Ref.

Department of Computer and
Information Science, Linköping

Courses Fall 1999

International
Graduate School in
Computer and Information Science

Including the Industry Research School

International Graduate School in Computer Science

The Computer Science Graduate School is aimed at both industry and the academic world and covers the following subject areas:

*** Computer Science**
*** Computer Systems**
*** Information Science and Media**
*** Computational Linguistics**
*** Economic Information systems**
*** Information Systems Development**
*** Engineering Information Systems**

The Department runs an Industry Research School, as a special programme funded by The Foundation for Knowledge and Competence Development, and participates in the graduate schools Excellence Center in Computer and Systems Engineering (ECSEL), Graduate School for Human-Machine Interaction (HMI) and International Graduate School of Management and Industrial Engineering (IMIE). The research environment is strongly influenced by cooperation at both departmental and international levels and the department is regularly visited by guest professors and graduate students from international study programs. The aims of the graduate school are the following:

- The graduate school emphasizes the value of an integrated course of education in an area of importance for Swedish industry.The aim is to provide the student with broad competence. On completion of studies the student will have deep insights into his or her area of study as well as being well-oriented in the state of the art in related fields.
- The department has 5 divisions and 16 research laboratories and all graduate students belong to one of these. This provides an environment where the student, supported by advisors, formulates and produces his or her thesis as part of the requirements.
- In addition to a main advisor each graduate student has two deputy advisors. The advisory group can provide the student with a wider range of support than is possible with just one advisor.
- The course-work pursued is of central importance in gaining broad competence. The department offers a well-established program of about 30 courses per year. These are often of an interdisciplinary character, thus the range is not limited to the student's particular lab, but is of relevance to the department as a whole. In addition to courses of a more "technical" nature, others are given in research methodology, scientific writing, presentation technique and ethics. Each laboratory also runs courses specific to its range of interests.
- As a consequence the study program promotes communication between students pursuing different interests. Seminar series, graduate student conferences, information and assessment meetings also stimulate collaboration. Methods of continually assessing progress and results and proposing improvements to achieve this end are considered essential.
- In addition to traditional graduate studies the aims of the department have for many years included the further education of teachers and lecturers at regional University Colleges, as well as continuing education for applicants from industry.

Further information concerning the Graduate School of Computer and Information Science can be obtained from
Lillemor Wallgren
Director of Graduate Studies Administration
Department of Computer and Information Science
Linköpings universitet, S-581 83 Linköping Sweden
Phone: +46 13281480 (281000) •Telefax +46 13142231•Internet:lew@IDA.LIU.SE

Department of Computer and
Information Science

LINKÖPINGS UNIVERSITET

www.ida.liu.se

Contents

SCHEDULE FALL 1999

Course[1]	Course literature	Aug	Sept	Oct	Nov	Dec	Day	Time	Place
Aktuella Redovisningsproblem Rolf Rundfelt 5 p	Material delas ut vid föreläsningarna.	Aug 27		Oct 13		Dec 14		8-17	Betinget, Block B (Aug 27, Dec 14) Eliten, Block E (Oct 13)
Cognitive Systems Engineering Erik Hollnagel 5 p	Selected papers + draft of forthcoming textbook on CSE.		Sept 2, 16	Oct 7, 14, 28	Nov 4, 11, 18, 25		Thursday	13-16	Eliten, Block E
Computer Security & Systems Controls Maurice Abi-Raad 4-8 p	1. Fink D., "Information Technology Security: Managing Challenges and Creating Opportunities", CCH Australia Limited, Sydney, 1997. ISBN:1-86264-942-1. 2. Forcht K., "Computer Security Management, Course Technology", Thomson Publishing Company, ITP, 1994				Starts Nov 3	Ends Dec 3	Wednesday Friday	13-15 15-18 alt 13-16	Elogen, Block E
*Design and Analysis of Algorithms (TDDA32) Peter Jonsson 3.5 p	Cormen, T.H., Leiserson, C.E., and Rivest, R.L., "Introduction to Algorithms" MIT Press.	Aug 30, 31	Sept 3, 13, 14, 17, 20, 21, 27, 28	Oct 1, 4, 5, 7				se sep schema	
Design of Embedded Real-Time Systems Zebo Peng 4 p	Selected papers. Lecture notes.			Starts Oct 15		Ends Dec 17	Friday	10-12	Elogen, Block E
Etik i IT-samhället Göran Collste 3-5 p	1. Collste G. "Inledning till etiken", Studentlitteratur: Lund 1996. 2. Petersson B. "Forskning och etiska koder", Nya Doxa: Nora 1994. 3. Spinello R. A. "Ethical Aspects of Information Technology", Prentice Hall: New Jersey 1995. Artiklar.				Starts Nov 9	Ends Dec 21	Tuesday	10-12	Belöningen, Block B
***GIS in Business and Service Planning Åke Sivertun/Birger Rapp 3 p	1. Tor Bernhadsen "Geographical Information Systems". 2. Longley and Clarke. "GIS for Business and Service Planning"			Introduction meeting Oct 5				3-4 samlingstillfällen schemlägges under kursens gång, liksom tid för slutseminarium	Web-baserad distanskurs Oct 5, Estraden, Block E
***GIS/GeoInformatik Åke Sivertun 5 p	1. Laurini, Robert & Thompsson, Derek (1992). "Fundamentals of he APIC series, Academic Press Reference littterature: 2. Chang S.K. & Jungert E. "Projection for Image Information Retrieval and Spatial Reasoning, Academic Press London 1996. 3. Worboys, M.F. "GIS: A Computing Perspective".			Introduction meeting Oct 5				3-4 samlingstillfällen schemlägges under kursens gång, liksom tid för slutseminarium	Web-baserad distanskurs Oct 5, Estraden, Block E

SCHEDULE FALL 1999

Course[1]	Course literature	Aug	Sept	Oct	Nov	Dec	Day	Time	Place
Humanistisk informationsteknologi Yvonne Waern 2-3 p	1. Geoffrey C. Bowker, Susan Leigh Star, William Turner & Les Gasser (Editors). Social Science, Technical Systems, and coooperative Work: Beyond the Gread Divide (Computers, Cognition av Work Series).New Jersey: Lawrence Erlbaum, 1997. (479:- på Bokus) 2. Introduktion i Humanistisk Informationsteknologi. Editerad av Yvonne Waern. Tema Kommunikation, 1998. Görs tillgänglig genom Tema Kommunikation. (C:a pris 110:-)			Starts Oct 13			Wednesday	15-17	
Information Retrieval and Information Filtering Nahid Shahmehri 4 + 2-4	To be announced later. Articles.			Starts Oct 4	Ends Nov 22		Monday	9-12	Elogen, Block E
*Introduction to Fuzzy Control Dimiter Driankov 4 p	1. K. Passino and S. Yurkovich, "Fuzzy Control", Addison-Wesley, 1998. 2. R. Palm and D. Driankov, "Model Based Fuzzy Control", Springer Verlag, 1997.				Starts Nov 2	Ends Dec 1	Tuesday Wednesday	10-12--13-15 8.30-12.00	Galleriet, Block G
Introduction to Research Methodlogy in Computer Science Sture Hägglund 3 + 2 p	1. Chalmers, "What is this thing called science." Journal papers.		Starts Sept 23		Ends Nov 11		Thursday	10-12	Eliten, Block E, except on Sept 23, Elogen, Block E
*Rewriting Systems (TDDB40) Jan Maluszynski 4 p	Johan Boye, Jan Maluszynski, Ulf Nilsson "Rewriting Systems" These draft lecture notes under revision are available on the net. (for further information, see the course description.)			Grundutbildningskurs schemalägges senare					
Topics in Constraint Programming Kris Kuchcinski 4 p	1. C. Reeves (ed.) "Modern Heuristic Techniques For Combinatorial Problems" Blackwell 1993 2. Van Hentenryck et. al. Numerica: "a Modelling Language for Global Optimization", The MIT Press, 1997 3. The OZ/Mozart Documentation placed locally at: http://www.ida.liu.se/labs/logpro/mozart/ and some articles.		Starts Sept 29			Ends Dec 15	Wednesday	13-15	Galaxen, Block G, except on Nov 6, Galleriet, Block G
Utredningsmetodik och kvantitativa metoder Birger Rapp 5 p	Beslutas senare.	Starts Aug. 23							Belöningen, Block B

1. * = ECSEL. ** = HMI, *** = samläses delvis

SCHEDULE FALL 1999

Course[1]	Course literature	Aug	Sept	Oct	Nov	Dec	Day	Time	Place
Kommunikativt handlande och informationssystem Göran Goldkuhl 3 - 5 p	(definitiv lista fastställes senare): Litteratur avseende Talaktsteori, kommunikativ handlingsteori (Austin, Searle, Habermas) Kritisk granskning av talaktsteori ur IS-perspektiv (Holm & Ljungberg m fl) Action Workflow (Winograd, Medina-Mora) BAT (Goldkuhl, O Eriksson) DEMO (Dietz, van Reijswoud) SAMPO (Lyytinen, Auramäki) COMMODIOUS (Holm & Ljungerg) M Schoop		Sept 8	Oct 13	Nov 24	Dec 8 - juni 00		9-12	Belöningen, Block B
Object Oriented Language for Dynamic Systems Peter Fritzson 3 p	Articles and book draft on Modelica.				Starts Nov 1	Ends Dec 13	Monday	13-16(17)	Gryningen, Block G
Operating Systems Peter Fritzson 3 + 1 p		Schemalägges senare							
Presentation Technique Ingela Dellby 3 p	Short excerpts from literature on the subject.		Starts Sept 7		Ends Nov 9		Tuesday	9-12	Betinget, Block B

General Information about Graduate Studies in Computer and Information Science

Graduate studies at the department consists of courses and project participation.The course programme is organized at the department level as *regular courses*, each of which is given approximately every second or third year (if possible), and *occasional courses* which depend on the profile and interests of current faculty and visiting scientists. The programme covers the areas: Computer Science, Computer Systems, Information Systems and Media, Economic Information Systems, Computational Linguistics, Engineering Information Systems and Information Systems Development.

A special study programme for industry-based graduate students is available in the area of software engineering. This Industry Research School is funded by the Foundation for Knowledge and Competence Development and by participating companies.

The department also participates in three special graduate schools aiming for interdisciplinary studies preparting also for a career outside the university, with funding from the Foundation for Strategic Research. HMI, Human Machine Interaction, started in 1997 and its goal is to improve Swedish competence by educating specialists in HMI. It is a cooperation between Linköping (IDA, IKP, Tema-K) and Stockholm (NADA, DSV). ECSEL, Excellence Center in Computer Science and Systems Engineering, started in 1996 in cooperation with primarily the Department of Electrical Engineering. IMIE, International Graduate School of Management and Industrial Engineering, has been in operation a few years with contributions from the subject area Economic Information Systems in our department. Graduate students in these schools belong to research groups in the home department, but follow a special study programme.

About 120 Ph.D. students participate in the graduate programme, and may choose among about 30 courses given each year. The courses and seminars are normally given in English (unless all participants are fluent in Swedish).

The programme leads to one of the following degrees:

Licentiate of technology or philosophy. The requirements include 40 points (one point equivalent to one week full time studies) of completed courses and 40 points thesis work.

Doctor of technology or philosophy. The requirements are 80 points courses and 80 points thesis work. Most of the Ph.D. students take the licentiate degree as an integral part of their doctoral studies.

For the degree in technology, a master of engineering (4.5 years of study) is normally assumed as a prerequisite.

As an executive, there is one director of graduate studies (Ulf Nilsson). However, most of the administration and organization rests upon the director of graduate studies administration (Lillemor Wallgren). Most graduate students are employed by the department full time. They assist in undergraduate courses and other internal assignments of the divisions/laboratories, up to about 20%of their time. The rest of the time is spent on graduate courses and thesis project.

This program contains the following types of courses:

- **General graduate courses given by the department**
- **Graduate courses given by each division within the department**
- **Graduate courses at ECSEL, HMI, IMIE**
- **Recommended Master Courses**
- **Planned graduate courses spring 2000**

It also includes presentations of

- **Organization**
- **Faculty**

In addition to the graduate study courses given in the Department of Computer Science, graduate students may also take courses from other departments, in particular courses from the special graduate schools ECSEL, HMI, IMIE. These courses will be found at their web addresses (see chapter Graduate course programmes 1999/2000 at ECSEL, HMI, IMIE).

The following acitvities are strongly recommended:

Main seminar series on Tuesdays at 13.15.

The seminars are announced by e-mail, in the IDA-Kuriren, and occasionally by special announcement. They are usually given in Estraden, E-building, 1st floor or Belöningen, B-building, 1st floor.

Departmental coffee-breaks on Tuesdays (IDA-fika)

Current information, short presentations of new arrivals and visitors in the department, descriptions of trips and conferences etc. are given every Tuesday at 12.30 in the coffee area, E-building, 1st floor.

Further information concerning the contents of this program can be obtained from Lillemor Wallgren, phone 013- 28 14 80, Ulf Nilsson, 013-28 19 35, Britt-Inger Karlsson, tel. 013-28 17 06 or for a particular course from the person responsible for that course.

Linköping, June 30, 1999

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General Information about Graduate Studies in The Industry Research School

The special industry research school programme within the graduate school is sponsored by the KK Foundation and a number of companies. It offers

- an industry-related, high-quality doctoral programme which is based on and utilizes the special IT competence at Linköping University.
- an effective organization coordinated with the regular graduate study programme and other strategic research efforts.
- a market-oriented and individually designed research education with extensive advisor capacity, leading to an exam as PhD, Licentiat or Master of Science.

Within the programme, twenty industry doctoral students are trained each year in Software Engineering, Computer Science and Applied Information Technology. The subject areas covered by the school focus on a scienfically based, engineering approaches to the design, development and maintenance of software systems in an industrial scale, as well as on methods and tools supporting software processes. There is a special emphasis on very large systems and their interaction with the individuals and organizations involved. Applications may concern real-time systems, net-based information systems, user interfaces, IT services, etc.

Who can become an industry doctoral student?

An industry doctoral student is supposed to have

- a research orientation belonging to the programme areas of the industry research school and fulfill the formal requirements necessary to be accepted as a doctoral student within one of the academic subjects affiliated with the school.
- a well-defined connection to a company, which contributes with resources according to a formal contract.
- an approved application to the industry research school , an assigned scientific supervisor and an individual study plan, against which an annual follow-up of results is performed.

As applicants we welcome experienced professionals from industry as well as newly examined undergraduate students. As an industry doctoral student, you may be employed either by the university or by a company.

Which companies participate?

Initially participating companies include Ericsson, Telia Research, Ida Systems, SoftLab, SKF, Idonex, WM-data, Focal Point and others, but new industrial partners are still welcome. The most recent companies to join were IKEA, Devenator and Nokia. Participating companies are expected to contribute a contact person and normally also a financial contribution, either in the form of man hours or as a cash contribution. The company is required to sign a formal contract for each sponsored doctoral student.

The Industry Research School 1999/00

Activities in the Industry Research School started in 1997 and doctoral students are recruited continously. Currently the following programme areas are established.

Division for Software and Systems

Contact persons: Prof Peter Fritzson, prof Mariam Kamkar, prof Dag Fritzson, doc Bengt Lennartsson, prof Kristian Sandahl.

This area studies issues related to software architecture and support environments for software development, as well as software quality, with a particular emphasis on processes and methods. Doctoral projects treat for instance software for web servers, testing, requirements engineering , conceptual software design, and support for product design and simulation. Companies active in this area are e.g. Ericsson Radio, Ericsson UAB, Ida Systems, Idonex, MathCore and SKF.

Division for Information Systems and Management

Contact persons: Prof Birger Rapp, prof Göran Goldkuhl.

This area studies IT management and strategies, information system development and electronic commerce. Current doctoral projects deal with, for instance, executives' use of communication technology, web-based virtual organizations, IT strategies and effects of IT investments. Active companies include Cepro, Devenator, IKEA, SYSteam, IVA and Telia Research.

Division for Database and Information Technique.

Contact persons: Prof Nahid Shahmehri.

Examples of areas of interest are database technology, intelligent agents and security in information networks. Active companies include WM-data.

Division for Database and Information Technique.

Contact persons: Prof Sture Hägglund, prof Lars Ahrenberg, prof Kjell Ohlsson.

This area focusses multimodal user interfaces, usability engineering, IT and learning, and web interaction. Active companies include Ellemtel, Ericsson Radio Systems, FöreningsSparbanken, Ida Systems, Nokia and Telia Research.

Courses.

There are some courses arranged especially for the industry doctoral students, for example the course in industrial project management and some concentrated courses in the Software Tutorials series, SOFT. In general,courses are taken from the regular graduate study programme.

Information about the Industry Research School can be obtained through the manager:

Sture Hägglund, Computer Science Dept., Linköping University, 581 83 LINKÖPING
Phone: 013 - 281431, Fax: 013 - 142231, Email: StuHa@ida.liu.se

IDA's research program has been designed to cover areas of strategic importance, both for undergraduate education as well as for the needs of society. Research in the department is organized and carried out in five divisions covering a broad spectrum of areas; several of which are multi-disciplinary. Each division is characterized by its long-term commitment to develop and maintain the knowledge within a defined area, and by its longterm responsibility for individual graduate students.

The department hosts research in areas such as programing and specification languages, software engineering, databases and knowledge based systems, real-time systems, hardware/ software codesign and verification, artificial intelligence, intelligent autonomous agents, theoretical computer science, economic information systems, information systems for businesses and other organizations and human/cognitive aspects of computer systems, e.g natural language processing and human-computer interaction. A short review of the five divisons is given in this chapter.

ADIT

The Division for Database and Information Techniques

Professor Nahid Shahmehri

ADIT conducts research concerning principles, methods and tools for defining and constructing advanced database and information management systems tailored to present and future information technology. Important research areas are databases, information management, security, text and data mining, distributed networks and artificial intelligence.

The research is performed within two research laboratories:

EDSLAB - Laboratory of Engineering Databases and Systems
Professor Tore Risch

EDSLAB conducts research on methods and theories for database support of engineering applications. Applications for this technology include mechanical, electronic, telecom, and software applications. Current research includes the following fields: database integration, domain-oriented database technology, design suppport systems, active databases, multi-database query processing, temporal databases and real-time databases.

IISLAB - Laboratory for Intelligent Information Systems
Professor Nahid Shahmehri

IISLAB conducts research in intelligent information systems. Current projects focus on information security, information retrieval and filtering, and the representation, organization and processing of knowledge in distributed environments such as the World Wide Web.

AIICS

The Division for Artificial Intelligence and Integrated Computer Systems

Docent Patrick Doherty

The focus of interest for the Artificial Intelligence and Integrated Computer Systems Division is intelligent artifacts, that is, man-made physical systems containing computational equipment and software that provide them with capabilities for receiving and comprehending sensory data, for reasoning, and for rational action in their environment. Research and teaching activities in AIICS currently include large parts of artificial intelligence, theoretical and applied logic, computer architecture and hardware/software codesign, formal modeling techniques for discrete and hybrid systems. The AIICS division consists of three research laboratories and two additional groups supporting activities and research in computer science education (Professor Anders Haraldsson) and in electronic publishing (Professor Erik Sandewall).

CADLAB - Laboratory for Computer-Aided Design of Digital Systems
Professor Krzysztof Kuchcinski

CADLAB concentrates its research activities on computer-aided synthesis and verification of digital systems, which are supposed to be implemented completely or partially in hardware. Using computer science methods, we develop a design framework, where abstract design specifications are systematically translated into a concrete implementation. Our research currently concentrates on the high-level synthesis and hardware/software co-design.

KPLAB - Knowledge Processing Laboratory
Docent Patrick Doherthy

Research in KPLAB focuses on the theoretical and practical aspects related to the representation and processing of knowledge. Special emphasis is placed on the specification and implementation of deliberative/reactive architectures for autonomous artifacts. Current activities include the development of nonmonotonic temporal logics for reasoning about action and change, and the specification of higher level cognitive tasks such as planning and diagnosis. Special focus is placed on the study of unmanned aerial vehicle (UAV) architectures integrated with active vision systems. Other areas of interest include model-based simulation and real-time reasoning.

TASLAB - Laboratory for Autonomous Systems
Docent Dimiter Driankov

The research in TASLAB is aimed at developing the theoretical basis for the design and analysis of systems with high degree of autonomy. Enhancing the autonomy of unmanned vehicles and large industrial process control systems is of major interest. We have a focus on topics such as the design and analysis of hybrid systems, discrete event control systems, and fuzzy control systems; fault identification and re-planning in sequential control, and software aspects for layered architecture autonomous systems.

HCS

The Division for Human-Centered Systems

Professor Lars Ahrenberg

Research in the Division for Human-Centered Systems is aimed at studying and improving the interactions among humans, computing systems, and information resources. Human abilities constitute the goal as well as a point of departure for our research.

Our research is concerned with the development of new technologies and methods as well as the effects of new technologies for individuals, groups and society at large. Thus, research is usually multi-disciplinary, combining methods from computer and information science with perspectives from the humanities and social sciences.

ASLAB - Application Systems Laboratory
Professor Sture Hägglund

The research in ASLAB has several foci. One is human-computer interaction, especially usability-oriented methods for IT design, IT learning and support for the design process. Another interest is development methods and meta-level tools for knowledge engineering, supporting knowledge acquisition and reusable problem solving methods. There are also studies of cooperative expert systems, cognitive models for visual creativity, collaborative dialogues in intelligent tutoring systems and simulation for training.

LIBLAB - Laboratory for Library and Information Science
Dr. Åke Sivertun

Research at LIBLAB, is focused on long term studies of the interactions between information technology and the generation, access to and use of information resources, in particular documents and document collections. Another focus is Geographical information systems

MDA - People, Computers and Work
Professor Toomas Timpka

The MDA group develops and studies information systems in working-life contexts, with a focus on applications in service organizations. The research has an interdisciplinary character and integrates methods from computer science, psychology and sociology. Specific areas of interest include computer-supported cooperative work, inter-organizational networks, economic evaluations of information systems and participatory design.

NLPLAB - Natural Language Processing Laboratory
Professor Lars Ahrenberg

NLPLAB studies linguistic processing and knowledge representation from linguistic, computational and behavioral perspectives. Current applied projects concern spoken and multimodal natural-language dialogue systems and computer-aided translation.

ISM

The Division for Information Systems and Management

Professor Birger Rapp

ISM conducts research about management issues arising from the use of modern ICT. These include its impact on organisations and business, communication, knowledge development and utilisation, business oriented model- and system development, and strategic and economic management control, accounting, auditing, design of control and responsibilities applied to information usage for information provision. Research is often conducted in co-operation with industry to achieve applicable solutions to business and organisational issues. Mutual research interests for the collaborating research groups are also encouraged and supported. ISM has responsibility for courses within the areas of model building and system development, information systems and business management, and economic thinking applied to business and organisational use of information.

EIS - Economic Information Systems

Prof. Birger Rapp

The research area Economic Information Systems involves, among other things, communication and transfer of information between people, as well as the development of suitable information systems for this purpose. This subject also deals with the use of modern information technology and the development of structures within organizations, together with the effects of information technology on people and organizations. This involves both questions concerning economic direction and control, and the capacity of people to take in and use information as well as training.

The division of Economic Information Systems conduct research in the following main streams,

- Business Information Development
- Application of transaction and principal agent theory
- IT and new organizational structures
- Simulation, decision support system and control systems of manufacturing flows
- Business control
- IT - economics
- Internal auditing
- External Accounting and auditing
- Economic crimes

VITS - Development of information systems and work contexts.

Prof. Göran Goldkuhl

Research areas covered by VITS include business and communicative action theory, business process development, change analysis, information requirements analysis, evaluation of information systems and business activities, modelling methods, meta modelling, CASE and method supporting tools, information systems architecture, inter-organizational information systems. VITS IS A network-based research group with some twenty researchers from universities of Linköping, Borås, Jönköping, Örebro, Karlstad and Dalarna (Borlänge)

SAS

The Division for Software and Systems

Professor Mariam Kamkar

The division for Software and Systems (SaS) deals with research and education in areas such as software engineering, programming environments, systems software, embedded SW/HW systems, computer systems engineering, real-time systems and theoretical computer science.

The division has approximately 30 Ph.D. students involved in three graduate programs: computer systems, computer science and engineering information systems. The research is funded from Linköping School of Engineering but is also receiving significant external funding from TFR, NUTEK, the Foundation for Strategic Research, KK-stiftelsen and the European Commission (CEC). The research covers both basic research and projects in cooperation with industry, for instance ABB Robotics, ABB Industrial Systems, Ericsson Radio Systems, Ericsson Telecom, SKF, Saab, Saab Dynamics, Saab Combitech and several other companies. The research is carried out in five research laboratories:

ASELAB - Applied Software Engineering Laboratory
Prof Kristian Sandahl

Software quality, software engineering methodology and process improvement, and reliability for software and networks.

ESLAB - Embedded Systems Laboratory
Prof Zebo Peng

Codesign and design for testability of embedded HW/SW systems and formal methods for embedded systems.

PELAB - Programming Environments Laboratory
Prof. Peter Fritzson

Software engineering tools and architectures, programming languages and environments, including compilers, debuggers, testing tools, parallel and real-time programming tools.

RTSLAB - Laboratory for Real-Time Systems
Dr. Anders Törne

Tools, methods and architectures for the design of software intensive real-time systems.

TCSLAB - Theoretical Computer Science
Doc. Ulf Nilsson

Programming theory, declarative programming and specification languages, formal models and methods, algorithms and complexity.

Etik i IT-samhället

Lectures:
16 h

Recommended for
Alla doktorander.

The course was last given:
Ny kurs

Goals
Kursens syfte är att ge en introduktion till etisk teori och metod, etiska frågor i samband med datorisering och IT-användning och forskningsetiska problem.

Prerequisites
Inga.

Organization
Föreläsningar och seminariediskussioner.

Contents
Kursen ger en introduktion till etiken som ämnesområde, etiska teorier och etisk argumentation. Den är inriktad mot etiska frågor som uppkommer i samband med användning av IT såsom integriteten i IT-samhället, ansvar och beslutsstöd och etiska frågor i samband med Internet, samt forskningsetiska frågor såsom forskningsfusk, rätten till en uppfinning, forskarens ansvar och förhållandet mellan olika normsystem som möts vid tillämpad forskning, exempelvis universitetens och näringslivets. Erik Sandewall kommer specifikt att taga upp gamla och nya etiska frågeställningar i samband med vetenskaplig publikation.

Literature
Collste G. Inledning till etiken, Studentlitteratur: Lund 1996.
Petersson B. Forskning och etiska koder, Nya Doxa: Nora 1994.
Spinello R. A. Ethical Aspects of Information Technology, Prentice Hall: New Jersey 1995.
Artiklar.

Teachers
Göran Collste, Jan Holmquist, Centrum för tillämpad etik.
Erik Sandewall, IDA.

Examiner
Göran Collste.

Schedule
Kursen ges 9 november till 21 december, tisdagar 10-12.

Examination
Skriftliga papers.

Credit
3-5 credits.

Introduction to Research Methodology in Computer Science

Lectures:
16 h

Recommended for
New graduate students. Special study groups will be arranged for students with common interests, such as students in the Industry Research School, HMI Research School, etc.

The course was last given:
Fall 1998

Goals
To prepare for graduate studies in general and for formulating research problems and thesis topics in particular.

Prerequisites
None.

Organization
Lectures and seminars. Optional study groups for extra course credit.

Contents
Computing as a discipline. Introduction to the philosophy of science. Scientific writing, publication and information retrieval. Science and technology, methodological issues. The PhD study process. Aspects of ethics and quality control in scientific work. Research funding and politics.

Literature
Chalmers: What is this thing called science.
Journal papers.

Teachers
Sture Hägglund and invited guests.

Examiner
Sture Hägglund.

Schedule
The course starts on September 23 and ends on November 11. At 10-12 , Thursday.

Examination
Written examination and seminar activity. Study group report for 2 extra credit points.

Credit
3 + 2 credits.

Presentation Technique

Lectures:
30 h

Recommended for
Graduate students.

The course was last given:
Fall 1998

Goals
To achieve better presentations of your own research at international conferences and local meetings. To feel confident in front of an audience. To practise introduction of speakers and dealing with questions.

Prerequisites
None.

Organization
Presentations, seminars, video recordings, discussions and evaluations.

Contents
Different presentation techniques. Mind-mapping, flash-cards and other preparations. Body language, visual aids and vocabulary expansion.

Literature
Short excerpts from literature on the subject.

Teachers
Ingela Dellby.

Examiner
Ingela Dellby.

Schedule
Kursen ges 7 september - 9 november 1999. Tisdag 9-12.

Examination
Presentations and active participation in workshops, discussions and continuous evaluation of performances.

Credit
3 credits.

Comments
Maximum ten participants.

Computer Security & Systems Controls

Lectures:
25 h

Recommended for
Graduate Students. (Orienteringskurs C4).

The course was last given:
1998/99

Goals
Upon Completion of this subject, Students will have :

- an appreciation on how basic audit techniques can be adapted to control EDP environments.
- an understanding of the importance of enterprise security approaches to security implementation and management.
- an exposure on how to recognise security and control weaknesses in EDP systems.
- an understanding of basic risks, performance of general risk assessment exercises and recommendation of management strategies.
- an understanding and explaination of measures available to secure physical locations, Upon Completion of this subject, Students will have :
- an appreciation on how basic audit techniques can be adapted to control EDP environments.
- an understanding of the importance of enterprise security approaches to security implementation and management.
- an exposure on how to recognise security and control weaknesses in EDP systems.
- an understanding of basic risks, performance of general risk assessment exercises and recommendation of management strategies.
- an understanding and explaination of measures available to secure physical locations, computer sites, data and personnel.
- an understanding of the common terminology used within the security industry.
- A key objective of this subject is to prepare the students for a holistic view of entreprise security
  in the context of business strategic views, computer sites, data and personnel.
- an understanding of the common terminology used within the security industry.

A key objective of this subject is to prepare the students for a holistic view of entreprise security in the context of business strategic views.

Prerequisites
A good understanding of the Information Systems area as well as some exposure to management issues associated with computer environments.

Organization
The course will be delivered in an on-campus mode via a series of lectures, videos, students' presentations, case studies, individual research paper as well as a real life risk analysis field exercise.

Contents

- Introduction to computer security, framework of the course, terminology
- Security policy development and implementation, Current International Standards
- Risk management and analysis
- Physical security issues
- People/Personnel security issues
- Technical security issues
- EDP Auditing/Data Quality
- Internet Security (secure transactions)
- Cryptography
- Disaster planning/recovery
- Social/Ethical Issues in computer security
- (A possible Industry forum on current hot issues at the time)

Literature

Fink D., Information Technology Security: Managing Challenges and Creating Opportunities, CCH Australia Limited, Sydney, 1997. ISBN:1-86264-942-1.
Forcht K., Computer Security Management, Course Technology, Thomson Publishing Company, ITP, 1994

Teachers

Maurice Abi-Raad.

Examiner

Nahid Shahmehri

Schedule

November 3 - December 3, 1999. Wednesday 13-15, Friday 15-18 alt. 13-16.

Examination

In the beginning of the course a written exam will be given on the text book.
Individual research paper class presentation (depending on the number of students) syndicate group risk analysis exercise Open book case study test at the end.

Credit

4 to 8 credits.
4 credits for the advanced project.

Comments

Intensive course. The course is taught by Maurice Abi-Raad (from RMIT).

Level (for undergraduate students):
D-level = Master's level

Information Retrieval and Information Filtering

Lectures:
24 h

Recommended for
Graduate Students. (Orienteringskurs C4).

The course was last given:
1995/96

Goals
The course goal is to give an introduction to information filtering techniques and the underlaying technology (statistics, collaboration, natural language understanding, learning). Hands on experience with a few existing systems will be included. The course will include an introduction to the WWW and its relevance and role in information retrieval.
After the course, students should have an understanding of existing information filtering techniques, their limitations and possibilities. They will also have some experience with a few systems.

Prerequisites
General knowledges of information systems.

Organization
A combination of lectures + seminars (prepared by the participants) + practical exercises.

Contents
Information Retrieval (IR)
Connection between IR and Information Filtering (IF)
Fundamentals of IF (Requirements)
Basic Approaches to IF (IR, collaboration, group reviews, rule based, agent oriented, user modeling, natural language)
Email and news filtering systems
Machine learning of user preferences
Agents in IRIF
Privacy issues
WWW including agents for searching the net and WWW as interface to DB
Application areas

Literature
To be announced later.
Articles.

Teachers
Nahid Shahmehri.

Examiner
Nahid Shahmehri.

Schedule

October 4 - November 22, 1999. Monday 9-12.

Examination

Article presentation, laboratory Assignments and term paper.
Possibly a written exam on basics in IRIF.

Credit

4 + additional credits 2-4 for advanced project.

Comments

Level (for undergraduate students): D-level = Master's level.

Introduction to Fuzzy Control

Lectures:
24 h

Recommended for
ECSEL graduate students.

The course was last given:
Fall 1997

Goals
The course goal is to provide both a theoretical and practical overview of fuzzy control in addition to a number of in depth studies of different approaches to the design and implementation of fuzzy controllers.

Prerequisites
Basic ECSEL graduate student competence and background with knowledge of basic linear control is assumed.

Organization
The course will be structured relative to the course literature and based on three levels of difficulty: Basic level: Basics of fuzzy control
Chapters 1-3, Passino and Yurkovich
Medium level: Basics of fuzzy control and aspects of nonlinear analysis
Chapters 1-3, Passino and Yurkovich
Advanced level: Model based fuzzy control: fuzzy sliding mode controllers and Takagi-Sugeno controllers.

Contents
We will try understand the theory of fuzzy control at different levels of sophistication; to show how to apply various fuzzy control techniques; to illustrate design and analysis procedures for fuzzy controllers; and to consider a number of practical issues that arise in the development and implementation of fuzzy controllers. The basics of fuzzy control, related aspects of nonlinear analysis, model based fuzzy control, fuzzy sliding mode controllers and Takagi-Sugeno controllers will all be considered.

Literature
Fuzzy Control, K. Passino and S. Yurkovich, (Addison-Wesley), 1998.
Model Based Fuzzy Control, R. Palm and D. Driankov, (Springer Verlag), 1997.

Teachers
Dimiter Driankov.

Examiner
Dimiter Driankov.

Schedule
November 2 - December 1,1999. Tuesday 10-12--13-15, Wednesday 8.30-12.

Examination

The examination will consist of a series of exercises and projects from the course literature using computer aided tools which will be provided.

Credit

4 credits.

Cognitive Systems Engineering

Lectures:
27 h

Recommended for
Recommended for: Graduate and doctoral students

The course was last given:
Fall 1998 (HMI 602)

Goals
To provide a unified presentation of the concepts and methods of Cognitive Systems Engineering (CSE). CSE is a technical discipline that offers a coherent view on the analysis, design and evaluation of complex human-machine systems, which goes beyond human factors, human-machine interaction and HCI

Prerequisites
Graduate status as HMI student.

Organization
Guided discussions based on reading of prepared material.

Contents
The course presents the main concepts, data, and methods of Cognitive Systems Engineering. The concepts are the basic hypotheses and assumptions about the domain of human work. The data define the empirical basis for CSE, and thereby provide the justification for the concepts. The methods, finally, refer to the consistent and systematic ways in which the concepts and the data of CSE can be applied. The application can have a practical or utilitarian purpose such as in design, i.e., the specification and implementation of a specific (joint) cognitive system. It can also have a more scientific purpose, such as improving the understanding of the set of causes that have led to a specific consequence, or understanding the way in which various aspects or conditions interact, for instance in the development of automation. Focus on the use of CSE for interface design and evaluation, development of tools and support systems, risk and reliability analysis, and accident investigation.

Literature
Selected papers + draft of forthcoming textbook on CSE.

Teachers
Erik Hollnagel

Examiner
Erik Hollnagel

Schedule
September 2 - November 25, 1999. Thursday 13-16.

Examination
Attendance + term paper analysing and specifying decision support for a chosen application.

Credit
5 credits.

GIS in Business and Service Planning

Lectures:
20 h

Recommended for
Students in Informatics, systems and computer sciences and subjects related to work with GIS in Business and service planning.

The course was last given:
Spring 1999.

Goals
To give an introduction to the use of Geographical data, tools and information systems in Business and service planning.

Prerequisites
Graduate student.

Organization
Lectures.

Contents
Introduction
Datacapture in GIS
Data mining
Spatial statistics
Information systems för descision support
Practical laborations
Report

Literature
Geographical Information Systems, Tor Bernhadsen.
GIS for Business and Service Planning, Longley and Clarke.

Teachers
Åke Sivertun.

Examiner
Åke Sivertun/Birger Rapp.

Schedule
October 1999 - January 2000. Introduction meeting on October 5.

Examination
Written report.

Credit
3 credits

Comments
The course will be given in cooperation with EIS (The Laboratory for Economical Information Systems).

GIS/GeoInformatik

Lectures:
32 h

Recommended for
All PhD students in informatics, systems and computer science and other for GIS.

The course was last given:
Spring 1999

Goals
To give a deeper understanding for the theoretical and practical aspects of GIS.

Prerequisites
Graduate students.

Organization
Lectures.

Contents
The students will read and present papers from the current litterature.
Topics include tool kits, model-based interface development, UI software architectures, user interface development systems, and user interface development methodologies.

Literature
Laurini, Robert & Thompsson, Derek (1992). Fundamentals of spatial information systems. The APIC series, Academic Press ca 700 sidor.
Reference littterature: Chang S.K. & Jungert E. Projection for Image Information Retrieval and Spatial Reasoning, Academic Press London 1996.
Worboys, M.F. "GIS: A Computing Perspective".

Teachers
Teachers who will collaborate in the course are: Erland Jungert, Michael LeDuc, Tore Risch, Per Svensson, Åke Sivertun.

Examiner
Åke Sivertun.

Schedule
October 1999 - January 2000. Introduction meeting on October 5.

Examination
Written paper.

Credit
5 credits.

Aktuella redovisningsproblem

Lectures:
25 h

Recommended for
De som deltar i forskningsprogrammet med inriktning på redovisning och revision.

The course was last given:
New course.

Goals
Diskussion kring några av de redovisningsproblem som diskuteras internationellt med betoning av de principiella frågeställningar som därvid aktualiseras.

Prerequisites
Inga formella krav.

Organization
Föreläsningar och seminarier vid fem tillfällen om vardera ca 5 timmar.

Contents
Preliminärt kommer bland annat följande att behandlas; immateriella tillgångar, finansiella instrument, avsättningar samt nedskrivningar.

Literature
Material delas ut vid föreläsningarna.

Teachers
Rolf Rundfelt.

Examiner
Rolf Rundfelt.

Schedule
Augusti 1999 - juni 2000. Kursstart 27 augusti.

Examination
Enskilda arbeten.

Credit
5 credits

Kommunikativt handlande och informationssystem

Lectures:
25 h

Recommended for
Kursen ges av ämnesområdet informationssystemutveckling. Den vänder sig till personer intresserade av teorier om kommunikativt handlande och teorier om informationssystem.

The course was last given:
Ny kurs.

Goals
Kursen syftar till att öka kunskaperna om teorier om kommunikativt handlande och hur sådana teorier kan appliceras inom informationssystemområdet. Kursen har ett uttryckligt bimål att öka förmåga att kritiskt granska samt skriftligen kommentera och muntligen kommunicera kring vetenskapliga artiklar.

Prerequisites
Inga särskilda krav.

Organization
Kursen genomförs till väsentlig del seminariebaserat. Kursen består av granskning av klassiska och aktuella artiklar/bokkapitel inom kursens område. Ett seminarium ägnas åt granskning av några artiklar inom ett avgränsat område.

Contents
Teorier om kommunikativt handlande (talaktsteori). Hur sådana teorier appliceras inom informationssystemområdet; dvs olika talaktsteoretiskt baserade teorier och metoder för informationssystem, verksamhets-/systemutveckling.

Literature
(definitiv lista fastställes senare):
Litteratur avseende
Talaktsteori, kommunikativ handlingsteori (Austin, Searle, Habermas)
Kritisk granskning av talaktsteori ur IS-perspektiv (Holm & Ljungberg m fl)
Action Workflow (Winograd, Medina-Mora)
BAT (Goldkuhl, O Eriksson)
DEMO (Dietz, van Reijswoud)
SAMPO (Lyytinen, Auramäki)
COMMODIOUS (Holm & Ljungerg)
M Schoop

Teachers
Göran Goldkuhl.

Examiner
Göran Goldkuhl.

Schedule
Kursen ges under hela läsåret 99/00. Kursstart 8 september. Ca ett seminarium per månad.

Examination

Varje kursdeltagare skall skriva en kurs-PM till fyra seminarietillfällen. En sådan PM skall vara en kristisk granskning (djupanalays) av kurslitteratur som behandlas vid aktuellt seminarium. En PM skall innehålla 1) en *rekonstruktion* av de viktigaste teserna och använda begreppen inom 2) en kritisk *värdering* av litteraturen. Aktivt deltagande på seminarierna förutsättes.

Credit

3-5 poäng.

Utredningsmetodik och kvantitativa metoder

Lectures:
35 h

Recommended for
Alla doktorander.

The course was last given:
Våren 1997

Goals
•väl insatt i modern utredningsmetodik

•väl orienterad om kvantitativa metoder

•känna till centrala begrepp och teorier inom vetenskapsteori

Prerequisites
Inga.

Organization
Föreläsningar, seminarier, inlämningsuppgifter, tentamina.

Contents
Vetenskapsteori, kvalitativ undersökningsmetodik, modelltänkande och systemanalys, statistiska metoder, simulering, prognoser, utvärdering och presentationsteknik.

Literature
Beslutas senare.

Teachers
Birger Rapp.

Examiner
Birger Rapp.

Schedule
Oktober 1999 - juni 2000. Kursstart 23 augusti.

Examination
Aktivt deltagande på seminarierna, godkända inlämningsuppgifter och laborationer samt skriftliga och muntliga tentamina.

Credit
5 credits

Design and Analysis of Algorithms

Lectures:
36 h

Recommended for
Graduate students in computer science.

The course was last given:
Fall 1998

Goals
The primary aim of this course is to increase the student's skills in algorithmic problem solving. To this end, the course presents several techniques for design and analysis of algorithms. In addition, the course gives knowledge about important subareas within algorithm and complexity theory.

Prerequisites
An introductory course on data structures and algorithms, e.g., TDDB 57 Datastrukturer och Algoritmer. That is, students are expected to be familiar with asymptotic notation, basic data structures such as lists, stacks, queues, trees, etc., and algorithms for fundamental problems such as searching, sorting, etc.

Organization
The theoretical content of the course is presented during the lectures. Since algorithmic problem solving is an art as much as a science, the seminars and homework exercises are intended to practice design and analysis of algorithms.

Contents
Techniques for design and analysis of algorithms, and for determining lower bounds on time complexity, fast Fourier transforms, randomized algorithms, string matching algorithms, geometric algorithms, NP completeness, approximation algorithms, parallel algorithms, etc.

Literature
Introduction to Algorithms by Cormen, T.H., Leiserson, C.E., and Rivest, R.L., MIT Press.

Teachers
Peter Jonsson.

Examiner
Peter Jonsson.

Schedule
August - October 1999. The course starts on August 30.

Examination
One final written exam.

Credit
3.5 credits.

Comments:
The course will be given in Swedish. The exam may be written in English.

Design of Embedded Real-Time Systems

Lectures:
20 h

Recommended for
PhD students in computer science and computer systems. ECSEL students.

The course was last given:
New course.

Goals
To give the students a broad view of the issues and techniques related to the design of embedded real-time systems.

Prerequisites
Basic knowledge in computer architecture and software engineering.

Organization
Lectures by the teachers and invited lecturers and case studies carried out by the PhD students.

Contents
Embedded real-time systems and their applications.
Heterogeneous systems.
Scheduling and resource management.
System specification and languages.
Modeling techniques.
Formal methods.
Design flow and design methodology.
Hardware/software co-design.
System verification.
Timing analysis and estimation.

Literature
Selected papers.
Lecture notes.

Teachers
Petru Eles, Simin Nadjm-Tehrani and Zebo Peng.

Examiner
Zebo Peng.

Schedule
October 15 - Dec 17, 1999. Friday 10-12.

Examination
Case study or individual project.

Credit
4 credits

Object Oriented Languages for Dynamic Systems

Lectures: 24 h

Recommended for
Students in ENSYM, SCORE, STEM, interested in software for modeling and simulation of dynamic systems.

The course was last given: Fall 1997 (A first version of the course).

Goals
To give an overview of modern equation-based object oriented modeling languages, with emphasis on the new language Modelica, and how to model complex dynamic systems.

Prerequisites
General background for type 3 courses. (Advanced ECSEL course)

Organization
Lectures and exercises/mini-project.

Contents
What is an object oriented modelling language? The concepts of model, simulation, simulation experiment. Different forms of ordinary differential equation systems. Object model. Connection structure. Units. Type system and type checking. Connection of subsystems. Integration of discrete and continuous system modelling. Examples of realistic application models, e.g. robots, airplanes etc. Compilation techniques for modelling languages.

Literature
Articles and book draft on Modelica.

Teachers
Peter Fritzson, Torkel Glad.

Examiner
Peter Fritzson.

Schedule
November 1 - December 13. 1999. Monday 13-16(17).

Examination
Exercises and mini project.

Credit
3 credits

Operating Systems

Lectures: 24 h

Recommended for
Post-graduate students interested in software design and advanced aspects of UNIX and similar operating systems.

The course was last given: New course

Goals
Give knowledge useful for understanding specifics of various operating systems and internals of process, memory and I/O management. This is useful for design of OS-specific software components. This is also useful for experimenting with UNIX (e.g. Linux and Solaris) kernels.

Prerequisites
Basic knowledge about operating system, e.g. from an undergraduate OS course. Knowledge of the C language and a UNIX command shell language.

Organization
8 lectures 3 hrs each. Optional course project.

Contents
- Introduction
- Process management
- Memory management
- File system
- I/O and Device Drivers
- Interprocess communication
- Multiprocessing and threads
- Streams

Literature
Uresh Vahalia. UNIX Internals, The New Frontiers. ISBN 0-13-101908-2.

Teachers
Peter Fritzson

Examiner
Peter Fritzson

Schedule
August - October 1999.

Examination
Written examination that covers contents of lectures.

Credit
3 + 1 credits

Comments

More information will be available via Peter Fritzson Home Page, http://www.ida.liu.se/~petfr

Rewriting Systems (TDDB40)

Lectures:
28 h

Recommended for
Ph. D. students in Computer Science and Computer Systems.

The course was last given:
Fall 1997

Goals
Any kind of computation can be seen as a rewriting process. The aim of the course is to give a uniform view of various rewriting systems and in this way provide a unified basis for studying and classifying various computing paradigms. The practical relevance of the presented concepts will be illustrated: (1) by some known formalisms for defining operational semantics of programming languages and (2) by a currently developed programming language integrating functional programming with logic programming.

Prerequisites
Some knowledge of discrete mathematics.

Organization
The course will consist of lectures, and seminars (for more details see home page http:// www.ida.liu.se/~janma/rewr.html). Examination in the form of seminar presentations and obligatory homework. The course is offered also for C-line students as TDDB40.

Contents
Abstract Rewriting Systems.
Functional computations as rewriting. Term rewriting. Lambda calculus and combinatory logic as examples of rewriting systems.
Computing relations through rewriting. Generalisation of context-free grammars to logic programs, attribute grammars and two-level grammars.
Defining operational semantics of programming languages in terms of rewriting.
Equational unification. Integration of functional and relational languages.

Literature
Johan Boye, Jan Maluszynski, Ulf Nilsson/ Rewriting Systems
These draft lecture notes under revision are available on the net.

Some existing slides are accessible. They may be subject of revision. Batch 1 concerns term rewriting and narrowing. Batch 2 gives a unified view of various grammatical formalisms and logic programming.

A seminar on Constraint Logic Programming will be based on the paper: J. Jaffar and M. Maher. Constraint Logic Programming: A Survey, J. Logic Programming 19-20, 1994

The view of computation as rewriting may be used for integration of the declarative programming paradigms: functional programming and logic programming. A seminar on this topic will be based on the material of the tutorial given by Michael Hanus in October 1997 at

ILPS'97 conference. Example of such a language is the functional logic programming language Curry , which is being developed by an international group of researchers led by Michael Hanus. One can try Curry on the net.

Teachers

Jan Maluszynski.

Examiner

Jan Maluszynski.

Schedule

October 1999 - January 2000.

Examination

One homework assignment.
A contribution to a seminar.

Credit

4 credits

Topics in Constraint Programming

Lectures:
24 h

Recommended for
Computer science and computer systems Ph.D. students

The course was last given:
New course.

Goals
The aims of the course are (1) to survey some well-known search techniques and to discuss their use in constraint programming, (2) to discuss interval constraint approach to modeling and solving of global optimization problems (3) to discuss Oz system approach to combining constraint programming with other programming paradigms.

Prerequisites
Basics of constraint programming. Additional intoduction can be given for the students who did not take the course *Introduction to Constraint Programming.*

Organization
A seminar course. The credits will be given for preparation of the seminar presentations and for solving the homework assignments.

Contents
1. Search techniques:
- global search heuristics: limited discrepancy search, credit search ...
- local search heuristics: simulated annealing, tabu search, genetic algorithms.
Are they relevant for constraint programming?

2. Interval constraints:
- the principles,
- modelling of nonlinear problems
- constraint programming with interval constraints.

3. The Oz system:
- the Oz features
- the Oz constraint solvers

Literature
1. C. Reeves (ed.) *Modern Heuristic Techniques For Combinatorial Problems* Blackwell 1993
2. Van Hentenryck et. al. *Numerica: a Modelling Language for Global Optimization*, The MIT Press, 1997
3. The OZ/Mozart Documentation placed locally at:
http://www.ida.liu.se/labs/logpro/mozart/
and some articles.

Teachers
Kris Kuchcinski, Jan Maluszynski, Ulf Nilsson.

Examiner
Kris Kuchcinski.

Schedule
September 29 - December 15, 1999. Wednesday 13-15.

Examination
Presentation of selected material and homework assignments.

Credit
4 credits.

Comments
The Oz system is installed at IDA and will be used for programming assignments. We investigate a possibility of installing a system using interval constraints. Unfortunately most of them seem to be expensive commercial products.

PLANNED GRADUATE COURSES AND ACTIVITIES SPRING 2000

The following graduate courses (titles) will preliminary be given spring 2000:

General Courses
Industrial project management
Aspekter av vetenskapligt skrivande

Courses in Databases and Information Techniques
Multidatabase systems
Advances in database system technology
Network services and protocols

Courses in Artificial Intelligence and Integrated Computer Systems
Advanced topics in knowledge representation
System synthesis of digital systems (given i coop. with the division for Software and Systems)
Electronic design automation

Courses in Human-Centred Systems
Advanced WWW programming

Courses in Software and Systems
Object oriented development of usable systems
Advanced compiler construction
Models of concurrency
Parallel computing
Complexity theory

GRADUATE COURSE PROGRAMS 1999/2000 at ECSEL, HMI, IMIE

Below you will find references to the courses which will be given during fall 1999 and spring 2000 by the other graduate schools in which the department is involved.

Human Machine Interaction (HMI)

Responsible persons and web address:
Stockholm: Director of graduate studies Ann Lantz, alz@nada.kth.se
Linköping: Director of graduate studies: Lena Strömbäck (on leave fall 1999). Acting director of graduate studies: Sture Hägglund (fall 1999), stuha@ida.liu.se
http://www.ida.liu.se/hmi/

Courses Fall 1999
HMI602 Cognitive Systems Engineering. Erik Hollnagel. (A course description is included in this programme).
HMI611 Humanistic Information Technology. Distance course with video Linköping - Stockholm. Proposed schedule: Thursdays or Fridays. Yvonne Waern.

HMI501 Human Information Processing. Sidney Dekker.

HMI705 Research Topics: Cognition and Creativity in Design Work. Martin Helander.

Courses Spring 2000 (preliminary)
HMI503 HMI Research Methodology and Field Experimentation. Håkan Alm.

HMI6xx Intelligent Decision - Intelligent support. Erik Hollnagel.

HMI604/HMI623 Human-Computer Interaction Martin Helander / David Carr.

HMI621 Speech Technology, Bertil Lyberg.

HMI722 Cognitive Modelling, Rita Kovordanyi.

International Graduate School of Management and Industrial Engineering (IMIE)

Responsible persons and web address:
Director of graduate studies Per-Olof Brehmer, perbr@eki.liu.se, phone 013/281488.
Administrator Lena Sjöholm, lensj@eki.liu.se, phone 013/282357.
http://www.liu.se/org/imie

ECSEL - Excellence Center in Computer Science and Systems Engineering in Linköping

Responsible persons and web address:
Director of graduate studies Nahid Shahmehri, nsh@ida.liu.se, phone 013/ 28 20 66.
Administrator Kristin Wiberg, kristin@isy.liu.se, phone 013/28 57 15.
http://vir.liu.se/ecsel

Humanistisk informationsteknologi

Lectures: 24 h

Recommended for
Kursen är avsedd för magisterstuderande på Tema Kommunikation och doktorander inom HMI forskarskola, andra teman eller IDA.

The course was last given: HT98 vid Tema Kommunikation

Goals
Målet för kursen är att ge en kännedom om humanistiska och beteendevetenskapliga problemställningar relaterade till datoranvändning och att konfrontera dessa mot olika informationstekniska perspektiv.

Prerequisites
Inga utöver antagningskraven till magister- resp. forskarutbildning

Organization
Kursen organiseras delvis som en seminarieserie på distans. Olika distansöverbryggande tekniker kommer att prövas - video, mud, chat och asynkron kommunikation.

Contents
Denna kurs avser att presentera forskningen inom området "Humanistisk Informationsteknologi" på Tema kommunikation, och att relatera den till annan forskning, främst kognitionsvetenskap, Människa-Dator Interaktion - "Human Machine Interaction".

Literature
Geoffrey C. Bowker, Susan Leigh Star, William Turner & Les Gasser (Editors). Social Science, Technical Systems, and coooperative Work: Beyond the Gread Divide (Computers, Cognition av Work Series).New Jersey: Lawrence Erlbaum, 1997. (479:- på Bokus)

Introduktion i Humanistisk Informationsteknologi. Editerad av Yvonne Waern. Tema Kommunikation, 1998. Görs tillgänglig genom Tema Kommunikation. (C:a pris 110:-)

Teachers
Yvonne Waern m.fl.

Examiner
Yvonne Waern

Schedule
Kursen kommer att samordnas med seminarieserien inom Humanistisk Informationsteknologi på Tema Kommunikation. Följande dagar och tider blir aktuella: Onsdagar kl 15-17 från den 6 oktober 1999. Vissa onsdagar kommer att uteslutas på grund av andra uppdrag. Andra tider kan tillkomma, beroende på deltagande lärares möjligheter.

Examination
Examination i form av egen skriven rapport, som diskuteras under ett eller flera seminarier. Alla studerande som önskar examineras bör därför räkna med att vara klara i mitten av januari, då examinationen genomförs.

Credit

2 credits för aktivt deltagande i seminarierna
(definition av aktivt: skrivna frågor för minst 3/4 av seminariegångerna)
3 credits för skriven rapport

Comments

Kursen ges på svenska, på begäran av såväl studenter som inblandade lärare.

C3-C4-courses

TDDA12	**System Development**
TDDA14	**AI Programming**
TDDA16	**Representation of Knowledge in AI**
TDDA32	**Design and Analysis of Algorithms**
TDDA37	**Compiler Construction**
TDDA41	**Logic Programming**
TDDA43	**Programming Theory**
TDDA99	**Kognitionsvetenskapliga kommunikationsmodeller**
TDDB02	**Software Quality**
TDDB06	**Advanced Programming and Interactivity on the WWW**
TDDB08	**Logik fördjupningskurs**
TDDB09	**Formell programutvecklingsmetodik**
TDDB12	**Concurrent Programming**
TDDB13	**Human-Computer Interaction**
TDDB15	**Computer Aided Software Engineering for Development and Maintenance**
TDDB34	**Object-Oriented System Development**
TDDB38	**Database Technology**
TDDB55	**Medieinformatik**
TDDB61	**Methodology of Program Development and Programming Development Project**
TDDB66	**Expert Systems-Methods and Tools**
TDDB67	**Distributed Systems**
TDTS41	**Computer Networks**
TDTS51	**Advanced Computer Architecture**
TGTU04	**Leadership**

SVP-courses

HIID62	**Programvarukvalitet**
HIID63	**Forskningsstrategier inom informationssystem** (VT2000)
HIID69	**Projektarbete och systemutveckling i praktiken**
HIID70	**Design för användbarhet**
HIID71	**Teorier om design för användbarhet**
HIIC72	**Ledarskap**

Master's Program in Communication and Interactivity

IDA and the Department of Electrical Engineering offer a master's programme in computer science and engineering which focuses on topics in communication and human-machine interaction. Applicants are expected to have a Bachelor's degree in computer science and engineering.

The program consists of three semesters. The first two semesters consist of advanced courses selected from the computer science and engineering syllabus in Linköping. Thesis work is carried out during the third semester.

More information about the program can be found at http://www.ida.liu.se/~msc-ci/

Faculty engaged in the graduate study programme

Leif Appelgren, Lic.Eng. Consulting professor (*adjungerad professor*), economic information systems. Previous academic appointments with Linköping and Handelshöyskolen Bl, Norway. Several previous affiliations. Current affiliation: Leif Appelgren Consulting AB.

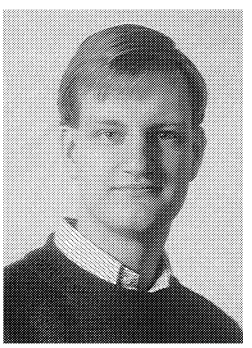
Measurement and audit methods related to economic crime prevention.

Lars Ahrenberg, Ph. D., Uppsala 1987. Professor of computational linguistics. Group leader, NLPLAB. Head of the Divison for Human-Centered Systems.

Syntax, semantics and pragmatics of natural language; dialogue systems, natural language; machine-aided translation, parallel corpora.

Karin Axelsson, Ph. D., Linköping 1998. Assistant professor (*forskarassistent*), information systems development.

Information systems architecture, theories on information systems development, inter-organisational business development, qualitative research methods.



Christer Bäckström, Ph. D., Linköping 1992. Associate professor (*docent, universitetslektor*).

Planning and temporal reasoning, algorithms and complexity, model-based diagnosis.

David Carr, Ph.D., Maryland 1995. Assistant professor (*universitetslektor*), human-computer interaction. Previous affiliations Maryland and Luleå.

User interface design, visualization, computer-supported cooperative work and groupware for teamwork.

Stefan Cronholm, Ph.D., Linköping 1998, Assistant professor, computer science. Co-leader, VITS. Director of undergraduate studies for the Information Systems Analysis Program.

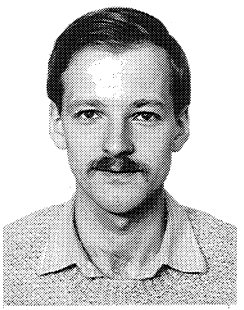
Theories/methods on business process and information systems development, method modelling, qualitative research methods, method tools, usability.

Nils Dahlbäck, Ph. D., Linköping 1992. Assistant professor (*universitetslektor*), cognitive science.

Natural language processing, especially empirically based computational models of discourse. Cognitive aspects of discourse coherence in man and machine. Intelligent user interfaces. Individual differences in cognitive abilities and their relationship to hypermedia navigation.

Patrick Doherty, Ph. D., Linköping 1991. Associate professor (*docent, universitetslektor*), logic and theoretical computer science. Group leader, KPLAB. Head of the Division for Artificial Intelligence and Integrated Computer Systems.

Artificial Intelligence, Knowledge Representation, Deliberative/Reactive Systems, Temporal Reasoning.



Wlodzimierz Drabent, Ph. D., Warsaw 1985. Associate professor (*docent, universitetslektor*), computer science. Associate professor at the Institute of Computer Science, Polish Academy of Sciences.

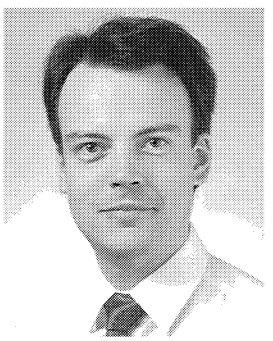
Logic programming: semantics, proving properties of programs, declarative diagnosis, negation; programming languages semantics.

Dimiter Driankov, Ph. D., Linköping 1989. Associate professor (*docent, universitetslektor*), logic and AI. Group leader, TASLAB.

Reasoning under uncertainty, many-valued logics, approximate reasoning, fuzzy control & systems, autonomous agents.

Petru Eles, Ph. D., Bucuresti 1993. Associate professor (*universitetslektor*), computer architectures. Previous affiliation: Technical University Timisoara, Romania.

Design of embedded systems, design automation for digital systems, real-time systems, hardware/software co-design, computer architectures, concurrent programming, hardware description languages and languages for system specification.



Henrik Eriksson, Ph. D., Linköping 1991. Associate professor (*docent, universitetslektor*), computer science. Previous affiliations: Stanford University, Stanford, CA, 1991-94 and the Swedish Institute of Computer Science (SICS) 1996-97.
Knowledge-based systems, knowledge acquisition, medical informatics, software development environments, software reuse, command-and-control systems, Internet-based applications, Java programming.

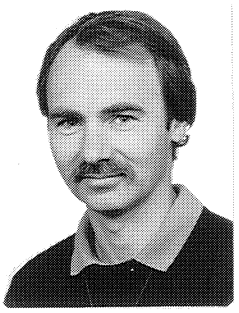
Johan Fagerström, Ph. D., Linköping 1988. Assistant professor (*universitetslektor*), computer science.

Distributed systems, object-oriented programming, object-oriented analysis and design, operating systems.

Dag Fritzson, Ph.D., Göteborg 1988. Consulting professor (*adjungerad professor*), engineering information systems especially scientific computing. Previous affiliation Chalmers University of Technology, Göteborg. Current affiliation SKF AB.

Modelling techniques, parallel simulation, visualization, machine element modelling, e.g. rolling bearings.

Peter Fritzson, Ph. D., Linköping 1984. Professor of programming systems and software engineering. Group leader, PELAB. Previous affiliations: Sun Micro Systems, USA, 1985-86, Linköping University Hospital 1976-79. LiU Physics dept., 1975-76.
Programming environments and languages, design languages and simulation environments, scientific computing, debugging tools, incremental compilation technology, compiler generation, compilers and development tools for parallel hardware.



Göran Goldkuhl, Ph. D., Stockholm 1980. Professor of information systems development. Part time professor of informatics, Jönköping International Business School. Research director VITS network. Research director at Centre for studies on Man, Technology and Organization. Previous affiliations: Stockholm, Göteborg.
Theories/methods on business process and information systems development, method modelling and renewal, business and communicative action, qualitative research methods.

Anders Haraldsson, Ph. D., Linköping 1977. Associate professor *(bitr professor)*, computer science. Head of the department of computer science. Previous affiliation: Uppsala.

Programming languages and systems, programming methodology, program manipulation, partial evaluation.

Erik Hollnagel, Ph.D., Ärhus 1981. Professor of Human-Computer Interaction. Several previous affiliations in Denmark, England and Norway.

Cognitive systems engineering, risk and reliability analysis, user modelling and simulations, decision support and expert systems.

Sture Hägglund, Ph. D., Linköping 1980. Professor of knowledge-based systems. Deputy head of the department of computer science. Manager Industry Research School. Group leader, ASLAB. Previous affiliation: Uppsala.

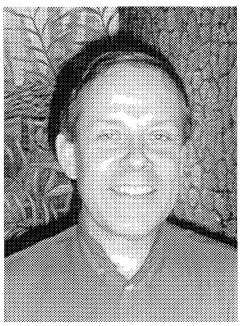
Expert systems and artificial intelligence applications, database technology, human-computer interaction, intelligent tutoring systems and software engineering.

Olof Johansson, Ph. D., Linköping 1996. Assistant professor *(forskarassistent)*, engineering information systems.

Engineering databases, complex product models.

Peter Jonsson, Ph.D., Linköping 1996. Associate professor (*docent, universitetslektor*), computer science.

Construction and analysis of algorithms. Complexity theory.



Erland Jungert, Ph.D., Linköping 1980, consulting professor (*docent)* geographical information systems and computer science. Main affiliation: Swedish Defense Research Establishment (FOA).

Qualitative spatsial reasoning, geographical information systems, database technology, visual languages.

Arne Jönsson, Ph. D., Linköping 1993. Associate professor (*docent, universitetslektor*), computer science. Director of undergraduate studies for the Cognitive Science program. Previous affiliation: Monash University, Clayton, Australia, 1994-95.
Artificial intelligence, natural language processing, dialogue systems, especially empirically based computational dialogue models.

Mariam Kamkar, Ph. D., Linköping 1993. Professor of software engineering. Head of the Division for Software and Systems. Deputy head of the department of computer science.

Software maintenance, software testing and analysis, program debugging, program analysis, optimization in compilers, multiparadigm programming languages.

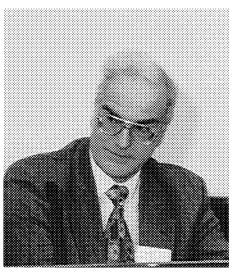
Krzysztof Kuchcinski, Ph. D., Gdansk 1984. Professor of computer systems. Group leader, CADLAB. Previous affiliation: Technical University of Gdansk, Poland.

Design of embedded systems, hardware/software co-design, design automation of diagital systems, VSLI, design for testability, computer architecture.

Patrick Lambrix, Ph.D., Linköping 1996. Assistant professor (*universitetslektor*).

Intelligent Information Systems: knowledge representation, organization and management of information, common-sense reasoning, knowledge-based information retrieval, information extraction.

Bengt Lennartsson, Ph. D., Göteborg 1974. Associate professor (*docent, universitetslektor*), software engineering. Group leader, PELAB 1981-88 and head of the department of coumputer science 1983-90. Previous affiliation: Carlstedt Elektronik AB, Göteborg 1992-94. Current affiliation ITN, Campus Norrköping.
System development models, development of complex systems, organizational learning.

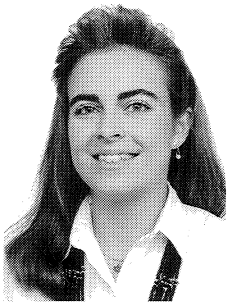


Bertil Lyberg, Ph.D., Stockholm 1981. Consulting professor (*adjungerad professor*), speech technology. Manager of spoken language processing, Telia Research AB. Research Affiliate, Research Laboratory of Electronics, M.I.T. 1982-83.

Text-to-speech conversion, speech recognition, speech-to-speech translation, prosody in speech synthesis and recognition

Jan Maluszynski, Ph. D., Warsaw 1973. Professor of programming theory. Several previous affiliations.

Constraint logic programming, formal methods in computer science

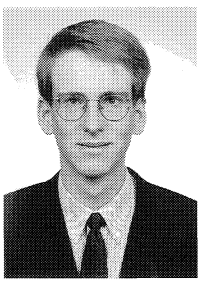


Anna Moberg, Ph.D., Linköping 1997. Assistant professor, (*vik. universitetslektor*), economic information systems.

IT and organizational design, communication, telework, non-territorial office.

Simin Nadjm-Tehrani, Ph. D., Linköping 1994. Assistant professor (*universitetslektor*), computer science.

Modelling and formal verification of embedded systems, hybrid (discrete/continuous) models, rule-based and synchronous languages, temporal logic, real-time systems.



Fredrik Nilsson, Ph. D., Linköping 1997. Assistant professor (*forskarassistent*), economic information systems. Manager at Deloitte & Touche Consulting Group.

Strategy and management control, environmentally-driven business development, valuation and accounting of intangible assets, production.

Ulf Nilsson, Ph. D., Linköping 1992. Associate professor (*docent, universitetslektor*), computer science. Deputy head of the department of computer science. Director of graduate study programme.Group leader, LOGPRO. Previous affiliation: State University of New York at Stony Brook, USA.
Logic programming and deductive databases; Model checking; Evaluation strategies for query processing; Program transformation and abstract interpretation.

Tomas Ohlin, Fil lic., Stockholm 1971. Consulting professor (*adjungerad professor*), economic information systems, especially public systems. Previous affiliations: Stockholm University, public research planning, government IT administration.

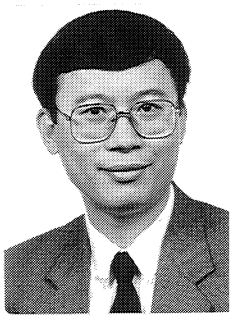
Information society, value added online services, citizen oriented dialogue systems, IT supported democracy.

Kjell Ohlsson, Ph.D., Umeå 1982. Part-time professor of human-computer interaction. Other affiliation Department of Mechanical Engineering. Previous affiliations Umeå, Luleå and others.

Human-computer interaction, usability engineering, cognitive ergonomics, decision making, psycho acustics.

Nils-Göran Olve, Econ. Dr., Stockholm 1977. Consulting professor (*adjungerad professor*), management control. Positions with the Stockholm School of Economics and EIASM in Brussels. Partner in Cepro Management Consultants since 1986.
Management issues arising from IT-enabled business change, especially how accounting, control, and pricing could be modified to provide information and incentives appropriate for the new business situation.

Kjell Orsborn, Ph. D., Linköping 1996. Assistant professor (*forskarassistent*), engineering information systems. On leave to Intelligent Engineering Systems Laboratory (IESL), MIT, Cambridge, USA.
Database technology for scientific and engineering applications, specifically computational database technology. Extensible database technology applied to the fields computer-aided design, computational mechanics, and product data management.



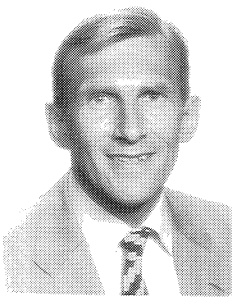
Zebo Peng, Ph. D., Linköping 1987. Professor of computer systems. Group leader, ESLAB.

Design and test of embedded systems, electronic design automation, design for testability, hardware/software co-design, real-time systems, computer architecture, VLSI.

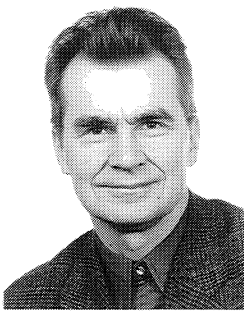
Birger Rapp, Econ. Dr., Stockholm 1974, Professor of economic information systems. Group leader, EIS. Head of the Division for Information Systems and Management. Among many other appointments president of the board of the Swedish Teleworking Association, Distansforum and program director in Management and Economic Information Systems at IMIT.
Accounting, business control, agency theory, IT and organization, production, economics.

Tore Risch, Ph. D., Uppsala 1978. Professor of engineering databases. Group leader, EDSLAB. Previously at Uppsala University, IBM Almaden Research Lab. (San José, CA), Stanford Research Institute, Syntelligence Inc. (Sunnyvale, CA), HP Laboratories (Palo Alto, CA), and Stanford University.
Database support for engineering and scientific applications, e.g. heterogeneous databases, multi-databases, data integration, object-oriented query processing, and distributed mediators.

Nancy Reed, Ph.D., University of Minnesota 1995. Assistant professor (*forskarassistent*), computer science. Previously at University of California, Davis.
Autonomous agents, knowledge-based systems, modelling human expert reasoning, real-time systems and specification languages for agents. Current application areas are agents in dynamic simulation environments and knowledge -based systems in diagnosis.



Rolf Rundfelt, Ph. D., Stockholm 1974. Consulting professor (*adjungerad professor*), economic information systems, especially in Swedish and international Financial Accounting. Docent in Business Administration, University of Stockholm. Since 1966, lecturer at the University of Stockholm.



Erik Sandewall, Ph. D., Uppsala 1969. Professor of computer science. Prorector of Linköping University. Several previous affiliations.

Representation of knowledge with logic, reasoning about action and change, cognitive robotics, autonomous agents.

Kristian Sandahl, Ph. D., Linköping 1992. Consulting professor (*adjungerad professor*), computer science. Group leader, ASELAB. Main affiliation Ericsson Radio Systems AB.

Knowledge management, knowledge engineering, industrial software engineering, quality improvement paradigm, empirical research methods, component-based design, inspection methods.

Nahid Shahmehri, Ph. D., Linköping 1991. Professor of computer science. Group leader, IISLAB. Head of the Division for Database and Information Techniques. Previous affiliation: Carlstedt Elektronik AB, Göteborg.

Information management, information retrieval and filtering, information extraction, information security, workflow management, CSCW.

Åke Sivertun, Ph. D., Umeå 1993. Assistant professor (*forskarassistent*). Assistant professor (universitetslektor) at Högskolan i Kalmar.

Geographical Information Systems - GIS. Communication of complex data and linking multi disciplinary models in GIS. Research in environmental programs, programs for medical geography, physical planning and decision support.

Lena Strömbäck, Ph.D., Linköping 1997. Assistant professor (*forskarassistent*), computational linguistics. Director of graduate studies for the HMI programme.

Natural language understanding, tools for grammar development, unification-based formalisms, models for natural language.

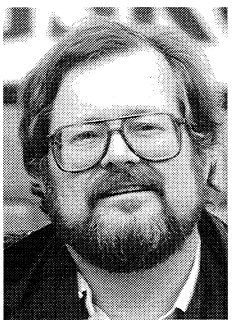
Toomas Timpka, MD., Stockholm 1983, Ph. D., Linköping 1989. Professor of Social Medicine and Public Health Sciences. Group leader, MDA.

Hypermedia, computers and society, human-computer interaction, systems development.

Anders Törne, Ph. D., Uppsala 1980. Part-time associate professor (*universitetslektor*), computer support in automation. Group leader, RTSLAB. Main affiliation is Carlstedt Research & Technology, Linköping.

Tools, methods and architecture for systems engineering and real-time system design. Applications in automation and embedded systems. Real-time programming and specification languages. Robot programming.

Guest researchers and affiliated faculty engaged in the graduate study programme



Sten F. Andler, Ph. D., Carnegie-Mellon University 1979. Professor of computer science, Högskolan i Skövde, (docent LiU), distributed systems, real-time systems, operating systems. Previous affiliations: IBM Software Solutions (1992-93) and Almaden Research Center (1979-92), San José, CA.

Distributed real-time systems, real-time databases, active real-time databases, distributed databases, real-time operating systems.

Mary Helander, Ph. D., SUNY Buffalo 1992. Current affiliation IBM, Boston. Previous group leader, ASELAB. Previous affiliations: Northeastern University, Boston, IBM Corporation. On leave since 1998.

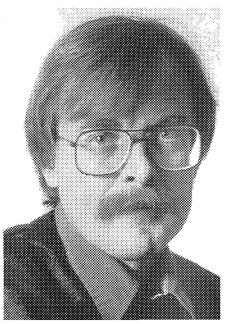
Software reliability, software quality, network reliability, network location, operations research.

Roland Hjerppe, Director of Libraries, Mid Sweden University. Previous group leader, LIBLAB.

Library science and systems, hypertext and -media, knowledge organization and information retrieval, citation analysis and bibliometrics, personal and everyday life information/document management.

Witold Litwin, Professor University Paris 9. Guest professor Linköping, Stanford, Berkeley, Santa Clara university.

Distributed scalable data structures (SDDSs), multidatabase systems, storage structures, query languages.

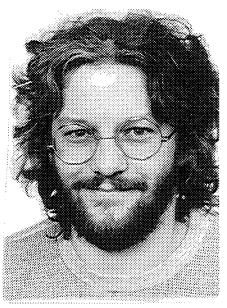


Witold Lukaszewicz, Ph.D.,Warsaw University 1979. Guest professor. On leave from the Institute of Informatics, Warsaw University, Poland.

Knowledge representation, non-monotonic reasoning, programming methodology.

Jonas Löwgren, Ph. D., Linköping 1991. Associate professor (*docent, universitetslektor*), human-computer interaction. On leave since 97/98.

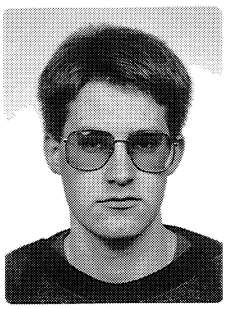
Human-computer interaction, usability-oriented systems development, interaction design.



Jacek Malec, Ph.D., Wroclaw 1987. Assistant professor *(forskarassistent)* in TASLAB. Previous affiliation: Technical University of Wroclaw, Poland.

Reactive systems, autonomous systems, system theory, knowledge representation, artificial intelligence.

Anders G. Nilsson, Econ Dr., Stockholm 1991. Professor of Informatics, University of Karlstad. Associate professor (docent, LiU) of information systems development in 1995. Acting professor of economic information systems in 1992. Previous affiliations: KTH, University of Stockholm and Stockholm School of Economics.
Application packages, business modelling, business process reengineering (BPR), information management, ISD methods, IS/IT strategies, maintenance management.



Henrik Nilsson, Ph. D., Linköping 1998. Assistant professor (*forskarassistent*), computer science.

Functional programming languages, programming language implementation, functional programming, declarative debugging.

James M. Nyce, Ph.D., Brown 1987. Guest professor (docent, LiU) computer and information science. Associate professor, School for Library and Information Management, Emporia State, Emporia, KS, USA. Previous affiliation Brown.

Work and knowledge (medicine and academia); tradition, innovation and technology; hypertext and visual resource developement paths.

LINKÖPINGS UNIVERSITET

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