

The Graduate School is an important part of Infotech Oulu. It has to report on its activities also to the general council of the Infotech Oulu Graduate School. The members of the council are professors and docents in information technology at the University of Oulu. The general council elects the board of the Graduate School for three years at a time. In addition, it elects the director of the school, who is also the chairman of the board. The general meeting is held once a year in November or December. In the beginning of 2007, a new three-year period started.

Infotech Oulu Graduate School operates in three areas corresponding to the major research fields of Infotech Oulu. Professor Risto Myllylä is the director of the school and the chair of the graduate school board. Each of the areas is represented on the graduate school board, as is VTT. The main areas are electronics, communications engineering, and computer science and information engineering. The representatives of the main areas on the graduate school are respectively Professors Timo Rahkonen, Markku Juntti, Tapio Seppänen and Juha Kortelainen. Professors Seppänen and Kortelainen are both representatives of computer science and information engineering. Research Professor Pentti Karioja is the representative from VTT.

The *Electronics* section consists of electronic circuit and system design, microelectronics, electronics manufacturing technology, physical electronics, electronic and optoelectronic measurement technology, and testing and disturbance techniques of electronics.

Communications engineering covers telecommunication systems from the architectures and implementations of transceiver to telecommunication networks, systems and services. The main research themes include broadband wireless access, short range communications and sensor networks.

Computer science and information engineering emphasizes information processing methods, software engineering and information systems. The topics include signal processing, machine vision, intelligent systems, the development of software applications and their functionality, human-computer interfaces, usability and usefulness, user-centered design methods, ubiquitous environments, computer networks, mobile services, digital media, virtual reality techniques and computer-aided cooperation.

Funding

In 2007, Infotech Oulu Graduate School had 25 doctoral student posts and a coordination position funded by the Ministry of Education. This funding is secured to the end of 2009. The posts are for doctoral students working in the research groups that are full or associate members of Infotech Oulu. The posts altogether represent annually over EUR 700 000 in salary costs. Additional funding has been obtained from the Academy of Finland for arranging post-graduate courses and for other costs. The Academy granted EUR 115 000 for the years 2006–2007 and EUR 206 000 for the years 2007–2009. EUR 83 940 was designated for the year 2007.

Infotech Oulu has supported its graduate school through the work of its staff and through direct financial support, and indirectly by financing international workshops and researcher visits that formed part of the postgraduate education.

Students and Dissertations

In the research groups of Infotech Oulu, including the associate member groups, there were 257 graduate students working in the areas of the graduate school. All of these have been considered as students of the graduate school.

The output was 14 dissertations. The funding from Infotech Oulu Graduate School positions was used for 6 of them: *Janne Aikio, Markus Turtinen, Xiaosong Zheng, Esa Rahtu, Marian Codreanu* and *Janne Paaso*. The dissertations can be found in electronic form on the web from the page <http://www.infotech.oulu.fi/dissertations>.

Teaching Activities

Strong research connections with other universities and research institutes are utilized in arranging lecturers for the courses. In each of the three major areas covered by the graduate school, several lectures (Infotech Oulu Lecture Series) and intensive courses are held annually. These provide a valuable extension to the other graduate courses in information technology provided by the university. The breadth of the courses below is expressed in new ETCS credits.



The Infotech Oulu Graduate School student meeting was held at VTT in March.

The Infotech Oulu Lecture Series

To gain two credits, a graduate student must follow lectures for 20 hours and make a written summary of one lecture. The following lectures were held in 2007:

- Professor Anind Dey, Carnegie Mellon University, USA - Context-aware computing and end-user control
- Professor Wan-Young Chung, Dongseo University, Pusan, South Korea - Wireless sensor network technology for ubiquitous healthcare applications
- Professor Tomas Kepka, Charles University, Prague, Czech Republic - Transitive closures of binary relations
- Dr. Vaclav Flaska, Charles University, Prague, Czech Republic - Congruence-simple semirings whose additive semigroups are nil of index 2
- Dr. Frank H.P. Fitzek, Aalborg University, Denmark - Cognitive and cooperative wireless networks
- Thomas J. Naughton, Department of Computer Science, National University of Ireland, Maynooth - Three-dimensional object sensing and image processing using digital holography
- Juhani Eronen, CERT-FI, CERT-FI on the touch of Criminal Underground of the Internet
- Professor Alf van der Poorten, Macquarie University, Sydney, Australia - Paperfolding, automata, and rational functions
- Professor Rama Chellappa, University of Maryland - Looking for patterns in video
- Professor Joseph Cavallaro, Rice University, Houston, Texas, USA - Algorithm and Architecture Prototyping on WARP: The Rice University Wireless Open-Access Research Platform
- Professor Keiichi Sato, Illinois Institute of Technology, USA - Design information framework: bridging different viewpoints in interactive systems design
- Professor Roderick Murray-Smith, University of Glasgow, Scotland, UK & Hamilton Institute, NUI Maynooth, Co. Kildare, Ireland - Negotiated interaction: models of continuous uncertain interaction
- Dr. Kimmo Kansanen, Norwegian Institute of Science and Technology, Trondheim, Norway - QoS guarantees in multiuser systems
- Professor Jan Flusser, Academy of Sciences of the Czech Republic, Prague - Dimensionality reduction in pattern recognition
- Professor Thomas S. Huang, University of Illinois at Urbana Champaign, USA - Computer vision in human computer interaction
- Professor Yrjö Neuvo, Helsinki University of Technology - DSP, from filter design to system design - past and future
- Dr. Nicolai Czink, Vienna University of Technology, Austria - Modelling the MIMO radio channel using clusters - The Random-Cluster Model
- Professor Anthony Ephremides, University of Maryland, USA - Network-level cooperative schemes for relay utilization
- Professor Markus Rupp, Vienna University of Technology, Austria - Testbeds and rapid prototyping in wireless systems
- Dr. Gareth Redmond, Tyndall National Institute, Cork,

Ireland - Organic nanowires: building blocks for nanoscale photonics and electronics

- Professor Tomas Kepka, Charles University, Prague, Czech Republic - Maximal nonlinear orders on the field \mathbb{Q} of the rational numbers
- Dr. Oriana Riva, ETH Zürich, Switzerland - Middleware for mobile sensing applications in urban environments

Intensive Courses and Workshops

- How to get a Ph.D.: Methods and practical hints (2007-2008), including lectures by Research Professor Aarne Mämmelä, VTT; Dr. Lauri Pirttiaho, Nokia; Professor Erkki Oja, Helsinki University of Technology; Dr. Kari Leppälä, Proviseo Ltd; Professor Päivi Tynjälä, University of Jyväskylä; Dr. Lisa Lena Opas-Hänninen, Professor Maija Kallinen, Professor Riitta Keiski, Professor Olli Silvén, Dr. Tauno Jokinen and Professor Timo Koivumäki, University of Oulu, 3+5 credits
- Infotech Oulu Summer School 2007 - Optoelectronics Devices and Instrumentation 7¹⁾, 5 credits
- ALT-07 - Advanced Laser Technologies²⁾
- Professor Sergey Karmanenko, Saint Petersburg Electrotechnical University, Russia - Metal-oxide layered structures: physics, technology, applications in microwave tunable devices, sensors, energy actuators
- Professor L. Golonka, Wroclaw University, Poland - LTCC (Low Temperature Cofired Ceramics) microsystems, 2 credits
- Professor Eung Soo Kim, Kyonggi University, South-Korea - Tailoring dielectric properties of ceramics at microwave frequencies
- Professor A. Gruverman, University of North Carolina, US - Piezoresponse force microscopy: from ferroelectrics to biocomposites, 2 credits
- Professor Imre Kiricsi, University of Szeged, Hungary - Nanostructured materials, 3 credits
- Professor A.E.Hill, Salford University, England - Thin film process technologies, 1 credit
- Professor Boris Ryvkin, A.F. Ioffe Physico-Technical Institute, Russia - Physical basis of semiconductor optoelectronic device operation, 7 credits
- Professor W. Kleemann, University of Duisburg-Essen, Germany - Physics and applications of modern ferroic materials
- Professor László Nánai, University of Szeged, Hungary - Introduction to nanophotonics
- Dr. Peter Heszler, University of Szeged, Hungary - 1) Nanoparticles and sensor; 2) Religion and natural sciences
- Dr. Igor Rozhansky, St. Petersburg Technical University, Russia - Semiconductors and semiconductor devices (How electrons and holes flow in semiconductors and “why they go as they go”)
- Workshop on picosecond laser diodes, high speed current switches and all-electronic, room-T THz sources
- Layout design of full custom mixed signal circuits
- 4th International Summer School - New Frontiers in Optical Technologies, Tampere, 3 credits
- The Second International Symposium on Medical Information and Communication Technologies³⁾
- IPICS2007 8th Winter School in Taivalkoski⁴⁾

- The 3rd International Crisis Management Workshop ⁵⁾
- KISS 2007 - Kilpisjärvi Information Systems Seminar, visiting keynote speakers Professor Mike Newman, University of Manchester, UK; Professor Michael D. Myers, University of Auckland, New Zealand and Professor Reima Suomi, Turku School of Economics
- KaamosKISS 2007 - Kilpisjärvi Information Systems Seminar, visiting keynote speaker Professor Mike Newman
- Dr. Mikko Salo, University of Helsinki - Linear algebra methods for pattern recognition
- Professor Thomas S. Huang, University of Illinois at Urbana Champaign, USA - Computer vision in human computer interaction, 3 credits
- Professor Ondrej Cepek, Charles University, Czech Republic - Time complexity of algorithms, 5 credits
- Thomas Naughton & Dr. Bryan Hennelly, National University of Ireland, Maynooth - Digital hologram image processing
- Adaptive user interfaces: technology and usage
- Dr. Bogdan Filipic, Jozef Stefan Institute, Ljubljana, Slovenia - Multiobjective optimization with evolutionary algorithms
- FINSIG'07 Symposium
- Software defined radio
- Professor Wadim Zudilin, Moscow State University, Russia - Lectures on modular forms
- Dr. Marko Moisio, University of Vaasa - On crosscorrelations of m-sequences

Co-operation

The following external organizations have provided co-financing or other support for the courses and workshops:

- Graduate School of Modern Optics and Photonics ¹⁾
- General Physics Institute, Center of Laser Technology and Material Science at GPA and International Laser Centre, and Moscow State University, Moscow, Russia; the Academy of Finland ²⁾
- The National Institute of Information and Communications Technology (NICT), Japan; Medical ICT (MICT) Center Yokohama National University, Japan; Centre Suisse d'Electronique et de Microtechnique SA (CSEM), Switzerland; Tekes ³⁾
- EU IST-programme, the Finnish Defence Forces, International Federation of Information Processing Science - IFIP, Gartner Group, Nokia, TeliaSonera, Cisco ⁴⁾
- Police IT Management Agency, the Finnish Defence Forces, the Border Guard of Finland, CMI (Crisis Management Initiative) ⁵⁾

Course Information

Information about the courses is distributed through web-pages and by email. The web address for the graduate school is <http://www.infotech.oulu.fi/GraduateSchool>, where students can also register to the graduate student mailing list.