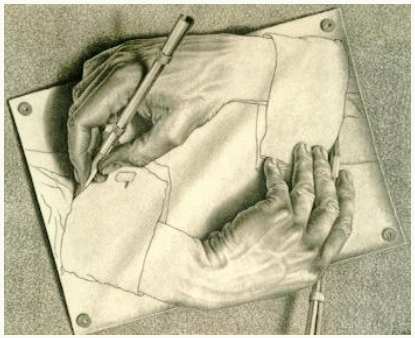


Ämneskonferens i datavetenskap
och numerisk analys
Stockholm 12-14 juni 2006

BILDNING:
Vad har vi att komma med?

Gordana Dodig-Crnkovic

Institutionen för datavetenskap
och elektronik
Mälardalens högskola

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 s

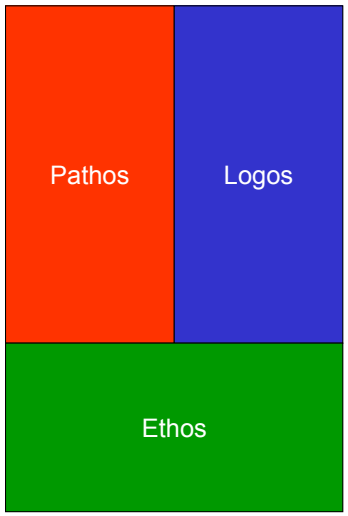
- *skolbildning* o.d. education;
- *[själs]kultur* culture;
- *belevenhet* [good] manners pl., breeding
- *fin bildning* refinement;
- *vetenskaplig bildning* [a] scientific training

- *formation el. bildande* formation

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.

Rhetoric



Pathos - appeal based on emotion.

Logos - appeal based on logic or reason.

Ethos - appeal based on the character of the speaker

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 Yóng), is a chapter in *Li Ji* (Chinese: 禮記; Pinyin: Lǐ jì) is one of the "Four books" of classical Chinese writings.

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

EXAMINATION

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

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

LECTURES – PART I
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

LECTURES – PART II
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

LECTURES – PART III

14 May

09-16 MINI-CONFERENCE

16-17 Closing Remarks

PI NETWORK

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 General and Computational Linguistics, Göteborg University
Lisper Björn Professor of Computer Engineering, Mälardalen University
Nivre Joakim Professor of Computational Linguistics, Växjö University
Odelstad Jan Senior Lecturer (docent) CS/Theoretic Philosophy Gävle University

Correspondent: **Gang Liu** Deputy Director of Philosophy of Science and Technology DivisionInstitute of Philosophy, Chinese Academy of Social SciencesPhD in Philosophy, Beijing

PHILOSOPHY OF COMPUTER SCIENCE

CD5650

COMPUTERS AND ARTS

Gordana Dodig-Crnkovic

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

COMPUTER ART

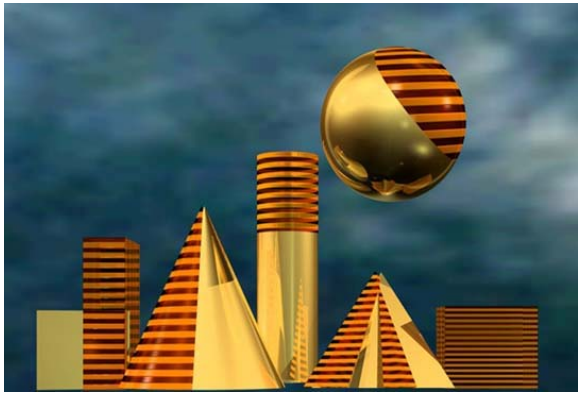
MOCA

MUSEUM OF COMPUTER ART

http://moca.virtual.museum/

3D Abstract Art

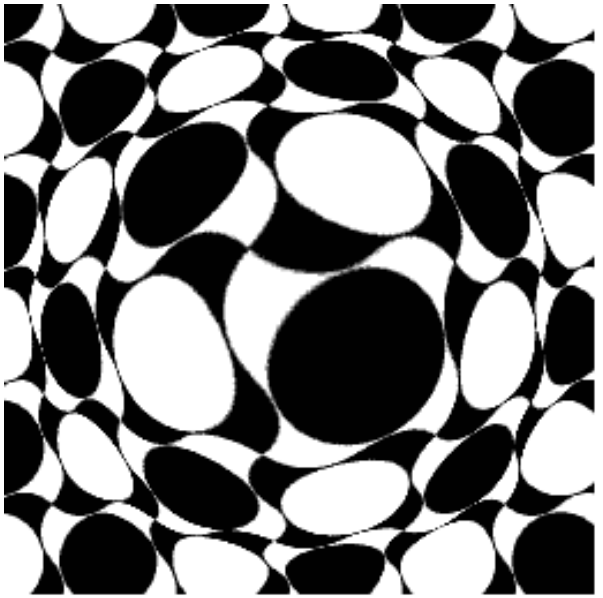
Amichai Shavit



No. 43D

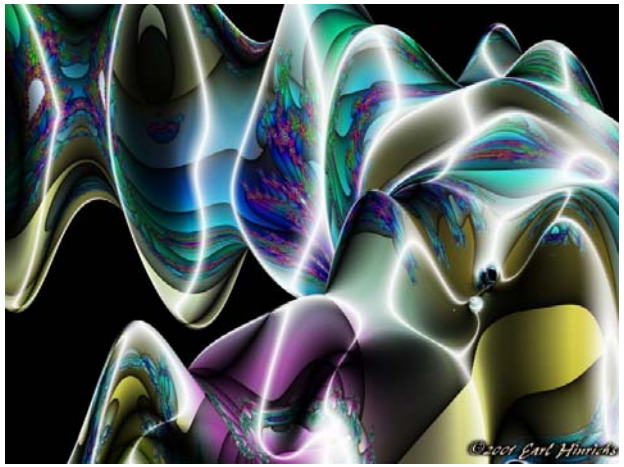
Angelo Di Cicco

Computer Art inspired by **Victor Vasarely**



http://computerart.org/a0028-3.html

Earl L. Hinrichs

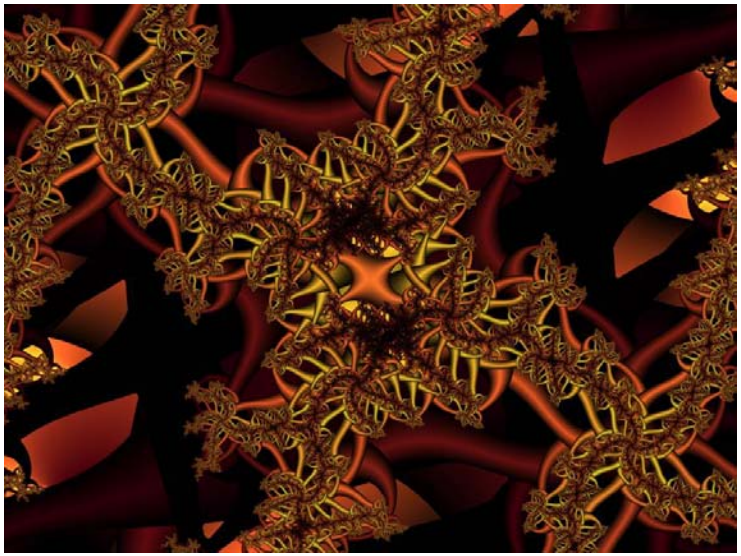


Title: Polished Spiral
Karin Kuhlmann 2003
Fractal,
Mathematical Art.

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

http://www.starbase1.co.uk/Fractal/fraxplorer/pages dna_tangler.jpg

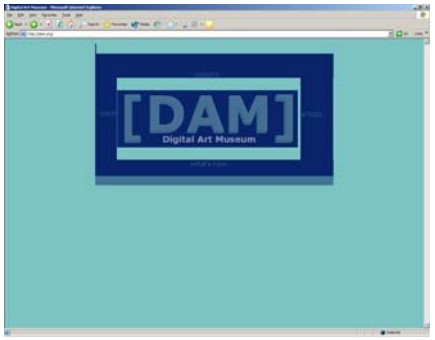
Nick Stevens' Fraxplorer Fractals



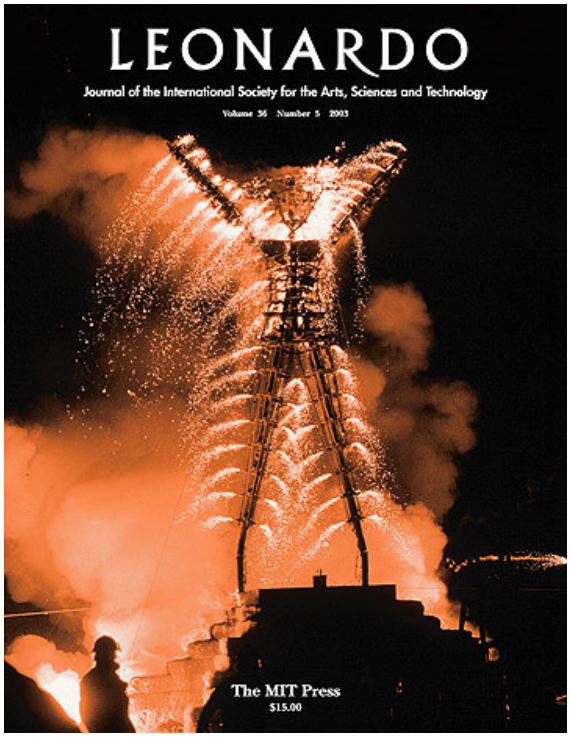
Aesthetic Experience of Computer Art

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

Digital Art Museum the history and practice of digital fine art



http://dam.org/



E-Poetry

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

Before Sleep

I need to find

I need to find

I need to find

I need to find

I need to find

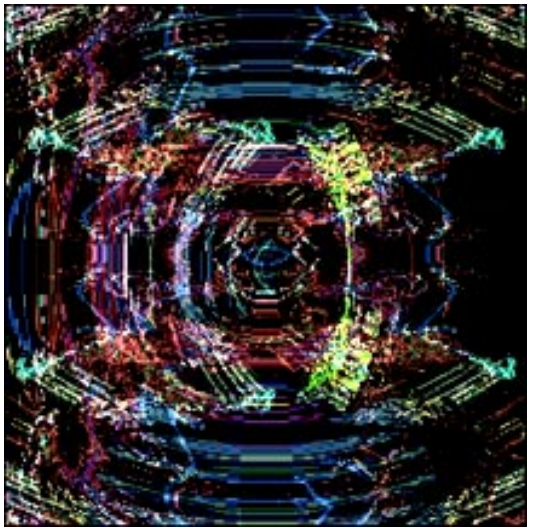
http://art.net/studios/visual/stowe/beforesleep.htm

one thin tear

http://art.net/studios/visual/stowe/Pomegraphics.htm
http://www.art.net/studios/visual/stowe/sleeptear1.htm

Interactive hyperpoetry & hyperimages

Were either of us
Icarus?



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

Computers and Music

- Music Composed and Performed by Computers
- Algorithmic composition
- Trackers
- Max Mathews
- Artificial Creativity
- Band-in-a-Box
- http://en.wikipedia.org/wiki/Computer-generated_music
- Music software

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Computers and Music:
Computer-generated music performed by computers

- ChucK, Csound, Max/MSP, PD, SuperCollider (languages)
- HG Fortune makes "magic music machines", such as XWOFIII, which create amazing music automatically, or with user input.
- 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.

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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.

CT3620

VETENSKAPSMETODIK FÖR TEKNIKOMRÅDET

GRUNDLÄGGANDE VETENSKAPSTEORI

http://www.idt.mdh.se/kurser/ct3620

Gordana Dodig-Crnkovic
Institutionen för datavetenskap och elektronik
Mälardalens högskola

Vetenskapsmetodik för teknikområdet CT3620, 5p, B-nivå

Senaste nytt Kursschemat Deadlines Resultat Kurspärm

Föreläsning	Moment	Lärare	Övrigt material
F0 Ti 24/08 13-15	**Grundläggande vetenskapsteori** Introduktion.Vetenskap, kunskap, sanning	gdc01	Val av rapportämne Användning av Word
F1 Fr 27/08 10-12	**Grundläggande vetenskapsteori** Logiska argument och kritiskt tänkande	gdc01	**Uppgift 1** (svarsmall) Bakgrundsmaterial
F2 Ti 31/08 13-15	**Grundläggande vetenskapsteori** Förklaringar och kommunikation	gdc01	**Uppgift 2** (svarsmall)
F3 Fr 03/09 10-12	**Grundläggande vetenskapsteori** Diskussion av uppgift 1	gdc01	**Uppgift 1-extra** (svarsmall) (för de som missar diskussion 1)
F4 Ti 07/09 13-15	**Grundläggande vetenskapsteori** Vetenskapens kulturella kontext/ alt **ISB gästföreläsning om samhällsvetenskapernas forskning**	gdc01	*Samläsning med Forskningsmetodikkursen (eng.)*
F5 Fr 10/09 Gästföreläsning 10-12	Forskningsmetodik och vetenskapsteori inom humaniora BirgittaBergsten, IHu	bin01	*Samläsning med Forskningsmetodikkursen (sv.)*

Vetenskapsmetodik för teknikområdet CT3620, 5p, B-nivå

Senaste nytt Kursschemat Deadlines Resultat Kurspärm

F6 Ti 14/09 13-15	**Grundläggande vetenskapsteori** Diskussion av uppgift 2	gdc01	**Uppgift 2-extra** (svarsmall) (för de som missar diskussion 2)
F7 Fr 17/09 10-12	Att läsa och förstå texter	jgn01	**Uppgift 3** (svarsmall)
F7 – F8 Ti 21/09 13-15	Att skriva och presentera rapporter Jan Gustafsson, IDE	jgn01	**Uppgift 4** Rapportmall* (Word) Teknisk rapportskrivning
F9 Fr 24/09 10-12	Att söka information Tord Heljeberg, Biblioteket	thg01	

Vetenskapsmetodik för teknikområdet CT3620, 5p, B-nivå

Senaste nytt Kursschemat Deadlines Resultat Kurspärm

F10 Ti 28/9 Gästföreläsning 13-15	Vetenskapens idéhistoria **Matematik** **Kimmo Eriksson**, IMa	ken05	Vetenskapens idéhistoria (Kompendium J Molander) *Kvinnliga matematiker*
F11 Fr 01/10 Gästföreläsning 10-12	**Vetenskapens idéhistoria** **Datavetenskap alt Teknikvetenskap**		*Kvinnliga vetenskapsmän* *(vetenskapare?)*
F12 Ti 05/10 Gästföreläsning 13-15	Vetenskapens idéhistoria **Forskningsinstitutioner ur ett svenskt historiskt perspektiv** **Ylva Bäcklund, IDE**	ybd01	**IEEE Women in Engineering**
F13 Fr 08/10 10-12	Att granska rapporter och opponera	jgn01	**Uppgift 6**
F14 Ti 12/10 13-15	**Datavetenskapens idéhistoria** Diskussion av Uppgift 5, idéhistoria	gdc01	**Uppgift 5** (svarsmall) **Uppgift 5-extra** (svarsmall) (för de som missar diskussion 5)
F15 Fr 15/10 10-12	Vetenskapens idéhistoria **Fysik** **Sten Lindstam**, IMa	slm01	*Kvinnliga fysiker*
Seminarie-Övning Ti 19/10 13-17	**MINIKONFERENS:** Presentera rapporter och opponera på varandras rapporter	jgn01 gdc01	

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PROFESSIONAL ETHICS

IN SCIENCE AND ENGINEERING

CD5590

Gordana Dodig-Crnkovic

Department of Computer Science and Electronics
Mälardalen University
2005

http://www.idt.mdh.se/kurser/cd5590/

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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.

(Gotterbarn 1991)

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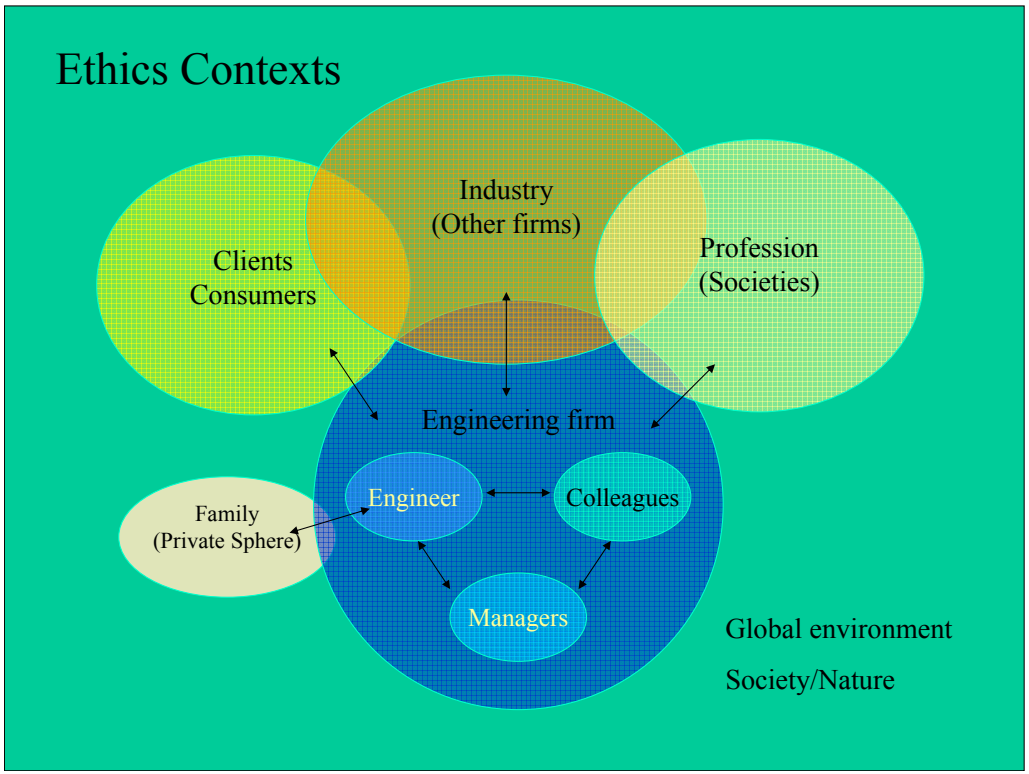
Ethics Contexts



A Real Life Example of the Importance of Ethical Judgement

VALDOR, VALues in Decisions On Risk

- http://www.congrex.com/valdor2006/

- **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**

Real Life Example - VALDOR, VALues in Decisions On Risk

- VALDOR, meaning VALues in Decisions On Risk, is a much appreciated forum for the discussion on values involved in complex and controversial matters. We take a holistic and democratic approach to societal decision-making in complex issues which almost always include risk related matters.

- The VALDOR arena thus becomes cross-disciplinary and includes aspects of social and natural sciences as well as policy analysis. We strongly believe that risk management must take an integrated approach using not only technical risk assessment but also learning from sociology, ethics and political science. All these disciplines are needed in order to avoid narrow framing and fragmentation of the decision-making basis.

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.

Swedish Computing Curricula

Swedish Computer Science and Engineering education follows in many respects an international model, the American *ACM/IEEE Computing Curriculum*

http://www.computer.org/education/cc2001/index.htm

Typical general knowledge subjects that are widely represented are Theory of Science (Philosophy of Science) and Research Methodology.

However, the education in professional ethics, that is a compulsory part of *ACM/IEEE Computing Curriculum* is as a rule absent.

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."

Ethics in Engineering, Martin, M.W., Schinzinger, McGraw-Hill, 1996

Social Importance of Engineering

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.

Why is the Professional Ethics Important for Scientists and Engineers?

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*!

Codes of Ethics

A code of professional ethics appears when an *occupation* organizes itself into a *profession*. It is central to advising individual professionals how to conduct themselves, to judging their conduct, and to understanding of a profession.

■ 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)

DATE		TOPIC
3 Nov L1		GETTING STARTED. Course Preliminaries. Introduction. Administrivia. Identifying Moral Issues Basic Moral Orientations
6 Nov L2		METHODS AND TOOLS OF ANALYSIS OF ETHICAL ARGUMENT Philosophical Foundations of Ethics Ethical Relativism, Absolutism and Pluralism
10 Nov L3		The Ethics of Conscience The Ethical Egoism The Ethics of Duty The Ethics of Respect

13 Nov L4		The Ethics of Consequences: Utilitarianism The Ethics of Rights The Ethics of Justice
17 Nov L5		The Ethics of Character The Ethics and Gender
20 Nov L6/E1	 Beehives	PROFESSIONAL AND ETHICAL RESPONSIBILITIES Codes of Ethics. Whistle Blowing In-class activity: CASE STUDIES (Jessica, Karin, Henrik)
24 Nov L7/E2	 Beehives	ENVIRONMENTAL ETHICS In-class activity: CASE STUDIES (Teresa, Said)
27 Nov L8		GUEST LECTURE BY PETER FUNK AI and Ethics
01 Dec L9		GUEST LECTURE BY KERSTI MALMSTEN Nursing and Medical Ethics

4 Dec L10/E3	 Beehives	PRIVACY AND CIVIL LIBERTIES In-class activity: CASE STUDIES (Virginia, Jörgen)
05 Dec L11		GUEST LECTURE BY MONIKA EIBORN Nuclear Non-proliferation and Ethics Nucleus 02 2003 side 39
08 Dec L12/E4	 Beehives	RISKS IN TECHNOLOGY AND SCIENCE PRECAUTIONARY PRINCIPLE In-class activity: CASE STUDIES (Jonas, Balaji, Artur)
11 Dec L13/E5	 Beehives	INTELLECTUAL PROPERTY In-class activity: CASE STUDIES (Magnus, Jens)
12 Dec L14/ E6	 Beehives	COMPUTER GAMES AND ENTERTAINMENT In-class activity: CASE STUDIES (Thomas, Kim)

15 Dec L15		COURSE WRAP-UP
TAKE-HOME EXAM		RESEARCH PAPER + CLASS NOTES

MDH Professional Ethics Course Home Page:

http://www.idt.mdh.se/kurser/cd5590/03_11/