



Department of Computer and  
Information Science, Linköping

# **Courses 2000**

**International  
Graduate School in  
Computer and Information Science**

**Including the Industry Research School**

Department of Computer and  
Information Science



**LINKÖPINGS UNIVERSITET**

**[www.ida.liu.se](http://www.ida.liu.se)**

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# SCHEDULE SPRING 2000

## Graduate Courses Spring 2000

Course <sup>1</sup>	Course literature	Jan	Febr	March	April	May	June	Day	Time	Place
*Advanced Compiler Construction Peter Fritzon 6 p	1. Bob Morgan: Building an Optimizing Compiler. Digital Press, 1998. Handouts.		Intensive course: Feb 28, 29	March 1, 6-17						Gryningen, Block G
Advanced WWW programming (TDDB06) Henrik Eriksson 5 p (or 3+3 p)	(preliminary) David Flanagan: Java in a Nushell, 2nd edition, O'Reilly, 1997.	Starts Jan 20	Feb 18		April 6, 7				13-15	Betinget, Block B
Avhandlingsseminarier Göran Goldkuhl 3 p	To be decided.	Starts Jan 13	Feb 17	March 2, 16	Apr 13	May 4, 18		Thursday	9-12	Eliten, Block E
*Calculi of Concurrency Jan Maluszynski/ Ulf Nilsson 4 p	1. R. Milner, Communication and Mobile Systems: the Pi-Calculus Additional literature and more detailed program will be announced in January.				Starts April 4		Ends June 6	Tuesday	10-12	Eliten, Block E
Component Software Sten Andler 3+1 credits	1. Clemens Szyperski, Component Software (Beyond Object-Oriented Programming). Articles.	Starts Jan 26	Feb 16-17	March 1-2, 20-21	Ends April 12 (Skövde högskola, E102, Block E)				Starts Jan 26 at 13-15, except on 13-17, 8-12	Estraden, Block E, March 21 Belföningen, Block B
*Complexity Theory Peter Jonsson 3 credits	1. Bovet, D.P., Crescenzi, P.: Introduction to the Theory of Complexity. First edition. 2. Hopcroft, J.E., Ullman, J.D.: Introduction to Automata Theory, Languages, and Computation.			Starts March 27		Ends May 22			Starts on March 27 at 10-12	AG23, Block A

## SCHEDULE SPRING 2000

### Graduate Courses Spring 2000

Course <sup>1</sup>	Course literature	Jan	Febr	March	April	May	June	Day	Time	Place
Fundamentals of Bayesian Artificial Intelligence Arne Jonsson 3 credits	Articles			Intensive course: March 27-31				Mon-Fri	14-16(17)	Elogen, Block E
*Fundamentals of Modern Database Systems Nahid Shahmehri 3 credits					Starts April 4	Ends May 26			10-12	Galleriet, Block G
**Human-Computer Interaction (HMI604) David Carr 5 credits	1. Compendium: Helander, M.G., Landauer, T. and Prabhu, P. (1997). Handbook of Human-Computer Interaction (2nd. Edition). Amsterdam: Elsevier. Selected Papers.	Starts Jan 14				Ends May 19		Friday (not week 11, 16)	10.30-11.45, 12.15-13.30	Elogen, Block E
Industrial Project Management Christian Berggren 5 credits	1. Russell Archibald 1992. Managing High-technology Programs and Projects. 2. Engwall, M (1995) Jakten på det effektiva projektet.			Intensive course: Starts March 17					13.15-16.00	Belöningen, Block B
Informationssamhällets infrastruktur Tomas Ohlin 5 credits	See course description.			March 7, 21	April 4, 18	May 2, 16		Tuesday	10-16	Elogen, Block E, except on March 21 Betinget, Block B
Intelligent Decision Intelligent Support Erik Hollnagel 3 credits	Selected research papers.				Starts April 7		Ends June 9	Friday	14-17	Elogen, Block E, except on April 28 Elién, Block E

# SCHEDULE SPRING 2000

## Graduate Courses Spring 2000

Course <sup>1</sup>	Course literature	Jan	Febr	March	April	May	June	Day	Time	Place
Knowledge management och elektroniska tjänster Birger Rapp 3-5 credits	See course description.				April 10, 11, 12 Örebro	May 8, 9 Karlstad	+ August 23,34,25 Visby			
Kunskapsprojektering och vetenskapsteori Göran Goldkuhl, Karin Axelsson 3 + 4 poäng	1. Föllesdal, Wallöe, Elster: Argumentationsteori, språk och vetenskapsfilosofi, Thales. 2. Gilje N, Grimen H: Samhällsvetenskaplig föreläsningar, Daidalos 3. Repstad: Närhet och distans, Studentlitteratur 4. Goldkuhl: Kunskapande, kompendium.Ytterligare artiklar i samhällsvetenskaplig metodik		Feb 17	March 16	April 6, 13	May 4	June 7	Thursday	Se separate schedule.	Belöningen, Block B
*Operating Systems Peter Fritzson 3 + 1 credits	1. Uresh Vahalia, UNIX Internals, The New Frontiers.					May 8, 15, 22 and 29		Monday	9-12, 13-16	Gryningen, Block G
Parallel Programming and Compilation Techniques (TDDB78) Peter Fritzson 4 credits	1. Ian T. Foster: Designing and Building Parallel Programs, Addison-Wesley.			Starts March 20						
Presentation Technique Ingela Delby 3 credits	To be decided.			Intensive course: Starts March 8					10-16	Elogen, Block E
*Reasoning about Actions and Change Erik Sandewall 4 credits	See course description.				Starts April 5		Ends June 14	Wednesday (not week 15)	10-12	Galleriet, Block G



SCHEDULE SPRING 2000

Graduate Courses Spring 2000

Course <sup>1</sup>	Course literature	Jan	Febr	March	April	May	June	Day	Time	Place
*System Synthesis of Digital Systems Petrú Eles 3 p	I. P. Eles, K. Kuchinski and Z. Peng "System Synthesis with VHDL," published by Kluwer Academic Publisher, December 1997.			Starts March 23			Ends June 15	Thursday	10-12	Elogen, Block E, except on March 30 Eliten, Block E

1. \* = ECSEL. \*\* = HMI



## 1.1 General information

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 Applied IT and 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 preparing also for a career outside the university, with funding from the Foundation for Strategic Research. ECSEL, Excellence Center in Computer Science and Systems Engineering, started in 1996 in cooperation with primarily the Department of Electrical Engineering. 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). 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 generally 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.



## 1.2 The Graduate Studies Programme Spring 2000

This presentation 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**

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 at ECSEL, HMI, IMIE).

The following activities are strongly recommended:

**Main seminar series, often Tuesdays at 13.15 and seminars in the divisions.**

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, March, 2000

Lillemor Wallgren

Director of Graduate Studies Administration, Department of Computer and Information Science

Linköping University, S-581 83 Linköping, Phone: 013-281480, Fax: 013-142231, E-mail:

lew@ida.liu.se



## 1.3 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 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?

Participating companies include Ericsson, Telia Research,, Ida Systems, SKF, Idonex, FöreningsSparbanken, 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 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 2000

Activities in the Industry Research School started in 1997 and doctoral students are recruited continuously. 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 Lenartsson, 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 Human-Centered Systems.

*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 Ericsson UAB, Ericsson Radio Systems, FöreningsSparbanken, 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

## 1.4 Divisions in the Department of Computer and Information Science

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 long term responsibility for individual graduate students.

The department hosts research in areas such as programming 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 divisions is given in this chapter.

### Department of Computer and Information Science

*Head of the department:*

Prof. Mariam Kamkar, marka@ida.liu.se

*Administrative manager:*

Inger Emanuelson, ime@ida.liu.se

*Technical manager:*

Kjell Sandberg, kjesa@ida.liu.se

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+46 13 284499 (building G)

*Internet:*

ida.liu.se

*Anonymous FTP:*

ftp.ida.liu.se (130.236.30.131)  
remote-und.ida.liu.se (students domain)

*Home page:*

<http://www.ida.liu.se/>



## **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 Nahid Shahmehri (acting lab leader)

EDSLAB conducts research on methods and theories for database support of engineering applications. Applications for this technology include mechanical, electronic, telecom, and software applications.

#### **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**

**Professor 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, and computer science and programming. The AIICS division consists of one research laboratory and two additional groups supporting activities and research in computer science education (Professor Anders Haraldsson) and in electronic publishing (Professor Erik Sandewall).

#### **KPLAB - Knowledge Processing Laboratory**

Professor Patrick Doherty

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, real-time reasoning, qualitative spatial reasoning, and approximate reasoning.

## **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**

The research in ASLAB, The Application Systems Laboratory, is conducted in three groups:

Human-Computer Interaction, especially usability-oriented methods for IT design and smart home appliances. Prof Sture Hägglund.

Cognitive Systems Engineering, focusing on cognitive modelling, decision support and expert systems. Prof Erik Hollnagel, Prof Kjell Ohlsson.

Web Software Engineering, with a special emphasis on knowledge acquisition tools and advanced web programming support. Doc Henrik Eriksson.

#### **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, including the 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 of 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 Crime Prevention; E-Business; Knowledge Management.

#### **VITS - Development of information systems and work contexts.**

Prof. Göran Goldkuhl

Research areas covered by VITS include business processes and information systems; inter-organisational relationships and electronic commerce; IT support for transportation, travelling and tourism; information systems - design & architecture; CASE/method tools; knowledge and method management. The research is mainly based on communicative and action theories and has a strong emphasis on methods for business and information systems development. Research approaches are mainly qualitative and case study based. VITS is a network research group with 30 researchers from the universities of Linköping, Borås, Dalarna (Borlänge), Jönköping, Karlstad and Örebro.

## **SAS**

### **The Division for Software and Systems**

#### **Professor Zebo Peng**

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 four research laboratories:

#### **ESLAB - Embedded Systems Laboratory**

Prof Zebo Peng

Codesign, system synthesis, and design for test of embedded HW/SW systems; specification, design and verification of embedded real-time applications.

#### **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; software engineering methodology and process improvement.

#### **RTSLAB - Laboratory for Real-Time Systems**

Dr. Simin Nadjm-Tehrani

Systems engineering tools and methods, safety-critical systems design and analysis, formal methods, agent technologies for simulation, real-time databases, fault-tolerant systems.

#### **TCSLAB - Theoretical Computer Science**

Doc. Ulf Nilsson

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

## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### Industrial Project Management

**Lectures:**

C:a 30 t och internat 3 heldagar.

**Recommended for:**

Alla.

**The course last ran:**

VT 1999

**Goals:**

Kursen bygger på växelverkan mellan teori och praktik och deltagarnas aktiva engagemang. Den syftar till att:

1. Ge insikt om och perspektiv på kunskapsbildningen inom projektledningsområdet, och dess tillämpningar. Det förutsätter välplanerade litteraturstudier, reflektioner och deltagande i tentamen
2. Eget projektarbete inom ett specialområde av effektiv projektledning avrapporterat i form av uppsats. Det är en fördel om detta arbete kan utgå från och bearbeta erfarenheter av pågående eller avslutat industriellt projekt inom berörda företag.
3. Ökad förmåga att omsätta teoretisk kunskap i handling och praktik, att delta i industriella projekt under osäkerhet, komplexitet och krav på tvärfunktionellt samarbete. Det förutsätter aktiv medverkan i kursens övningar i samspel, kommunikation och ledarskap, och att deltagarna därvid vinnlägger sig om ödmjukhet, generositet och vilja att lyssna och stödja andra.

**Prerequisites:**

Inga.

**Organization:**

Kursstart med en orienterande föreläsning om projektledning och redogörelse för inslag under kursen samt eventuellt en liten övning. Internat genomförs under v 14 - v 16, alternativa tillfällen är 3-5 april, 6-8 april, 9-11 april, 13-15 april, ev också 16-18 april.

Seminarium för reflektion om internatet. Tillfälle för litteraturtentamen och diskussion av Uppsats-PM. Industribesök. Gästföreläsning. Slutseminarium..

80% närvaro krävs för att få poäng.

**Contents:**

Modern industriell projektledning handlar i hög grad om interdisciplinär, internationell verksamhet, vare sig det rör sig om leveransprojekt, utvecklings- eller upphandlingsprojekt.

Kursen kommer att bygga på deltagarnas egna aktiviteter, liksom exempelvis kursen TQM och lärande organisationer. Den skall ge förståelse av organisation, ledning och styrning av olika typer av industriella projekt och förmedla insikt om samspelet mellan projekt och företagets basorganisation, och hur detta påverkar möjligheter att nå projektmål och generera långsiktigt organisatoriskt lärande. Avsikten är dels att göra en rejäl fördjupning i litteraturen om projektledning och projektledningsproblem (inklusive de klassiska "planning disasters"), dels att ha en nära koppling till praktiken genom att ta avstamp i aktuella industriprojekt inom regionen.

**Literature:**

- Russell Archibald 1992. "Managing High-technology Programs and Projects.

## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

•Engwall, M (1995) Jakten på det effektiva projektet.

**Teachers:**

Christian Berggren och inbjudna föreläsare.

**Examiner:**

Christian Berggren, tf professor i industriell organisation.

**Schedule:**

Kursstart 17 mars, kl 13.15-16.00. Kursen avslutas i juni.

**Examination:**

Litteraturtentamen c:a två veckor efter kursens start. Projektarbete i form av uppsats.  
Ev. artikelskrivning.

**Credit:**

5 credits.

**Comments:**

Deltagarna är begränsade i antal eftersom kursen innehåller vissa moment där antalet deltagare ej får vara för stort. Max 20 deltagare.



## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### **Presentation Technique**

**Lectures:**

Ca 30 h

**Recommended for**

Graduate students.

**The course was last given:**

Fall 1999.

**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**

Day 1-2: Voice- and body language, mind-mapping, how to take notes, the students present prepared presentations. One month later - Day 3-4: Body language, overheads, short performances, students presentations (10 min). One month later - Day 5-6: The language, students own unprepared presentations.

**Contents**

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

**Literature**

Basic book on speeches and presentations. Short excerpts from literature on the subject.

**Teachers**

Ingela Dellby.

**Examiner**

Ingela Dellby.

**Schedule**

March-May 2000

**Examination**

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

**Credit**

3 credits

**Comments**

Maximum twenty participants.



## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### Aspekter av Vetenskapligt Skrivande

##### Lectures

10 h

##### Recommended for

Alla doktorander inom området datavetenskap.

##### The course was last given

Våren 1999

##### Goals

Att ge grundläggande kunskap om språk, innehåll och struktur i vetenskapliga verk.

Att öka medvetenheten om problem och möjligheter i skrivprocessen.

Att ge kännedom om typografins möjligheter att lyfta fram och tydliggöra innehållet.

##### Prerequisites

Svenska.

##### Organization

Teorigenomgångar i föreläsningsform och grupparbeten kring ett antal hemuppgifter.

##### Contents

Introduktion. Vetenskapligt skrivande --- vad är det och hur skiljer det sig från andra former av skrivande? Vetenskaplig stil. De olika delarna i den vetenskapliga uppsatsen. Om titelns, sammanfattningens, introduktionens, huvuddelens, slutdiskussionens och referensernas roll i uppsatsen.

Skrivprocessen: Ett medel för att klarlägga det egna tänkandet och forskningsuppgiftens struktur. Problemformuleringens och dispositionens roll i skrivprocessen. Kramptillstånden.

Innehållsliga och språkliga aspekter av vetenskapligt skrivande: Olika typer av dispositioner.

Stycket. Om kärnmeningar och olika typer av stycken. Meningar och sambands signaler. Lite om skiljetecken. Språkfel. Vad man bör se upp med. Att skriva på engelska.

Typografiska aspekter av vetenskapligt skrivande: Typografin och dess syfte. Form och innehåll.

Typsnitt. Enhetlighet och måttlighet.

Att skriva avhandling: Avhandlingen och dess syfte. Olika typer av avhandlingar.

##### Literature

Meddelas senare.

##### Teachers

Ulf Nilsson.

##### Examiner

Ulf Nilsson.

##### Schedule

Höstterminen 2000.

##### Examination

Inlämningsuppgifter, grupparbeten och närvaro.

## **GRADUATE COURSES, SPRING AND FALL 2000**

### **General Graduate Courses**

**Credit**

3 poäng

**Comments**

Kursen kommer eventuellt även att erbjudas på distans.

## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### **Ethics in the Age of Information Technology**

**Lectures:**

16 h

**Recommended for**

Graduate students

**The course was last given:**

Fall 1999

**Goals**

To introduce ethical theories and methods. To present and analyse ethical issues related to computerisation and information technology. To present and analyse problems in research ethics.

**Prerequisites**

None.

**Organization**

Presentations, seminars and discussions.

**Contents**

Ethical theories and methods for analysing ethical arguments. The course focuses on ethical issues related to the use of information technology, like privacy, responsibility and decision support and ethical issues related to the use of Internet. Another focus is on research ethics. This includes cheating, rights and responsibilities of researchers, ethical issues related to publication and the confrontation of different systems of norms in applied research.

**Literature**

Spinello, R A, Ethical Aspects of Information Technology, Prentice Hall: New Jersey 1995.  
Further literature is not decided yet.

**Teachers**

Göran Collste and Jan Holmquist, Centre for Applied Ethics.  
Erik Sandewall, IDA.

**Examiner**

Göran Collste.

**Schedule**

November and December 2000.

**Examination**

Seminar activity and written papers.

**Credit**

3-5 credits.



## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### **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 1999.

##### **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**

September-November 2000.

##### **Examination**

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

##### **Credit**

3 + 2 credits





## GRADUATE COURSES, SPRING AND FALL 2000

### General Graduate Courses

#### **Presentation Technique**

**Lectures:**

30 h

**Recommended for**

Graduate students.

**The course was last given:**

Fall 2000.

**The course runs:**

Fall 2000

**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**

Basic book on speeches and presentations. Short excerpts from literature on the subject.

**Teachers**

Ingela Dellby.

**Examiner**

Ingela Dellby.

**Schedule**

Mid-September to late November 2000.

**Examination**

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

**Credit**

3 credits

**Comments**

Maximum ten participants.



## **Graduate Courses in Database and Information Techniques**

### **Fundamentals of Modern Database Systems**

#### **Lectures:**

20 h

#### **Recommended for**

This is a fundamental course to be attended by students without basic database knowledge. With this course the student will understand how to effectively use commercial database systems.

#### **The course was last given**

1999.

#### **Goals**

?

#### **Prerequisites**

Elementary programming knowledge, and knowledge about data structures and algorithms, corresponding to the course TDDb57 Data Structures and Algorithms.

#### **Related Courses**

There is related ECSEL Perspective Course on Advances in Database Technology which brings the student up-to-date on the state-of-the-art in database research and advanced systems.

The Research Frontier Course Multidatabase Systems covers recent developments within the areas of managing collections of heterogeneous databases as well as principles of distributed and scalable storage structures

#### **Organization**

This course is organized as a series of lectures, with accompanying computer based self-study exercises.

#### **Contents**

This course covers the fundamentals of the database field, i.e. is how to use computers to store and manage large quantities of data.

The first part of the course covers how to design a database, i.e. how to model reality using the so called Entity-Relationship (ER) model and how to translate ER models into efficient representations of data in computers using a Database Management System (DBMS). In particular we study how to design and use relational databases where data is stored as tables and are retrieved and updated using the database language SQL.

The course covers how a DBMS is structured and what major facilities it provides. E.g. in order to handle concurrent access to shared databases a transaction mechanism is provided, to describe the data there is a meta-data (schema) facility, to query data there is a general query facility, to reliably store data there is a recovery subsystem, and to secure data there are authorization facilities and integrity constraints, etc.

The course also gives overviews of some important recent developments within the fast-growing field of commercial database systems, e.g. Object-Oriented Databases, Active Databases, Distributed Databases, and modern PC-based database tools such as Access and Java-Builder.

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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**Graduate Courses in Database and Information Techniques****Literature**

Elmasri, Navathe: Fundamentals of Database Systems, 2nd Ed, Benjamin/Cummings, 1995.  
Course Compendium for independent Computer Exercises.

**Teachers**

Tomas Padron-McCarthy.

**Examiner**

Nahid Shahmehri .

**Schedule**

Spring 2000, April-May.

**Examination**

A large part of the course consists of a number of exercises that you will do mostly on your own.

**Credit**

3 credits

## **Graduate Courses in Database and Information Techniques**

### **Network Services and Protocols**

#### **Lectures**

20 h lectures + 20 h exercises

#### **Recommended for**

All ECSEL students.

#### **The course was last given**

New Course

#### **Goals**

The goal of the course is to provide an overview of the numerous existing and emerging communication protocols and services that comprise the core functionality of the Internet. After the course a student should have an understanding, based on knowledge of the underlying technologies, of the possibilities and limitations present in the current Internet. The student should also be familiar with ongoing development and its possible impact on the kind of services that will be available to the end user in the future.

#### **Prerequisites**

- Undergraduate network technology course
- Basic Computer Security Related Courses
- Basic Computer Security
- Cryptography
- Applied Network Security

#### **Organization**

Lectures and seminars. Optional individual project assignment.

#### **Contents**

The course touch upon many areas as shown below. Security issues and concerns are covered as an integrate part of all areas. The course starts out with a recapitulation of basic principles, concepts and terminology such as network layers and the OSI reference model taught in introductory network technology courses.

The Internet has an interesting history. The course will provide some figures on the size, growth of the Internet as well as knowledge about the organization behind it and of standards and standardization process. The course will look a bit closer at the Swedish University Network (SUNET) to provide the student with an of an overview of available technology as well as its structure and organization. Network resources at Linköping University will be studied in some detail. Working its way through the network layers, the course will look at the properties of different physical and link layer technologies such as IEEE 802, FDDI, ATM, ISDN, and Wireless networks.

Network and transport layer protocols comprise the core of Internet technology. The course will provide an overview of protocols such as IPv4, IPv6, UDP, TCP, ICMP, ARP, RARP, DHCP, BOOTP, and IP Multicasting.

Getting network packages from source to destination requires routing. The course look at two

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Database and Information Techniques

routing protocols: OSPF and RIP.

The Internet would be difficult to use without symbolic addresses such as "www.liu.se" and "ftp.sunsite.com". The course investigates the workings of the Domain Name System (DNS) that makes possible the use of such names.

End users often connect to the Internet using serial line dial-up connections. The course looks at SLIP and PPP, two point-to-point protocols for this purpose.

In recent years, an important use of the public Internet has become to utilize it as an infrastructure for a Virtual Private Network (VPN) within an organization. The course gives a basic understanding of the technology and problems involved in this.

At the application level, the course covers the most commonly used data transfer protocols, such as for instance FTP, NNTP, and HTTP. Alongside HTTP and the World Wide Web, e-mail is today the most commonly used Internet service and the course covers all of the important protocols and standards involved: SMTP, POP3, IMAP, X.400, and MIME.

Application programmers who need to utilize network services have a number of programming interfaces to choose from. The course will give an orientation about the most commonly used ones, such as BSD sockets and TLI, alongside with an account of the principles, protocols, tools and interfaces of Sun Remote Procedure Calls (Sun RPC and XDR). A part of the optional individual project work is to implement a simple NFS server using RPC.

Managing large networks and its connected resources is often a formidable task. The course looks at what Simple Network Management Protocol (SNMP) is and how it can help facilitate network administration.

The rapid development of the Internet constantly make possible new applications. The course will discuss IP-telephony and other emerging new uses of the Internet.

New applications also put new demands on performance and service quality and availability. The course will give an introduction to the area of Quality of Service and the ideas, tools and protocols that exist there to meet these new demands.

Today's Internet is a rather chaotic creation. However, the increasing use of the Internet and organizations growing dependency on it creates a need for third party services that can be trusted. The course looks at some such services and strives to incite discussion about what new services will be possible and/or needed in the future.

#### **Literature**

To be announced.

#### **Teachers**

Nahid Shahmehri

#### **Examiner**

Nahid Shahmehri

#### **Schedule**

Nov-Dec, 2000.

#### **Examination**

Lecture attendance and active seminar participation. Term paper.



## **GRADUATE COURSES, SPRING AND FALL 2000**

### **Graduate Courses in Database and Information Techniques**

#### **Credit**

5 + 2 credits

#### **Comments**

ECSEL Graduate Course

Invited teachers will give some of the seminars.



## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Artificial Intelligence and Integrated Computer systems

#### Reasoning about Actions and Change

##### Recommended for

ECSEL and other graduate students.

##### The course was last given:

New course.

##### Goals

Participants in the course shall obtain an understanding and concrete knowledge of the variety of approaches that are presently being pursued, in current research, to the logic-based representation of dynamic systems, in the sense of systems that change over time.

##### Prerequisites

ECSEL fundamenta are assumed. The course on AI/KR (TDDA 16) or the ECSEL fundamenta course on Knowledge Representation are particularly important.

Students not having all the ECSEL fundamenta should contact the course leader for advice whether she/he is recommended to try this course.

Related ECSEL courses

Other KR courses, naturally. Also the course on Hybrid Systems.

##### Organization

The course will be organized so as to confront two types of sources. First, we use precise accounts of the approaches mentioned under "contents". The reference articles that have been submitted to the Electronic Transactions on Artificial Intelligence will be used for this purpose. These approaches are then confronted to various accounts of what are the important problems in this area. This will be a broader set of literature, taken both within the speciality at hand and from neighboring areas. Different course participants will be assigned partly different reading lists, and the course meetings will be used for discussing the perspectives that the participants obtained from their different sources.

##### Contents

The course will particularly address the following approaches to reasoning about actions and change:

- The situation calculus (Reiter and McCarthy variants)
- Time and action logics; cognitive robotics logic
- Action languages
- The event calculus
- The fluent calculus

##### Literature

For the first aspect of the course (compare under "Organization" above) we use the following articles:

f-cis.linep.se-98-014 Michael Thielscher. Introduction to the Fluent Calculus. Linköping University Electronic Press, 1998: f-cis.linep.se-98-015 Patrick Doherty, Joakim Gustafsson, Lars Karlsson, and Jonas Kvarnström. TAL: Temporal Action Logics Language Specification and Tutorial. Linköping University Electronic Press, 1998: f-cis.linep.se-98-016 Michael

## GRADUATE COURSES, SPRING AND FALL 2000

### **Graduate Courses in Artificial Intelligence and Integrated Computer systems**

Gelfond and Vladimir Lifschitz. Action Languages. Linköping University Electronic Press, 1998: f-cis.linep.se-98-017 Erik Sandewall. Cognitive Robotics Logic and its Metatheory: Features and Fluents Revisited. Linköping University Electronic Press, 1998: f-cis.linep.se-98-018 Hector Levesque, Fiora Pirri, and Ray Reiter. Foundations for the Situation Calculus. Linköping University Electronic Press, 1998:  
For the second aspect, each participant will obtain a personalized reading list.

#### **Teachers**

Erik Sandewall

#### **Examiner**

Erik Sandewall

#### **Schedule**

April-June, 2000.

#### **Examination**

Each participant will be requested to write a brief memo (5-10 pages) summarizing the position that she or he has developed through the course. The course credits are conditional on having written such a paper.

#### **Credit**

4 points.

#### **Comments**

Advanced ECSEL Course

All information about the course will be posted on the webpage for Knowledge Representation courses, <http://www.ida.liu.se/ext/kr/>

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Human-Centered Systems

#### Advanced WWW programming

**Lectures:**

20 h

**Recommended for**

Graduate students who want to learn advanced Java programming and other WWW programming techniques.

**The course was last given:**

New course.

**Goals**

The goal of the course is to learn the principles for interactive programming on the WWW. After the course, students should be able to use current techniques, such as CGI-scripts, DHTML, XML, and Java (including various APIs) in research projects.

**Prerequisites**

None, except admitted to graduate studies in Computer Science.

**Organization**

The course consists of a number of lectures, programming assignments, and a programming project.

**Contents**

HTML, CGI, DHTML, XML, Java, and Java APIs. The emphasis is on Java.

**Literature**

(preliminary) David Flanagan: *Java in a Nutshell*, 2nd edition, O'Reilly, 1997.

**Teachers**

Henrik Eriksson et al.

**Examiner**

Henrik Eriksson

**Schedule**

January to April 2000.

**Examination**

Completed and approved programming assignments and Java project.

**Credit**

5 credits (or 3+3 credits)

**Comments**

This graduate course is based on «TDDb06 Avancerad programmering och interaktivitet på WWW». However, the requirements on the programming assignments and project are much stricter in this course. The project must use state-of-the-art Java technology and be relevant for research in Computer Science.



# GRADUATE COURSES, SPRING AND FALL 2000

## Graduate Courses in Human-Centered Systems

### Fundamentals of Bayesian Artificial Intelligence

**Lectures:**

12 h

**Recommended for**

This course introduces Bayesian methods for artificial intelligence. No specific background is required; familiarity with AI concepts is presupposed.

**The course was last given:**

New course.

**Goals**

To introduce the fundamental concepts of Bayesian reasoning, Bayesian networks for prediction and modeling, and the automated learning of Bayesian networks.

**Prerequisites**

Familiarity with artificial intelligence.

**Organization**

This course is organized as a series of lectures. Assessment will be via paper and programming exercises.

**Contents**

- Reasoning under uncertainty (RUU); Bayesian philosophy

- Bayesian networks

- o History of RUU in AI
- o Properties of Bayesian nets
- o Evaluation methods: exact, stochastic and approximate
- o Dynamic Bayesian nets

- Applications o Application tools

- o Medical decision making
- o Natural language generation (NAG)
- o Poker

- Learning Bayesian networks

- o Probabilistic causal structure
- o TETRAD II
- o EM learning
- o Bayesian learning
- o MML learning (GAs, MCMC)

- Evaluating machine learners

- o Orthodox evaluation
- o Bayesian confirmation theory
- o Kullback-Leibler distance
- o Information reward.

**Literature**

To be specified.

**Teachers**

Kevin Korb.

**Examiner**

Arne Jönsson.





## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Human-Centered Systems

#### Human-Computer Interaction (HMI 604)

**Lectures:**

45 h

**Recommended for**

Graduate students.

**The course was last given:**

Fall 1997.

**Goals**

The main objective is to give an overview of the most important research issues in human-computer interaction. In doing so, we will also encounter several design methodologies as well as specific design information. After finishing the course you should be able to design an interface. In addition, the course project will be an empirical study. This will give you experience with another important aspect of HCI research.

**Prerequisites**

A course in human factors engineering or cognitive psychology or the like.

**Organization**

Weekly seminars and a course project.

**Contents**

The course will be taught in a seminar format. Presentations will be made by students. Two or three articles are discussed each time. It is important that you have actually read the articles so that we can have a fruitful discussion. Students are required to bring 2 questions or discussion points per article that can be discussed in class. 15 classes, 3 hours each.

Students will be required to write a conference paper style report on their course project and present it to the class. Both the paper and the presentation will be in English.

**Literature**

Helander, M.G., Landauer, T. and Prabhu, P. (1997). Handbook of Human-Computer Interaction (2nd. Edition). Amsterdam: Elsevier.

Selected Papers.

**Teachers**

David Carr.

**Examiner**

David Carr.

**Schedule**

January-May, 2000.

**Examination**

Although grades other than pass and fail are not given, it is desirable to give nuanced feedback. You will therefore receive an "informal" grade according to the following criteria:

Class Participation 35 % Seminar Presentation(s) 20 % Project, Paper, and Presentation 45 %

**Credit**

5 credits



## **Graduate Courses in Human-Centered Systems**

### **Intelligent Decision - Intelligent Support**

#### **Lectures:**

24 h

#### **Recommended for**

Graduate students.

#### **The course was last given:**

New course.

#### **Goals**

To clarify the conceptual basis for decision support systems.

#### **Prerequisites**

Graduate status as HMI student. Some knowledge of decision theory will be an advantage.

#### **Organization**

The course will take place by means of weekly seminars. Details will be provided later.

#### **Contents**

Thematic discussions around the topic of intelligent decisions. Simply put, the issue is whether the aim should be to develop support for intelligent decisions, or to develop intelligent support systems. In other words, should system designers try to amplify human intelligence or to replace it.

This issue will be pursued by thematic discussions centring on the central notions of decision making and joint systems.

#### **Literature**

Selected research papers.

#### **Teachers**

Erik Hollnagel.

#### **Examiner**

Erik Hollnagel.

#### **Schedule**

April-June 2000.

#### **Examination**

Written essay on a couple of self-selected exam questions or a short term paper in which an existing decision support system is critically scrutinised.

#### **Credit**

3 credits



## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Human-Centered Systems

#### 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.

**Organization**

Lectures.

**Contents**

Introduction  
Datacapture in GIS  
Data mining  
Spatial statistics  
Information systems for decision 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**

Fall 2000.

**Examination**

Written report.

**Credit**

3 credits

**Comments**

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



## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Human-Centered 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:**

Fall 1999

**Goals**

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

**Organization**

Lectures.

**Contents**

The students will read and present papers from the current literature.

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 litterature: 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**

Fall 2000.

**Examination**

Written paper.

**Credit**

5 credits





## **Graduate Courses in Information Systems and Management**

### **Avhandlingsseminarier**

#### **Lectures:**

20 h

#### **Recommended for**

Kursen vänder sig till forskarstuderande som arbetar med sin lic- eller doktorsavhandling. För att få delta på kursen behöver kursdeltagare inte ha färdiga avhandlingskapitel, men ett synopsis eller utkast till sin avhandling skall finnas.

#### **The course runs:**

VT 2000.

#### **Goals**

Huvudsyftet med kursen är att deltagarna får delar av sina pågående avhandlingsarbeten (lic- eller doktorsavhandling) granskade av en utsedd opponenter samt av övriga deltagare. Ett annat viktigt syfte är att deltagarna får träning i att opponera på andra arbeten.

#### **Prerequisites**

Inga.

#### **Organization**

Kursen genomförs i seminarieform med presentation, opposition och diskussion.

#### **Contents**

Seminariebehandling av utkast till avhandlingsbidrag. Presentation och opposition. Varje bidrag behandlas i ungefär 45 minuter. Kursdeltagare förväntas aktivt delta i diskussioner kring struktur och innehåll i avhandlingar.

#### **Literature**

Presenteras senare.

#### **Teachers**

Göran Goldkuhl, Stefan Cronholm.

#### **Examiner**

Göran Goldkuhl.

#### **Schedule**

Januari-maj 2000

Seminarier kommer att planeras med hänsyn till studerande vid andra universitet/högskolor.

#### **Examination**

Avhandlingsseminarierna hålls i kursform och ger doktorandpoäng beroende på aktivitetsgrad. Opponentroll: Skriftliga oppositioner 1-2 sidor.

Respondentroll: Efter seminariet skriver respondenten ett lärpapper, som sammanfattar de viktigaste kommentarerna från seminariet.

#### **Credit**

3 poäng



## **Graduate Courses in Information Systems and Management**

### **Informationssamhällets infrastruktur**

#### **Lectures:**

36 h

#### **Recommended for**

Denna kurs, som är ny, vänder sig till doktorander och andra personer som är intresserade av en systematisk syn på informationssamhällets kännetecken.

#### **The course was last given:**

New course

#### **Goals**

Utvecklingen av informationssamhället har vid sekelskiftet nått en sådan mognad och stabilitet att det är meningsfullt att söka diskutera några av de övergripande mönster som kan vara giltiga för kontakter inom detta samhälles ekonomiska, sociala och kulturella verksamheter. Hur ser de mönster ut som är kännetecknande för olika kommunicerande verksamheter inom detta samhälle? Finns ramar för verksamheter, finns strukturella regler som är tydliga? Bland kännetecken finns t ex ökad snabbhet i många sammanhang. Finns villkor för denna snabbhet?

I denna kurs diskuteras och analyseras strukturella kännetecken som på makronivå gäller för detta kunskaps- och nätverkssamhälle. De tekniska system som numera kommer i bruk berör ett stort antal kontaktformer, med konsekvenser för ekonomi, kommunikation, rätt, kultur m m. Med en ökad tillgänglighet för kunskap om dessa former kan sannolikt ett stabilare och mer uthålligt samhälle byggas. Kan övergripande kännetecken definieras för kontakter inom detta samhälle?

*Avsikten med kursen är inte att allmänt diskutera en utveckling som pågår, utan att söka definiera egenskaper för viktiga funktioner inom informationssamhället, samt en yttre rand för dessa. Med hjälp av detta eftersträvas en vidgad skärpa för analys och kritik av den pågående samhällsförändringen.*

#### **Prerequisites**

Inga särskilda krav ställs för deltagande i kursen.

#### **Organization**

Kursen omfattar 6 heldagar under våren 2000. Verksamheten planeras äga rum i Belöningen (hus B, 1tr), från kl 10.15 till kl 17.15 med avbrott för raster. Dessa dagar kommer att vara förlagda under mars- juni år 2000.

Vid varje tillfälle enligt ovan medverkar gäster från LiU och utifrån. Från och med det andra tillfället ska kursdeltagare bidra med redovisningar över inläst litteratur samt skriftliga sammanställningar.

#### **Contents**

Bland områden som identifierats som intressanta för denna kurs, befinner sig:

- Olika sätt att beskriva informationssamhällets historiska utveckling
- En systematisk syn på tekniska nätförutsättningar
- Nya rättsliga förutsättningar

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

- Ekonomiska förutsättningar och nya former
- Vidgade kulturella förutsättningar
- Politiska förutsättningar

Finns gemensamma strukturer, finns i någon mening generella egenskaper som kännetecknar den aktuella utvecklingen inom olika områden som de ovan nämnda? Man kan t ex, funktionellt sett, utgå från de ökade möjligheterna att distribuera, de allt färre gränserna och (som nämnts) den ökade snabbheten m m. Vilka effekter får användning av egenskaper som dessa? Blir det kommande samhället mer uthålligt, blir det mer öppet och lättillgängligt? Inleds en sådan utveckling av sig själv, eller krävs åtgärder?

#### Literature

Preliminär lista av skrifter, av vilka en del endast kommer att studeras till utvalda delar.  
Barber, B A place for commerce or a place for us? Princeton, 1999  
Becker, T& Slaton, C The future of teledemocracy, Univ of Auburn, Spring, 2000  
Carlén, T Nätjuridik, Lag och rätt på Internet, Norstedts 98  
Castells, M Information Age, The rise of the Network Society, part I-III, 1996-98  
Dutton, B Society on the line, Oxford Univ Press, 1999  
Edmar, M Juridiska villkor på nätet (titel ej komplett), 1999  
Gates, B The road ahead, Viking, UK, 1997  
Hiltz, SR & Turoff, M The Network Nation, Human communications via computers, 1978  
INRIA/EU Measuring information society, Bryssel, 1999  
IT Kommissionen Informationsteknologin Vingar åt människans förmåga, SOU 1994:118  
Jerkert, B Att rösta med händerna, Demokratiutredningen, SOU 1998:85  
Keskinen, A Towards user empowerment, Univ of Tampere, 1999  
Montin, S Lokala demokratiexperiment, Demokratiutredningen SOU 1998:155  
Ohlin, T Samhällsdialogen, KFB, 1998  
Olsson, A R Elektronisk demokrati, Demokratiutredningen, SOU 1999:12  
Toffler, A The third wave, 1979  
Tsagarousiano, R et al Cyberdemocracy, Cities and civic networks, 1998  
Härförutom kommer utdrag ur ett antal offentliga betänkanden att återopas.

#### Teachers

Tomas Ohlin.

Förutom den kursansvarige beräknas följande personer kunna medverka:

Fil dr Auli Keskinen (Helsingfors) Det uthålliga informationssamhället

Jur kand Per Furberg (Göteborg) De nya rättsliga förutsättningarna

Historikern Lars Ilshammar (Örebro) Olika historiska perspektiv

Fil dr Frans Lettenström (Academic Press, Barcelona) Ekonomiska villkor för kunskapsjänster på nätet

Kanslichef (Kulturnät Sverige) Cissi Billgren Nya kulturella villkor

Journalistikforskaren Anders R Olsson Elektronisk demokrati

#### Examiner

Tomas Ohlin.

#### Schedule

Mars-juni 2000. 6 heldagar.

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

#### **Examination**

Varje elev ska författa en rapport inom ett av ovanstående områden, samt opponera på en annan. En avsikt är att de inlämnade rapporterna tillsammans ska komma att visa på sådan kvalitet att sammanställningen kan publiceras.

#### **Credit**

5 poäng.

Frånvaro medges med högst 6 timmar (en dag) per deltagare för att få poäng.



## **Graduate Courses in Information Systems and Management**

### **Knowledge management och elektroniska tjänster**

#### **Recommended for**

Doktorander.

#### **The course was last given:**

Ny kurs.

#### **Goals**

Kursens grundidé är att utifrån aktuella trender (intresset för knowledge management och för electronic commerce) diskutera begreppens innehåll och rötter, strategisk vikt, affärspåverkan, aktuella tillämpningar och kommersiella möjligheter och att utifrån fallstudier och deltagarnas egna erfarenheter följa kedjan från vision till genomförande. Särskild vikt läggs vid processen att omsätta strategi i handling.

#### **Prerequisites**

Inga formella.

#### **Organization**

Eftersom ett delsyfte med kursen är att skapa och stärka relationer mellan deltagarna i nätverket är mötet mellan deltagarna ett viktigt inslag. Kursen bedrivs därför i koncentrerad internatform.

Kursdeltagarna samlas till två veckointernat med ca sex veckors tid emellan. Inför respektive vecka har deltagarna läst viss gemensam litteratur, gjort egna fördjupningar utifrån föreslagen litteraturlista samt sökt kompletterande litteratur och gjort vissa egna fördjupningsstudier.

Internaten ägnas åt seminarier, falldiskussioner, workshops, arbete i mindre grupper samt företagsspel. I tiden mellan de två intensivveckorna skriver deltagarna artiklar (helst två och två). Presentation och diskussion av dessa artiklar kommer därför att vara ett inslag den andra internatveckan.

#### **Contents**

Kursen kommer att behandla kunskapshantering och elektronisk affärskommunikation från individ-, grupp-, företags-, nätverks- och marknadsperspektiv.

Kursen har såväl en företagsekonomisk grund som en tydlig koppling till informationsteknologisk forskning och tillämpning. Bland de teknikbaserade inflassvinklarna finns naturligtvis utvecklingen inom web-teknologi, men även lärdomar från forskning inom artificiell intelligens och expertsystem, Intelligent sökning, data mining och utvärdering, samt Integrerade affärssystem, e-handelslösningar och virtuella nätverk.

#### **Literature**

Förslag till litteraturlista

Alavi, Maryam (1997) KPMG Peat Marwick U.S.: One Giant Brain, Harvard Business School 9-397-108

Argyris, Chris (1993) Knowledge for action: a guide to overcoming barriers to organizational change, Jossey-Bass

Austin, Robert D. och Mark Cottleer (1997) Ford Motor Company: Maximizing the Business Value of Web Technologies, Harvard Business School 9-198-006

Austin, Robert D. och Mark Cottleer (1997) Network Computing at Sun Microsystems: A Strategic Deployment, Harvard Business School 9-198-007

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

- Belbin, R. Meredith (1981) *Management Teams: Why They Succeed or Fail*, Butterworth-Heinemann
- Brooking, Annie och Philip Harris (1997) *Knowledge Management in Engineering Organisations*, i *Leveraging Knowledge for Business Performance*, Wits Business School.
- Brown, John Seely och Paul Duguid (1998) *Organizing knowledge*, California Management Review; Berkeley; Spring 1998
- Davenport, Thomas H. (1997) *Information Ecology: Mastering the Information and Knowledge Environment*, Oxford University Press
- Davenport, Thomas H. och Laurence Prusak, (1998) *Working knowledge: how organizations manage what they know*, Harvard Business School
- Earl, Michael och Ian Scott (1998) *What on earth is a CKO?*, London Business School
- Edvinsson, Leif och Patrick Sullivan (1996) *Developing a model for managing intellectual capital*, European Management Journal, Aug 1996.
- Hedberg, Bo, Dahlgren, G., Hansson, J. & Olve, N.-G. (1994) *Imaginära organisationer*, Liber-Hermos.
- Hjertzén, Emanuel & Johan Toll (1999) *Measuring knowledge management at Cap Gemini AB*, Linköpings universitet, LiTH IDA-EX-99/19
- Kogut, Bruce och Udo Zander (1996) *What firms do? Coordination, Identity, and Learning*, Organization Science, Vol 7, No. 5, pp. 502-518.
- Langefors, Börje (1993) *Essays on Infology*, Gothenburg Studies in Information Systems.
- Leonard-Barton, Dorothy, *Wellsprings of knowledge : building and sustaining the sources of innovation*, Harvard Business School Press
- Nonaka, Ikujiro och Hirotaka Takeuchi (1995) *The knowledge-creating company: how Japanese companies create the dynamics of innovation*, Oxford University Press.
- Olve, Nils-Göran, Roy, J. & Wetter, M. (1997) *Balanced scorecard i svensk praktik*, Liber
- Orlikowski, Wanda J. och J. Debra Hofman, (1997) *An Improvisational Model of Change Management: The Case of Groupware Technologies*, Sloan Management Review, Winter 1997.
- Polanyi, Michael (1958, 1962) *Personal knowledge*, Routledge
- Ruggles, Rudy (1998) *The state of the notion: Knowledge management in practice*, California Management Review; Berkeley; Spring 1998; 40:3, pp. 80-89
- Shapiro, Carl & Hal Varian (1999) *Information rules*
- Skyrme, David, (1997) *Knowledge Management: Oxymoron Or Dynamic Duo*, Managing Information, September 1997 (4:7)
- Stjernberg, Torbjörn (1993) *Organisationsideal - livskraft och spridning*, Norstedts
- Zander, Udo och Bruce Kogut (1995) *Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test*, Organizational Science, Vol. 5, No. 1, pp. 76-92.

Kursen kan sedan utvidgas med arbete kring t.ex. något av följande ämnen

1. Relation Management (RM),
2. Flexibel Process Management(FPM),
3. Value Chains and Value Constellations (VC),
4. Sourcing Management (SM),
5. Demand Pull (DP).
6. Agent Perspectives, baserat på Jonas Edlund SISU, 1999:01
7. Neutrala marknadsplatser för Elektroniska affärer, baserat på
8. VKC-konceptet (Virtuellt Kompetens Centrum)
9. Elektroniska affärssystem där småföretagare deltar på lika villkor.



## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

- 10. Vilka konsekvenser har affärsprocessens automatisering för bl a
- 11. Kvalitetsarbetet.
- 12 Kostnadsanalyser av elektroniska tjänster

#### Teachers

Birger Rapp, Nils Göran Olve, Tomas Ohlin, Alf Westelius

#### Examiner

Birger Rapp

#### Schedule

April-augusti 2000, 8 heldagar.

#### Examination

Tentamen, inlämningsuppgifter.

#### Credit

Grundläggande kurs (3 poäng) med möjlighet att bygga ut till 5 poäng.



## **Graduate Courses in Information Systems and Management**

### **Kunskapsprojektering och vetenskapsteori**

#### **Lectures:**

32 h

#### **Recommended for**

Kursen vänder sig till forskarstuderande inom informationssystemutveckling samt andra med intresse för forskningsplanering, kunskapsteori och forskningsmetodik.

#### **The course was last given:**

VT 1999

#### **Goals**

Kursen skall ge kunskaper och färdigheter avseende planering av forskningsarbete (kunskapsprojektering) samt förståelse för dess kunskapsteoretiska grunder. Kursen skall också ge introduktion till vetenskapsteoretiska begrepp och synsätt, för att ge förbättrade förutsättningar att bedriva egen forskning.

#### **Prerequisites**

Inga särskilda förkunskapskrav.

#### **Organization**

Kursen består av två delkurser; kunskapsprojektering och vetenskapsteori. För kunskapsprojekteringen gäller en obligatorisk del och en frivillig fördjupningsdel. Den obligatoriska delen innebär utförande av kunskapsprojektering för en forskningsuppgift. Den frivilliga delen kan genomföras som exempelvis en mindre empirisk studie.

#### **Contents**

Kursen fokuserar forskningsarbete som kunskapsutveckling och särskilt problemställningar inom samhällsvetenskaplig kunskapsbildning. Väsentligt moment i kursen är inläring och tillämpning av en metod för strukturerad och reflekterad forskningsplanering (kunskapsprojektering). Här ingår:

- Behov av och innebörd av kunskapsprojektering
- Kunskapsprojektering som forskningsplaneringsprocess
- Kunskapsteoretiska grunder för kunskapsprojektering
- Metodik/arbetsfaser i kunskapsprojektering
- Hantering av forskningsfrågor, perspektivanalys
- Kunskapskaraktärisering (analys av olika kunskapsformer)
- Val av forskningsstrategi och forskningsmetoder
- Olika typer av undersökningar (klassificering, strategier, tillförlitlighet)
- Olika undersökningsmetoder (främst intervju, observation, källanalyser)

Kursen behandlar även vetenskapsteori, där följande ingår:

- Vetenskap som process (forskning) och som produkt (kunskap)

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

- Viktiga kunskapsteoretiska begrepp; paradigm, teori, lag, hypotes, empiri
- Olika kunskapsformer: förklaringar (kausala, funktionalistiska, intentionalistiska), kategoriell kunskap (definitioner, klassificeringar), normativ kunskap, kritisk kunskap
- Samspel teori - empiri (hypotesprövning ex ante - ex post; induktion - deduktion)
- Vetenskapliga skolbildningar; historisk utveckling
- Vetenskaplig kunskapsutveckling (evolution vs revolution)
- Rationalitet och argumentation; argumentationsteori
- Vetenskapliga kriterier; inomvetenskapliga kriterier vs samhällelig relevans
- Forskarroller; forskningsetik

#### Literature

Föllesdal, Wallöe, Elster: Argumentationsteori, språk och vetenskapsfilosofi, Thales  
Gilje N, Grimen H: Samhällsvetenskaplig förutsättningar, Daidalos  
Repstad: Närhet och distans, Studentlitteratur  
Goldkuhl: Kunskapande, kompendium  
Ytterligare artiklar i samhällsvetenskaplig metodik

#### Teachers

Göran Goldkuhl, Karin Axelsson

#### Examiner

Göran Goldkuhl, Karin Axelsson

#### Schedule

Mars-juni 2000

#### Examination

Utförande av arbetsuppgift som dokumenteras i skriftlig rapport. Arbetsuppgiften bör i första hand bestå av utförande av en kunskapsprojektering med egen vald inriktning (obligatoriskt moment). Arbetsuppgiften kan fortsättas med genomförande av en mindre empirisk undersökning. Resultat från denna undersökning ska dokumenteras tillsammans med särskild analys av forskningsmetodik och kunskapskaraktärisering (frivillig fördjupning). Deltagande på seminarier. Den vetenskapsteoretiska delen av kursen examineras genom en uppgift i vetenskapsteoretisk analys som dokumenteras i skriftlig rapport.

#### Credit

3 poäng (obligatorisk del) + 4 poäng (vetenskapsteori).

## **Graduate Courses in Information Systems and Management**

### **Systemstrukturering som strategisk design**

#### **Lectures:**

24 h

#### **Recommended for**

Kursen ges av ämnesområdet informationssystemutveckling. Den vänder sig till personer med intresse för teorier om informationssystemarkitektur och systemstrukturering.

#### **The course was last given:**

Ny kurs

#### **Goals**

Kursen skall ge kunskap om informationssystemarkitekturer och systemstrukturering. Kursen skall ge kunskap om olika tillvägagångssätt, metoder och strategier vid systemstrukturering. Målet med kursen är också att visa hur en viss informationssystemarkitektur påverkar verksamheten. Kursen har ett tydligt verksamhetsperspektiv, vilket innebär att den inte i första hand fokuserar tekniska aspekter inom informationssystemarkitekturområdet.

#### **Prerequisites**

Inga särskilda förkunskapskrav.

#### **Organization**

Kursen består av ett antal föreläsningar samt diskussions- och examinationsseminarier.

#### **Contents**

- Systemstrukturering; teoretiska grunder samt praktiska exempel
- Strategisk IS-planering (SISP)
- Arkitekturstrategier; Information Resource Management (IRM), Verksamhetsbaserad systemstrukturering (VBS), Process-, Aktivitets- och komponentbaserad Systemstrukturering (PAKS)
- Relationer mellan verksamhet, information och teknik
- Teknikutvecklingens betydelse för IS-arkitekturområdet
- Olika systemlösningars påverkan på IS-arkitekturen; t ex web-system, Enterprise Resource Planning (ERP), standardsystem vs. egenutvecklade system
- Metoder för systemstrukturering
- Inter-organisatoriska informationssystemarkitekturer

#### **Literature**

Axelsson & Goldkuhl (1998), Strukturering av informationssystem - arkitekturstrategier i teori och praktik, Studentlitteratur, Lund. Artikelkompendium.

#### **Teachers**

Karin Axelsson, ev gästföreläsare

#### **Examiner**

Karin Axelsson

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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**Graduate Courses in Information Systems and Management****Schedule**

Oktober-december 2000

**Examination**

Inlämningsuppgift som examineras på seminarium.

**Credit**

3 poäng.

## **Graduate Courses in Information Systems and Management**

### **Verksamhetsdiagnos**

#### **Lectures:**

Ca 30 h

#### **Recommended for**

Kursen ges av ämnesområdet informationssystemutveckling. Kursen vänder sig i första hand till doktorander i informationssystemutveckling men även till andra intresserade av verksamhetsbegreppet, produktbegreppet och verksamhetsdiagnos.

#### **The course was last given:**

Hösten 1998 i samarbete mellan IDA och IHH/Jönköping

#### **Goals**

Kursen syftar till att öka den generiska förståelsen av verksamheter; dess nyttjande av kunskap och andra förutsättningar samt dess handlande och produktion av resultat (varor och/eller tjänster) riktat mot klienter. Kursen syftar också till att öka förståelse och färdigheter avseende teori- och metoddreven verksamhetsdiagnos, särskilt verksamhetsdefiniering.

#### **Prerequisites**

Kursen bygger på kunskaper i förändringsanalys enligt SIMMetoden. För kursens genomförande är det ett krav att deltagarna har tillgång till en organisation att studera; att genomföra verksamhetsdefiniering och verksamhetsdiagnos på. Kursen anknyter också till den tidigare givna kursen Kunskap och handling.

#### **Organization**

Föreläsningar, seminarier samt utförande av empiriskt arbete/tillämpningsuppgift på extern organisation.

#### **Contents**

Kursen behandlar teori för verksamheter (praktiker) och dess utnyttjande av kunskaper och handlande samt teori för produkter (varor/tjänster). Kursen behandlar hur dessa teorier kan användas för verksamhetsdefiniering och verksamhetsdiagnos. Kursen har teorihöjd, men innehåller till väsentlig del tillämpning av teori- och metodkunskaper på en extern organisation. Kursen behandlar följande delar:

- Pragmatisk kunskapsteori
- Tyst kunskap, rekonstruktion och artikulering av tyst kunskap
- Samspel kunskap - handling
- Reflektion och handling
- Professioner, tysta kunskaper och kompetent handlande - yrkeskunnande
- Verksamhetsbegreppet/praktikbegreppet
- Produktbegreppet; varor vs tjänster
- Praktikteori - praktikgeneriska modellen
- Praktikinriktad produktteori
- Verksamhetsdefiniering

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Information Systems and Management

- Teori- och metoddreven verksamhetsdiagnos - vidareutveckling av förändringsanalys
- Tillämpning av verksamhetsanalys, problemanalys, styrkeanalys och målanalys i en teori-driven verksamhetsdiagnos

#### Literature

G Goldkuhl: Handlingars vad, vem och var - ett praktikteoretiskt bidrag, rapport IDA.

G Goldkuhl & A Röstlinger: Praktikbegreppet: En praktikgenerisk modell som grund för teori-utveckling och verksamhetsutveckling, rapport CMTO.

A Röstlinger & G Goldkuhl: Produktbegreppet: En praktikteoretisk innebördsbestämning, rapport CMTO.

G Goldkuhl & A Röstlinger: Expanding the scope: from language/action to generic practice, Proceedings LAP'99.

Lind M, Goldkuhl G: Reconstruction of different business processes - a theory and method driven analysis, Proceedings LAP'97.

Kursivlitteratur:

G Goldkuhl, A Röstlinger: Förändringsanalys - Arbetsmetodik och förhållningssätt för goda förändringsbeslut, Studentlitteratur, 1988.

B Rolf: Profession, tradition och tyst kunskap, Nya Doxa.

Ytterligare rapporter kan tillkomma.

#### Teachers

Göran Goldkuhl.

#### Examiner

Göran Goldkuhl.

#### Schedule

Hösten 2000.

#### Examination

Skrivande av rapport som baseras på utförd tillämpning (verksamhetsdiagnos) på extern organisation. Seminariebehandling av skrivna rapporter.

#### Credit

Ca 5 poäng



## **Graduate Courses in Software and Systems**

### **Advanced Compiler Construction**

#### **Lectures:**

Ca 27 h

#### **Recommended for**

Ph.D. students or practitioners in computer science or systems engineering.

#### **The course was last given:**

Vårterminen 1997.

#### **Goals**

Give Ph.D. students or practitioners knowledge about advanced compiler optimization techniques, as well as compiler generation tools for semantics and code generators.

#### **Prerequisites**

Basic course in compiler construction, corresponding to the undergraduate courses Compilers and Interpreters TDDA 28, or Compiler Construction TDDA 37.

#### **Organization**

Lectures and programming exercises.

The part of the course that builds on Bob Morgan's book will be given by Bob Morgan himself as a 2 week intensive course during the middle of March, 2000.

#### **Contents**

Compiler generators. Generating semantics modules from Natural Semantics using RML. Automatically generating code generators. The BEG code generator generator. Control flow and data flow analysis. Code scheduling. Register allocation. Interprocedural optimization. Memory hierarchy optimization, etc...

#### **Literature**

Bob Morgan: Building an Optimizing Compiler. Digital Press, 1998. (required book. need to be bought)

Two chapters: Stephen Muchnick: Advanced Compiler Design and Implementation. Kaufmann publishers, 1997. (will be handed out. Only people who will work with compilers in the future should be this book, which is like an encyclopedia)

Peter Fritzson: Generating language implementations from Natural Semantics using RML. (Book draft, 1998) (handed out)

Niclas Andersson, Peter Fritzson: Overview and Industrial Application of Code Generator Generators. Journal of Systems and Software, 1995. (handed out)

#### **Teachers**

Bob Morgan.

#### **Examiner**

Peter Fritzson.

#### **Schedule**

Intensive course, Feb 28, 29, March 1, 6-17.

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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**Graduate Courses in Software and Systems****Examination**

Exercises;

Written examination if needed.

**Credit**

6 credits

**Comments**

ECSEL Graduate Course

## **Graduate Courses in Software and Systems**

### **Calculi of Concurrency**

#### **Lectures:**

18 h

#### **Recommended for**

IDA and ECSEL students with basic background in discrete math.

#### **The course was last given:**

New course.

#### **Goals**

The aim of the course is to study basic principles of concurrent and communicating systems with focus on CCS (Calculus of Communicating Systems). We also discuss various techniques (e.g. bisimulation, model checking) for specifying and verifying properties of concurrent systems. Primitives notions for the modeling of mobile processes (embodied in the pi-calculus) are also surveyed.

#### **Prerequisites**

Selected Notions in the Theory of Computing.

#### **Organization**

The course will have a form of lectures, and exercises using available tools (e.g. the Concurrency workbench).

#### **Contents**

Modeling of concurrent communicating systems and automatic verification of the models. Reactive sequential processes. Concurrent communicating systems. Calculus of Communicating Systems (CCS). Observational equivalence. Model checking with the mu-calculus. An introduction to the pi-calculus. Concurrency Research : a Perspective.

#### **Literature**

R. Milner. Communicating and Mobile Systems: the Pi-Calculus. Cambridge University Press, May 1999.

In addition, the following material will be used in the course:

R. Cleaveland and S. Sims. The Concurrency Workbench of North Carolina: User's Manual, version 1.11, 1998.

Additional articles (to be distributed).

#### **Teachers**

Jan Maluszynski, Ulf Nilsson.

#### **Examiner**

Jan Maluszynski/ Ulf Nilsson.

#### **Schedule**

Spring 2000. (Tuesdays 10-12 starting 4 April.)

#### **Examination**

Two batches of homework and participation in the presentation of the solutions.

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Software and Systems

**Credit**

4 credits.

**Comments**

Advanced ECSEL Course.

For latest information see: <http://www.ida.liu.se/~ulfni/conc/>

## **Graduate Courses in Software and Systems**

### **Complexity Theory**

#### **Lectures:**

12 h

#### **Recommended for**

Graduate students.

#### **The course was last given:**

Spring 1998

#### **Goals**

The systematic study of computability and complexity theory has developed into one of the central and most active research areas of theoretical computer science. The aim of this course is to present the most significant results of this research.

#### **Prerequisites**

It is recommended that students of this course have some prior knowledge of formal languages, automata theory, design and analysis of algorithms, and discrete mathematics.

#### **Contents**

The course covers computability theory, complexity classes, the classes P and NP, complexity of optimization problems, beyond NP, space-complexity classes, probabilistic algorithms and complexity classes, interactive proof systems, models of parallel computers and parallel algorithms.

#### **Literature**

Bovet, D.P., Crescenzi, P.: Introduction to the Theory of Complexity. First edition.  
For the computability part of the course, it is recommended to have access to Hopcroft, J.E., Ullman, J.D.: Introduction to Automata Theory, Languages, and Computation.

#### **Teachers**

Peter Jonsson.

#### **Examiner**

Peter Jonsson.

#### **Schedule**

March- May 2000.

#### **Examination**

Students are assessed by three sets of homework assignments. Each set gives a total of 12 points; to pass the course, a student should have at least 8 points from each set.

#### **Credit**

3 credits

#### **Comments**

The course will be given in Swedish. Examination can, on request, be given in English.



## **Graduate Courses in Software and Systems**

### **Component Software**

#### **Lectures:**

30 h

#### **Recommended for**

Recommended for Computer Science and Systems graduate students.

#### **The course was last given:**

New course.

#### **Goals**

The purpose of this course is to give students insight in recent research of and development on component-based software development. It is important to understand the problems in this area as component-based technology is a promising cost-saver for industry, which is now emerging in various tools such as DCOM (Distributed Component Object Model), CORBA (Common Object Request Broker Architecture), and EJB (Enterprise Java Beans).

#### **Prerequisites**

Knowledge in a couple of the following fields are useful for this course:

- Object-oriented analysis and design or programming
- Distributed systems
- Software Engineering
- Design patterns
- Software Architecture

#### **Organization**

Discussion-oriented seminars will be held, in which parts of the material is highlighted and discussed. An additional point may be gained by writing a report on a particular topic within component-based software engineering (e.g., real-time components).

#### **Contents**

- Motivation for components
  - introduction covering experience from software development
  - market vs. technology
  - standards
- Foundation
  - definition of a component
  - important issues: components, interface and re-entrance
  - polymorphism: friend or foe 8-)
  - objects vs. class composition (or how to avoid inheritance)
  - scale and granularity of components
  - architecture (patterns and frameworks)
  - programming (shades of gray)
- State of the art
  - wiring standards (how to connect components)

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Software and Systems

- approaches: 1) OMG: CORBA and OMA 2) Microsoft: DCOM, OLE and ActiveX 3) Sun: Java and JavaBeans
- comparison of approaches
- standards
- open problems
  - The future
- component architecture
- component frameworks
- component development
- component distribution and acquisition
- component assembly
- on the horizon

#### Literature

Text book: Component Software (Beyond Object-Oriented Programming) by Clemens Szyperski. Articles.

#### Teachers

Sten F. Andler, Jonas Mellin

#### Examiner

Sten F. Andler

#### Schedule

January-April 2000.

#### Examination

Active participation during seminars, presentation of material, home exam.

#### Credit

3 (+1) credits



## **Graduate Courses in Software and Systems**

### **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:**

Fall 1991.

#### **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**

Lars Viklund.

#### **Examiner**

Peter Fritzson

#### **Schedule**

May 2000, 4 days.

## GRADUATE COURSES, SPRING AND FALL 2000

### Graduate Courses in Software and Systems

**Examination**

Written examination that covers contents of lectures.

**Credit**

3 + 1 credits for optional projects.

**Comments**

Advanced ECSEL Graduate Course

## **Graduate Courses in Software and Systems**

### **Parallel Programming and Compilation Techniques (TDDB78)**

#### **Lectures:**

30 h

#### **Recommended for**

Generally available for ECSEL-students with any background.

#### **The course was last given:**

Spring 1999

#### **Goals**

To give knowledge how to design and implement parallel programs on several architectures.

#### **Prerequisites**

Some programming experience in C or C++.

#### **Organization**

Lectures and programming exercises.

#### **Contents**

Parallel execution models, languages, etc. For example: definition of parallel computing, measures of performance, parallel processors, shared-memory parallel programming, distributed-memory parallel programming, object-oriented parallel programming, data parallel programming, functional dataflow programming, scheduling parallel programs, loop scheduling, parallelizing serial programs, parallel programming support environments. Practical programming exercises on a parallel machine.

#### **Literature**

Ian T. Foster: Designing and Building Parallel Programs, Addison-Wesley.

#### **Teachers**

Peter Fritzon.

#### **Examiner**

Peter Fritzon.

#### **Schedule**

March-May 2000.

#### **Examination**

Written examination.

#### **Credit**

4 credits



## **Graduate Courses in Software and Systems**

### **System synthesis of digital systems**

#### **Lectures:**

24 h

#### **Recommended for**

Computer science and engineering students as well as students working in digital electronics design.

#### **The course was last given:**

A graduate course with similar topic has been given in 1997.

#### **Goals**

Gives the basic knowledge about modern design methods for digital systems containing both hardware and system components.

#### **Prerequisites**

Basic knowledge in computer architecture and hardware description languages (e.g., VHDL).

#### **Organization**

There will be lectures given by teachers and case studies carried out by the students.

#### **Contents**

- Introduction and motivation.
- VHDL basics.
- High-level synthesis (scheduling, allocation and binding, controller synthesis).
- System-level synthesis (component allocation, partitioning, communication synthesis, hardware/software co-design).
- Optimization heuristics for synthesis.
- Transformational approach to synthesis (design representation, basic transformations, pipelining, transformation selection).
- Synthesis of advanced features (subprograms, concurrent processes).
- Hardware/Software partitioning.
- High-level test synthesis (introduction, testability analysis, testability improvement transformations).
- High-level low power synthesis (estimation, power optimization transformations)
- New developments in system synthesis.

#### **Literature**

P. Eles, K. Kuchcinski and Z. Peng "System Synthesis with VHDL" published by Kluwer Academic Publisher, December 1997.

#### **Teachers**

Zebo Peng, Petru Eles.

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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**Graduate Courses in Software and Systems****Examiner**

Petru Eles.

**Schedule**

March-June 2000.

**Examination**

Term paper on a selected topic.

**Credit**

3 credits

**Comments**

ECSEL Graduate Course

## **Graduate Courses in Software and Systems**

### **Programming 3D Graphics and Virtual Reality**

#### **Lectures:**

20 h

#### **Recommended for**

This course is recommended for ECSEL and other graduate students and master students in computer science or systems engineering.

Course includes both introductory and research frontier issues.

#### **The course was last given:**

Fall 1998

#### **Goals**

The goal of the course is to give the participants knowledge about effective techniques for programming 3D graphics, animation and virtual reality applications.

#### **Prerequisites**

Basic programming knowledge.

#### **Organization**

Lectures and programming labs with practical programming exercises. Optional presentation by course members.

#### **Contents**

Virtual reality and Virtual environments. VR systems. 3D graphics. Geometric modeling and transformations. Hierarchical structured graphics objects. Parametric surface techniques. Rendering and texture. Interaction with 3D objects. 3D graphics standards such as OpenGL. Animation. Virtual reality and modeling. Physical simulation Cooperative work within virtual reality environments. Designing virtual environments. Current hardware architectures for 3D and animation.

#### **Literature**

Main book John Vince: Virtual Reality Systems. ACM Press, 1995. ISBN 0-201-87687-6. This book is needed for exam. It is partially covered by Introduction to 3D CG & VR (Peter Fritzson's presentation).

OpenGL Programming Guide, (Second Edition is recommended). Version 1.1, Addison-Wesley, 1997. ISBN 0-201-46138-2. This book is recommended for using OpenGL exercises, however you can find reference information on the WWW. Emphasis: page 1-210, 251-275, overview: 213-248, 277-528. Note that difference from the First Edition is mainly GLUT library (interface between OpenGL and window system)

Article: Olof Hagsand: Interactive Multiuser VEs in the DIVE system. IEEE MultiMedia, 1996. Will be distributed on the lecture.

#### **Teachers**

Peter Fritzson and invited speakers.

Assistant Vadim Engelson, IDA/PELAB, vaden@ida.liu.se

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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## **Graduate Courses in Software and Systems**

### **Examiner**

Peter Fritzson

### **Schedule**

Fall 2000.

### **Examination**

Written examination and mandatory programming exercises. Obligatory programming exercises.

### **Credit**

3 credits plus 1 extra credit for presentation or miniproject.

### **Comments**

ECSEL Graduate Course



## **Graduate Courses in Software and Systems**

### **Safety-Critical Computer Systems**

#### **Lectures:**

12 h

#### **Recommended for**

Recommended for Graduate students with interest in systems engineering.

#### **The course was last given:**

New course.

#### **Goals**

To get an overview of system development process for computer systems which have the potential to cause harm to people or the environment. To study specific techniques for safety and reliability analysis and understand their interrelationships. To get some orientation on the current international standards for system safety and software in safety-critical systems.

#### **Prerequisites**

Basic knowledge in software engineering, control engineering or human computer interaction, basic knowledge in logic and statistics.

#### **Organization**

One lecture a week followed by a period of self study leading to presentation of a case study at a final seminar.

#### **Contents**

Development process for safety-critical systems, Risk management, Reliability analysis, Fault tolerance, Safety and functional analysis, Modelling and verification, The role of standards and authorities.

#### **Literature**

Neil Storey, Safety-Critical Computer Systems, Addison Wesley, 1996. Nancy Leveson, Safeware, system safety and computers, Addison Wesley, 1995. Material from Risk Forum and other web sources on computer systems failures.

#### **Teachers**

Simin Nadjm-Tehrani and invited lectures from industry.

#### **Examiner**

Simin Nadjm-Tehrani.

#### **Schedule**

Fall 2000.

#### **Examination**

Preparation of written questions for discussion based on the chapters studied before each lecture. The detailed study of one real-life case and the presentation of the sources of failure.

#### **Credit**

4 credits



## **Graduate Courses in Software and Systems**

### **Testing of Digital Systems**

#### **Lectures:**

20 h

#### **Recommended for**

Recommended for: IDA Ph.D. students in computer science and computer systems. ECSEL students.

#### **The course was last given:**

New course.

#### **Goals**

To study the basic principles and practice of test technology and design-for-test methods for digital systems. To address also issues related to the integration of test consideration with system synthesis and to system-on-chip testing.

#### **Prerequisites**

Basic knowledge of computer organization and digital hardware.

#### **Organization**

Mainly lectures given by the teachers, which will be supplemented by seminars prepared by the participants.

#### **Contents**

- Introduction.
- Fault modeling and simulation.
- Automatic test pattern generation.
- Basic principles of design for testability.
- Testability analysis.
- Testability enhancement techniques.
- Test synthesis.
- Testability issues in hardware/software systems.
- Test issues related to system-on-chip.
- On-line testing and self-checking design.
- Built-in self-test and special BIST architectures.

#### **Literature**

M. Abramovici, M. A. Breuer, and A. D. Friedman, "Digital Systems Testing and Testable Design," Computer Science Press, 1990, ISBN 0-7803-1062-4

Lecture notes

Selected papers

#### **Teachers**

Zebo Peng and Petru Eles.

<b>GRADUATE COURSES, SPRING AND FALL 2000</b>
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**Graduate Courses in Software and Systems****Examiner**

Zebo Peng .

**Schedule**

Oct-Dec 2000.

**Examination**

Term paper and seminar presentation.

**Credit**

4 credits

## **GRADUATE COURSE PROGRAMS 2000 at ECSEL, HMI, IMIE**

Below you will find references to the courses which will be given during the academic year 2000 by 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](mailto:alz@nada.kth.se)

Linköping: Director of graduate studies: Lena Strömbäck (on leave). Acting director of graduate studies: Sture Hägglund, [stuha@ida.liu.se](mailto:stuha@ida.liu.se)

<http://www.ida.liu.se/hmi/>

#### **Courses Spring 2000**

HMI604 Human-Computer Interaction.

HMI 607 Intelligent Decision - Intelligent Support.

HMI621 Speech Technology.

#### **Courses Fall 2000**

HMI 622 Natural Language Interfaces.

### **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](mailto:perbr@eki.liu.se), phone 013/281488.

Administrator Lena Sjöholm, [lensj@eki.liu.se](mailto: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](mailto:nsh@ida.liu.se), phone 013/ 28 20 66.

Administrator Kristin Wiberg, [kristin@isy.liu.se](mailto:kristin@isy.liu.se), phone 013/28 57 15.

<http://vir.liu.se/ecsel>



## RECOMMENDED MASTER COURSES

### C3-C4-courses

TDDA12	System Development
TDDA14	AI Programming
TDDA16	Representation of Knowledge in AI
TDDA32	Design and Analysis of Algorithms
TDDA41	Logic Programming
TDDA43	Programming Theory
TDDB02	Software Quality
TDDB06	Advanced Programming and Interactivity on the WWW
TDDB13	Human-Computer Interaction
TDDB34	Object-Oriented System Development
TDDB37	Distributed Systems
TDDB38	Database Technology
TDDB44	Compiler Construction
TDDB55	Medieinformatik
TDDB61	Methodology of Program Development and Programming Development Project
TDDB63	Process och programmering
TDDB66	Expert Systems-Methods and Tools
TDTS41	Computer Networks
TDTS51	Advanced Computer Architecture
TGTU55	Forskning LiTH

### 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.lith.liu.se/en>





## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM

### Database and Information Techniques



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

Engineering databases, complex product models.



**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.



**Nahid Shahmehri**, Ph. D., Linköping 1991. Professor of computer science. Group leader, IISLAB and EDSLAB. 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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM

### Artificial Intelligence and Integrated Computer Systems



**Patrick Doherty**, Ph. D., Linköping 1991. Professor of computer science. Group leader, KPLAB. Head of the Division for Artificial Intelligence and Integrated Computer Systems.

Artificial Intelligence, Knowledge Representation, Autonomous Systems, Deliberative/Reactive Systems, Reasoning about Action and Change, Planning, Nonmonotonic Reasoning.



**Dimitar Driankov**, Ph. D., Linköping 1989. Associate professor (*docent, universitetslektor*), logic and AI.

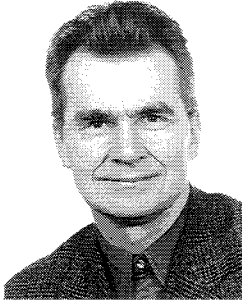
Reasoning under uncertainty, many-valued logics, approximate reasoning, fuzzy control & systems, autonomous agents.



**Anders Haraldsson**, Ph. D., Linköping 1977. Associate professor (*bitr professor*), computer science. Head of the department of computer science, 1990-1999. Director of undergraduate studies for the Computer Science and Technology programmes at Linköping Institute of Technology. Previous affiliation: Uppsala.

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

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



*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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM

### Human-Centered Systems



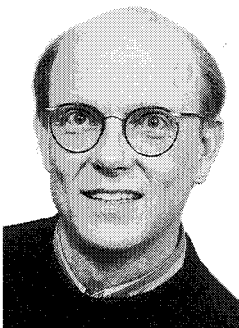
**Lars Ahrenberg**, Ph. D., Uppsala 1987. Professor of computational linguistics. Group leader, NLPLAB. Head of the Division for Human-Centered Systems.

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



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

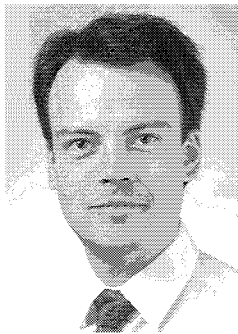
User interface design, visualization, computer-supported cooperative work and groupware for teamwork.



**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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



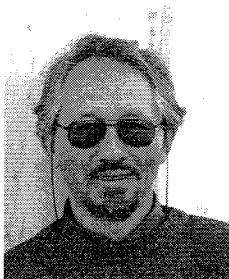
**Henrik Eriksson**, Ph. D., Linköping 1991. Associate professor (*docent, universitetslektor*), computer science. Previous affiliations: Stanford University, Stanford, CA, 1991-94 and the Swedish Institute of Computer Science (SICS) 1996-97.

Knowledge-based systems, knowledge acquisition, medical informatics, software development environments, software reuse, command-and-control systems, Internet-based applications, Java programming.



**Niklas Hallberg**, Ph.D., Linköping 1999. Assistant professor (*vik. forskarassistent*), informatics.

System development, requirements engineering, organizational development, quality methods, participatory design, internet and intranet technology.



**Erik Hollnagel**, Ph.D., Århus 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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**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.



**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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Rita Kovordányi**, Ph. D., Linköping 1999. Assistant professor (*forskarassistent*), computer science. Previous affiliation: Lund University.

Cooperative systems, adaptive support for visual reasoning, cognitive modeling and simulation, constraint satisfaction in interactive activation networks, knowledge representation.



**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



**Hans Marmolin**, Ph.D., Uppsala 1973. Consulting professor (*adjungerad professor*), human-computer interaction, especially information psychology. Previous affiliation KTH and others.

Human-computer interaction, usability engineering, cognitive ergonomics, user interface design.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Magnus Merkel**, Ph.D., Linköping 1999. Assistant professor (*vik. universitetslektor*), computational linguistics.

Natural language processing, computational support for writing and translation; machine-aided translation, parallel corpora, information extraction.



**Kjell Ohlsson**, Ph.D., Umeå 1982. Professor at the Department of Mechanical Engineering. Part time at the Department of Computer and Information Science, human-computer interaction. Previous affiliations Umeå, Luleå and others.

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



**Eva Ragnemalm**, Ph.D., Linköping 1999. Assistant professor (*vik. universitetslektor*), computer science.

Intelligent tutoring systems and cognitive science.



## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Åke Sivertun**, Ph. D., Umeå 1993. Assistant professor (*universitetslektor*), geoinformatics. Group leader, LIBLAB. 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. Part time at the Department of Computer and Information Science, informatics. Group leader, MDA.

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

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Vivian Vimarlund**, Ph.D. Linköping 1999. Assistant professor (*forskarassistent*), informatics.

IT och society, economic evaluations of implementation and use of IT, human-computer interaction, medical informatics, system developments.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM

### Information Systems and Management



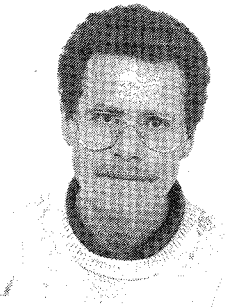
**Leif Appelgren**, Lic.Eng. Consulting professor (*adjungerad professor*), economic information systems. Previous academic appointments with Linköping and Handelshöyskolen BI, Norway. Several previous affiliations. Current affiliation: Leif Appelgren Consulting AB.

Measurement and audit methods related to economic crime prevention.



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

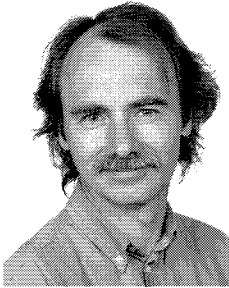
Information systems architecture, theories on information systems development, inter-organisational business development, qualitative research methods.



**Stefan Cronholm**, Ph.D., Linköping 1998, Assistant professor (*universitetslektor*), 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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



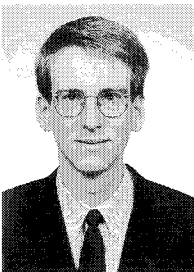
**Göran Goldkuhl**, Ph. D., Stockholm 1980. Professor of information systems development. Group leader, VITS. Part time professor of informatics, Jönköping International Business School. Research director VITS network. Research director at Centre for studies on Man, Technology and Organization. Previous affiliations: Stockholm, Göteborg.

Communicative action theories and methods for evaluation and design concerning inter-organisational networking, business processes, information systems, human-computer interaction, electronic commerce and knowledge management. Method modelling and renewal. Qualitative research approaches.



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

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



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

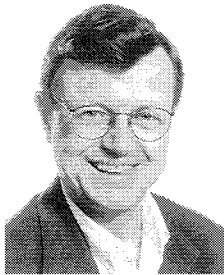
Strategy and management control, environmentally-driven business development, valuation and accounting of intangible assets, production.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**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.



**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.

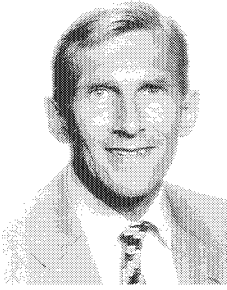
Management issues arising from IT-enabled business change, especially how accounting, control, and pricing could be modified to provide information and incentives appropriate for the new business situation.



**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.

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**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.



**Alf Westelius**, Econ. Dr., SSE Stockholm, 1996. Assistant professor (*universitetslektor*), economic information systems, especially electronic commerce and knowledge management. Previous affiliations: The Stockholm School of Economics, the Ministry of Culture.

Knowledge management, project management, electronic commerce, change management and implementation processes.

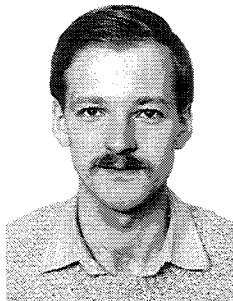
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### Software and Systems



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

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



**Włodzimierz 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, error/diagnosis, negation; programming languages semantics.



**Petru Eles**, Ph. D., Bucuresti 1993. Associate professor (*docent, 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.

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**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.



## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Jörgen Hansson**, Ph.D., Linköping University 1999. Assistant professor (*universitetslektor*), real time systems. Previous affiliations: University of Skövde and University of Virginia, Charlottesville.

Real-time systems, database support for embedded and real-time systems, real-time operating systems, distributed systems.



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

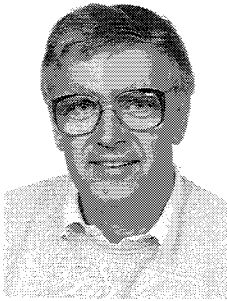
Construction and analysis of algorithms. Complexity theory.



**Mariam Kamkar**, Ph. D., Linköping 1993. Professor of software engineering. Head of the department of computer science.

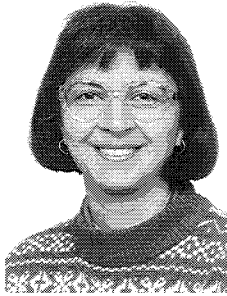
Software engineering, software testing, program debugging, program analysis, optimization in compilers, programming environments and languages.

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

Constraint logic programming, formal methods in computer science.



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

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



**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, TCSLAB. 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.

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**Zebo Peng**, Ph. D., Linköping 1987. Professor of computer systems. Group leader, ESLAB. Head of the Division for Software and Systems.

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



**Nancy Reed**, Ph.D., University of Minnesota 1995. Assistant professor (*universitetslektor*), 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.



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

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

## FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Anders Törne**, Ph. D., Uppsala 1980. Part-time associate professor (*universitetslektor*), computer support in automation. 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 RESEARCHER AND AFFILIATED FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**Sten F. Andler**, Ph. D., Carnegie-Mellon University 1979. Professor of computer science, Högsolan 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.



**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.



**Bengt Lennartsson**, Ph. D., Göteborg 1974. Associate professor (docent LiU), software engineering. Group leader, PELAB 1981-88 and head of the department of computer 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.

## GUEST RESEARCHER AND AFFILIATED FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM

**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.

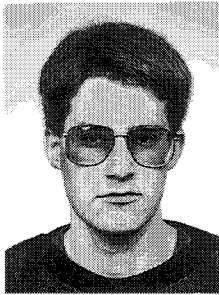
Human-computer interaction, usability-oriented systems development, interaction design.

## GUEST RESEARCHER AND AFFILIATED FACULTY ENGAGED IN THE GRADUATE STUDY PROGRAM



**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 development paths.





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