinese: 中庸; Pinyin: Zhōng Yōng), is a chapter in Li Ji (Chinese: 礼记; Pinyin: Lǐ jì) is one of the "Four books" of classical Chinese writings.
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 Phil. Found. of Computability
14-15 Planning for the Course and Mini-Conference
   Closing Remarks (GDC)

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

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 is research-oriented and will prepare 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
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.

Digital Art Museum  
the history and practice of digital fine art

http://dam.org/

Leonardo  
Journal of the International Society for the Arts, Sciences and Technology, published by the MIT Press.

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

E-Poetry

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

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
Computers and Music - Examples

- Algorithmic composition
- Artificial Creativity
- Band-in-a-Box
- 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

Experiences from the PI Course

- Participants from different universities (Blekinge, Dalarna, Mälardalen, Skövde, Uppsala) 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.
- We hope to see the network activity and the course develop in the future, possibly as a distance course, in collaboration with colleagues in other countries. This will certainly broaden our experience and allow us to identify further relevant topics to be included.
"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

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<th>Föreläsning</th>
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<tr>
<td>F10 Fr 22/09 10-12</td>
<td>Informationssökning</td>
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<td>Att söka information</td>
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<td>Vetenskapens idéhistoria Forskningsinstitutioner ur ett svenskt historiskt perspektiv</td>
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<td>IEEE Women in Engineering</td>
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<td>F15 Fr 13/10 10-12</td>
<td>Att arbeta med rapporter och opponera Deadline för rapporter (förlag midnatt)</td>
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<td>F16 Ti 17/10 Gästföreläsning 15-15</td>
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<td>Ta med dig rapportgranskningar Kritiska fysiker</td>
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Computing as Common Denominator

"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 ...”


PROFESSIONAL ETHICS
IN SCIENCE AND ENGINEERING
CD5590

Gordana Dodig-Crnkovic
Department of Computer Science and Electronics
Mälardalen University
2005

Course web page: [http://www.idt.mdh.se/kurser/cd5590/](http://www.idt.mdh.se/kurser/cd5590/)

Why Learn Ethics?

- Convey a sense of professional responsibility not covered in other courses
- Deal with the true nature of computing as a service to other human beings.

Why Teach Ethics?

- Sensitize students to professional ethics issues
- Provide tools and methods for analyzing cases
- Provide practice in applying the tools and methods to actual or realistic cases
- Develop in the student good judgment and helpful intuitions - ethical autonomy.
A Real Life Example of the Importance of Ethical Judgement

VALDOR, VALues in Decisions On Risk


- Risk management and democracy – the role of public participation
- The precautionary principle

  The precautionary principle exists in many versions as a method for risk management. One version, adopted in the Rio Declaration, is that when there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. The conference organizers want to evaluate the use of the precautionary principle by raising issues of practical, philosophical and legal nature.

- Community environmental justice in risk management

Engineering as Social Experimentation

“All products of technology present some potential dangers, and thus engineering is an inherently risky activity. In order to underscore this fact and help in exploring its ethical implications, we suggest that engineering should be viewed as an experimental process. It is not, of course, an experiment conducted solely in a laboratory under controlled conditions. Rather, it is an experiment on a social scale involving human subjects.”


Why is Engineering Socially Important?

Engineering has a direct and vital effect on the quality of life of people. Accordingly, the services provided by engineers must be dedicated to the protection of the public safety, health and welfare.

Way is the Professional Ethics Important for Engineers and Scientists?

Because the Professional Ethics shall be a part of education for every socially important profession, as one of essential constituents of the meaning of the term professionalism!
# LECTURES

**Professional Ethics in Science and Engineering, CD5590**

Teacher and examiner: Gordana Dodig-Crnkovic, gordana.dodig-crnkovic@mdh.se

*Time & Place: Monday & Thursday, 13:15 - 15:00, Classroom V220 (V222 on 11-27 and 12-05)*

<table>
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<td>GETTING STARTED. Course Preliminaries.</td>
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<td>Introduction. Administrivia.</td>
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<td>Identifying Moral Issues.</td>
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<td>Basic Moral Orientations</td>
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<td>The Ethics of Respect</td>
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| 4 Dec    | PRIVACY AND CIVIL LIBERTIES                                           |
|          | In-class activity: CASE STUDIES (Virginia, Jörgen)                    |
| 5 Dec    | GUEST LECTURE BY MONIKA EIBORN                                        |
|          | Nuclear Non-proliferation and Ethics                                  |
|          | Nucleus 02 2003 side 39                                                |
| 8 Dec    | RISKS IN TECHNOLOGY AND SCIENCE PRECAUTIONARY PRINCIPLE               |
|          | In-class activity: CASE STUDIES (Jonas, Balaji, Artur)                |
| 11 Dec   | INTELLECTUAL PROPERTY                                                 |
|          | In-class activity: CASE STUDIES (Magnus, Jens)                        |
| 12 Dec   | COMPUTER GAMES AND ENTERTAINMENT                                      |
|          | In-class activity: CASE STUDIES (Thomas, Kim)                         |
| 15 Dec   | COURSE WRAP-UP                                                        |

| 4 Dec L10/E3 | Privacy and Civil Liberties                                           |
| 5 Dec L11    | Guest lecture by Monika Eiborn                                        |
| 8 Dec L12/E4 | Risks in Technology and Science Precautionary Principle               |
| 11 Dec L13/E5| Intellectual Property                                                 |
| 12 Dec L14/E6| Computer Games and Entertainment                                      |

| 15 Dec L15  | Course Wrap-Up                                                        |
| TAKE-HOME EXAM | Research Paper + Class Notes                                      |

## Conclusions: Why is bildning important?

- Communication – both within computing community and wider
- Context – cultural and social framework
- The relation between bildning and computing is very much two-way – bildning defines computing which in its turn defines bildning.
- Being well oriented in a cultural context means having access to valuable "thinking tool-box" with:
  - Paradigms
  - Metaphors
  - Historical examples (knowledge capital)

- Democratic and humanist dimensions of higher education are important!
- Knowledge society – leads to automated production, organization and even automated discovery. Only genuine creativity will make the difference!
- "Of all things the measure is (hu)man, of the things that are, that [or "how"] they are, and of things that are not, that [or "how"] they are not." (Protagoras, c. 490 - c. 420 BC)