# University of Oulu Annual Report 2004

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The University of Oulu is an international science community with a reputation for producing high quality research and top-notch specialists for challenging national and international projects. Founded in 1958, the university is among the largest in Finland and has an exceptionally wide scientific base. Promoting education and material well-being in Northern Finland, the University of Oulu has managed to carve niche for itself in the national and European scientific innovation and education system. Its concentrated research policy channels the efforts of researchers in a range of fields into three focus areas: Information Technology, Biotechnology and Northern Issues and the Environment.

In its activities, the University of Oulu draws on the quality and breadth of its scientific programmes, state-of-the-art research and educational technology, close ties with business and industry and strong enterprise agenda, not to mention its contact network involving hundreds of national and international scientific and educational institutes and organizations.

**Fast facts for 2004**

<table>
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<tr>
<th>Faculties</th>
<th>Fields of study</th>
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<tr>
<td>Humanities</td>
<td>Humanities</td>
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<tr>
<td>Education</td>
<td>Education</td>
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<tr>
<td>Science</td>
<td>Science</td>
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<tr>
<td>Medicine</td>
<td>Medicine</td>
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<td>Dentistry</td>
<td>Dentistry</td>
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<tr>
<td>Public Health Science</td>
<td>Public Health Science</td>
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<tr>
<td>Economics and Business Administration</td>
<td>Economics and Business</td>
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<tr>
<td>Technology</td>
<td>Technico-scientific</td>
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</table>

- **Total students**: 15,818
- **First-year students**: 2,424
- **Total degrees awarded**: 16,19
- **Under-graduate degrees**: 12,47
- **Doctoral degrees**: 130
- **Other degrees**: 242
- **Total staff (person years)**: 3,104
- **Professors**: 242
- **Total University funding (EUR 1000)**: 206,566
- **Budgetary funding**: 130,869
- **Extra-budgetary funding**: 65,568
- **Other sources**: 10,129
- **Publications (2003)**
  - **Total publications**: 2,871
  - **Scientific publications**: 2,111
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>1.1.</td>
<td>Inauguration of the Kajaani University Consortium</td>
</tr>
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<td>27.1.</td>
<td>Inauguration of the university’s Culture Committee</td>
</tr>
<tr>
<td>4.2.</td>
<td>Opening of the Non-Smoking University Theme Year</td>
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<td>18.–20.3.</td>
<td>National Physics Days</td>
</tr>
<tr>
<td>26.4.</td>
<td>Olavi K. Fält, professor of history, and Olavi Pelkonen, professor of pharmacology, invited as members to join the Finnish Academy of Science and Letters</td>
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<tr>
<td>30.3.–7.4.</td>
<td>5th International Information Security Seminar IPICS 2004</td>
</tr>
<tr>
<td>20.4.</td>
<td>Inauguration of the Medical Faculty’s new main building</td>
</tr>
<tr>
<td>28.4.</td>
<td>Signing of co-operation agreement between the universities of Lapland and Oulu to develop and diversify graduate and post-graduate programmes</td>
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<td>18.5.</td>
<td>Kjell Magne Bondevik, prime minister of Norway, visited the University</td>
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<td>31.5.–3.6.</td>
<td>International Workshop on Wireless Ad-hoc Networks</td>
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<tr>
<td>2.6.</td>
<td>Opening of the 4G and eLab laboratories of the Centre for Wireless Communications (CWC)</td>
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<td>9.–12.6.</td>
<td>International women’s studies summer symposium</td>
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<tr>
<td>11.6.</td>
<td>5th co-operation agreement of the university to expand the functions of the Kajaani University Consortium</td>
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<tr>
<td>15.–23.6.</td>
<td>EAVE Workshop of European Audiovisual Entrepreneurs</td>
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<tr>
<td>20.–23.6.</td>
<td>First International Symposium on Space Climate</td>
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<tr>
<td>18.8.</td>
<td>Sámi culture introduced as a major subject</td>
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<td>18.8.</td>
<td>Christian Wulff, prime minister of Lower Saxony, visited the University</td>
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<td>19.–23.8.</td>
<td>22. Nordic Archaeology Conference</td>
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<tr>
<td>26.8.</td>
<td>The University’s first office abroad opened at the University of Petroskoi (run by the Department of Information Processing Science)</td>
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<td>10.–11.11.</td>
<td>Presentation of the University to final-year students of high school</td>
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<td>19.–20.11.</td>
<td>4th International Kastelli Symposium: Northern Stress – Challenges of Living in the North</td>
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<td>3.12.</td>
<td>45th anniversary of the University Library and the inauguration of the Science Library Tellus</td>
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<tr>
<td>9.12.</td>
<td>Atte Sillanpää is presented the Gustav Komppa Award for the best dissertation in chemistry and applied chemistry by the Finnish Chemical Society</td>
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<tr>
<td>13.12.</td>
<td>Pentti Kaitera Award presented to Helena Aksela, professor of physics</td>
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Both national and international comparisons and evaluations ascertained that the performance of the University of Oulu was outstanding across a range of indicators. In token of this, we received productivity-based funding for the quality and impact of our activities in 2004.

One way of characterizing the University of Oulu would be to say that it is a thriving educational community. From among a total of almost 9,300 applicants who sought admittance to the various programmes offered, about 30 percent were accepted. Of freshman students, approximately 75 percent came from the Provinces of Oulu and Lapland.

For the first time, the total number of students exceeded 16,000. Almost a quarter of all first degree students studied in information technology-related programmes, designed to meet the forecast recruitment requirements of software houses and electronics companies in the Oulu region.

Coming into effect at the beginning of August, the new Universities Act of 2004 firmly established the third official mission of Finnish universities, to serve society. During the year, the activities of the Kajaani University Consortium were set in motion, and we were also involved in the development of the Kokkola University Consortium. Redesigning the regional strategy of Northern Finland was another initiative launched in collaboration with the University of Lapland and the five polytechnics in the area. Also the Bothnian Arc programme moved on during the past year and was on the agenda when the prime ministers of Sweden and Finland met at a seminar in Haaparanta.

Increasing international contacts

Promoting international contacts is one of our central development areas. This resulted in the forging of several bilateral agreements and student exchange programmes. Sapporo hosted a joint seminar arranged in cooperation with the universities of Hokkaido and Oulu, the Oulu Chamber of Commerce and the National Technology Agency of Finland. Further, professors in a variety of fields met in Ulm, Germany, for discussions, and collaboration among circumpolar universities received a boost through the drafting of the Strategy for Co-Operation in Neighbouring Areas. We also initiated negotiations with some international partner universities to devise new degree programmes leading to joint degrees.

Several reports were published in 2004 on globalization, Finland’s international competitiveness and its science and higher education policies. When carried out, the suggestions presented serve to further enhance the position of the University of Oulu as an international scientific and educational community. As pointed out in these reports, the University of Oulu is a multidisciplinary university with a distinct scientific and educational profile, a good domestic and international co-operation network and strong ties with both industry and public sector organizations.

Structural development and support

The year 2004 presented us with a number of opportunities. In the field of graduate education, the Bologna process enabled us to radically redesign our curriculum for the needs of the changing scientific and global community. We exposed our curricula to rigorous core content analysis and streamlined the quality assurance system. In research and post graduate education, the focus is now on productive doctoral programmes and further expanding the links to companies and foreign university networks to attract competitive research funding.
Companies in the Oulu region are international movers. They demand qualified and skilled staff who possess the intellectual and social flexibility to forge success in an ever-changing global economy. This is why we have paid special attention to bringing in students and researchers from all over the world to study at the university. We also started a further development of the support system for our domestic students and staff to make it even easier for them to work and study abroad in our partner universities.

International campus

The number of international exchange students in Oulu was around 350 in 2004. This is about 30 percent more than the year before. The tenacious work on providing teaching in English and on ensuring the quality of teaching and support services have proven their worth.

International cooperation in providing university degrees became a topical issue during 2004. The University of Oulu launched seven projects, the aim of which is to establish joint or double degrees with a number of foreign universities. We consider this kind of close partnership in education to bring added value to the offerings we have. This is also a way to seek international visibility in the education market.

Over 350 exchange students and hundreds of doctoral students and research scientists worked at the University in 2004. A group of students participating in a Finnish preparatory language course teams up with the Guard at the market place.

The employability of the qualifications is of utmost importance. We train graduates who can specialize in research and demanding expert positions in businesses, industry and public sector. Therefore, an effective system of collecting feedback from students and employers is important. Responding to it with meaningful and effective ways ensures that the University of Oulu continues to enhance the economic, cultural and intellectual life in the region.
In 2004, the university board decided to augment the use of result-based indicators and institutional self-assessments with regular evaluations of research performance. Based on an international appraisal, seven high-quality research projects were selected for funding over the next three years.

As a step toward ensuring the high standard of its research, groups in the university’s research focus areas will be selected on the basis of their scientific merit. This applies, for example, to the process whereby Infotech Oulu chooses its research teams for the funding period starting in 2006. On the other hand, the Faculty of Economics and Business Administration was involved in an evaluation of the research programme for business know-how coordinated by the Academy of Finland.

Four Oulu-based groups made the shortlist for the second round of application of the Academy’s Centres of Excellence Programme. The university is home to three centres of excellence, namely, the Collagen Research Team (2000–2005), Population Genetics Group (2002–2007) and Tissue Engineering Group (2004–2005), which constitutes part of the Center of Excellence for Biomaterials and Tissue Engineering.

Such indicators as volume of publications and amount of external research income showed that the university kept a steady pace throughout 2004.

**Funding to purchase equipment**

Extra-budgetary funding was obtained chiefly from the Academy of Finland (11.1 m euros) and the National Technology Agency (10.5 m euros). Nearly 2.5 m euros of the Academy’s funding was earmarked for purchasing new equipment for biotechnology and physics research.

The University of Oulu was an active participant in 18 projects within the 6th European Framework Programme of the EU. Eight of these were integrated projects, four involved networks of excellence and three were specific targeted research projects. The total amount of funding allocated to these projects was 3.3 m euros. Six of the projects were in the field of biotechnology and three in information technology. In addition, projects involving the University of Oulu were also launched under the auspices of other EU research programmes.

**Publications at the University of Oulu in 2004**

<table>
<thead>
<tr>
<th>Field</th>
<th>Scientific publications</th>
<th>Other publications</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>209</td>
<td>176</td>
<td>385</td>
</tr>
<tr>
<td>Education</td>
<td>89</td>
<td>84</td>
<td>173</td>
</tr>
<tr>
<td>Economics</td>
<td>37</td>
<td>19</td>
<td>56</td>
</tr>
<tr>
<td>Science</td>
<td>493</td>
<td>105</td>
<td>598</td>
</tr>
<tr>
<td>Medicine</td>
<td>659</td>
<td>95</td>
<td>754</td>
</tr>
<tr>
<td>Dentistry</td>
<td>53</td>
<td>16</td>
<td>69</td>
</tr>
<tr>
<td>Health science</td>
<td>31</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td>Technical-scientific</td>
<td>459</td>
<td>160</td>
<td>619</td>
</tr>
<tr>
<td>Other departments</td>
<td>81</td>
<td>97</td>
<td>178</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2111</strong></td>
<td><strong>760</strong></td>
<td><strong>2871</strong></td>
</tr>
</tbody>
</table>

Not included are translations, edited materials and printed abstracts.
Extensive research networks in focus areas

Research conducted at the University of Oulu revolves around three multidisciplinary focus areas. Activities within these areas are geared to promoting research, advancing researcher training and fostering interaction with extramural partners.

The selection of research focus areas is based partly on the various departments’ research traditions and partly on the area’s significance not only to business and industry, but also to society at large.

Information technology

InfoTech Oulu, the organizing body for the pursuit of knowledge in information technology, promotes the development and activities of high-quality research groups in the area. Its main fields of research are electronics and systems engineering, communications engineering, computer science and information engineering as well as software engineering and information systems.

For the years 2003–2005, eight research groups were selected to Infotech Oulu as full members and three groups as associate members. Of these groups, two are run jointly by the University of Oulu and the Technical Research Centre of Finland. Full member groups employ almost 350 staff. All research groups are selected on the basis of their scientific merit as judged by an international panel.

Most of the annual funding provided by the university is used to support the research groups’ activities. Research carried out under the auspices of InfoTech Oulu is largely dependent on external funding, most of it coming from the National Technology Agency, Academy of Finland, Ministry of Education, EU and industry.

External funding received by the full member groups amounted to 12.4m euros in 2004, representing approximately 70 percent of the total. Budgetary funding by the university and the Technical Research Centre of Finland covered the remaining 30 percent.

Biotechnology

Biocenter Oulu is an umbrella organization that seeks to strengthen international research and post-graduate training in biotechnology. In 2004, the center launched 12 research projects, selected on the basis of evaluation.

At the beginning of the year, Biocenter received new facilities in the main building of the Faculty of Medicine. These premises house some of the center’s research groups, core services and administration.

Biocenter Oulu’s research groups are characterized by the use of similar molecular biological and cell biological methods. A substantial portion of the budget funding provided by the university is used to maintain and develop the center’s core services.

Totalling about 300, staff members participated in the graduate programmes offered by three different faculties. Specific funding is set aside to enable young scientists to engage in independent research, and annual awards are presented for high quality research. In addition, Biocenter Oulu is an active participant in the Finnish network of biotechnology-related research institutes.

Northern issues

In 2004, nine projects, selected after an international evaluation process, participated in the Global Change Programme of the Thule Institute, which coordinates research surrounding Northern issues. Within the institute, the Centre for Arctic Medicine coordinated the Graduate School for Northern Welfare, Health and Adaptation and published a scientific journal. Employed in the Thule Institute, the associated research projects and the graduate school were a total of 87 staff members.

Towards the end of the year, the institute organized a planning workshop entitled Nordic Role in Arctic Research, financed by the Nordic Council of Ministers. In addition, the institute represented the University of Oulu on the boards of the International Arctic Science Committee and the University of the Arctic.

Environment

NorNet, the cooperation network of Northern Finnish environmental researchers, drafted a five-year plan in 2004. Other developments during the reporting year comprise the inclusion of the Geological Research Center in the network. NorNet’s broadly-based research and development projects received 4.3m euros in funding.

As for researcher training, the Post-Graduate School for the Environment awarded grants and coordinated a number of seminars and courses. Also the Graduate School for the Environment continued its operation.

NorTech Oulu supported projects aimed at promoting environmentally-sustainable entrepreneurial activities and initiated collaboration with EcoForum of the Oulu Region Centre of Expertise. Carrying out the university’s strategy for neighbouring areas, the unit helped to launch the degree programme for environmental engineers at the Murmansk State Technical University.

An extensive evaluation of the university’s Northern issues and environmental research focus areas, conducted in the course of 2004, led to a decision to combine them into the focus area of Northern Issues and the Environment.
Post-graduate training at the university has been organized around graduate schools, some of which are supported by the Ministry of Education, while others rely on alternative resources. University-based researchers are in charge of coordinating seven graduate schools funded by the ministry and one funded by the university itself. Those in the former category have about 150 students.

In spring 2004, the Faculty of Humanities founded the Graduate School of Culture and Communications. The university is also partner in 55 graduate schools coordinated by other universities. In addition to that, such time-honoured approaches to post-graduate studies as independent work and part-time studies combined with work have not lost their appeal to students.

The Biocenter Oulu Graduate School had about 140 students, 16 percent of them international. Fifteen graduates of the school earned a doctoral degree in 2004. The total number of student places funded by the Ministry of Education was 30.

Roughly 230 students studied at the Infotech Oulu Graduate School, which produced a total of 20 doctorates in 2004. Of the student places, 30 were funded by the Ministry of Education and one by the Academy of Finland.

A total of 34 post-graduates worked on the various projects of the Global Change in the North Programme of the Thule Institute, while another 81 attended its Graduate School of Circumpolar Wellbeing, Health and Adaptation. Eight post-graduates from the University of Oulu studied at the Arctic Graduate School. In 2004, four doctorates were awarded within the Northern issues research focus area.

The post-graduate school of the environment had 150 students, two of whom received a doctorate in 2004.

All in all, the past year was a successful one for the University of Oulu in terms of scientific post-graduate education. A record number of doctorates, 130, were conferred, representing an increase of eight percent relative to 2003. Of the new doctorates, 49 were female, translating into 38 percent of the total.
Research at the Centre for Wireless Communications (CWC) focuses on researching and designing innovative methods and solutions applicable both to current communication networks and future 4G and UWB systems. In these areas, the CWC is at the forefront of international research.

Operating at the interface between academia and business, the CWC is a highly atypical unit. Drawing the bulk of its financing from the business world, the CWC’s research activities are organized through projects run in close collaboration with industry.

A number of post-graduate students are employed in these projects, among them Antti Tölli, MSc(Eng), who has been on the payroll for about one and a half years. He is intent on finishing his doctoral thesis in four years. Having graduated from the Department of Electrical Engineering in 2000, Tölli found employment at Nokia, where he worked for three years before enrolling at the CWC.

“I see the dissertation as a personal challenge and a chance to explore some topic of interest in detail” says Tölli. His research centres on the radio interfaces of future communication systems, particularly on means of sharing radio resources such as frequencies, codes, time and space among all users.

The manifest aim of the researchers is to patent as many inventions as possible for industrial use. Also Antti Tölli, who was previously employed in the FUTURA project which came to a close at the end of 2004, has a patent pending. His work continues under the auspices of the PANU project. All in all, FUTURA yielded over 30 inventions, resulting in nine patent applications last year.
Digital games are essentially about fun and entertainment. With an increasing number of games literate people, society is learning to harness game applications for a variety of purposes. In this way, a combination of scientific research, high technology development and artistic content production is changing the role of information technology forever.

Research conducted by the LudoCraft Game Design and Research Unit is intent on answering questions related to contemporary games studies by focusing on the art of creating play and games. Essentially, it is not about technology. Research on the design and production of games, and reflection thereon, enhance the purely analytical approach. Mastering the empirical side of game studies provides a medium for inspiration, concrete examples of research results and new innovations for future games.

Game design research is not just about the production of art assets, functional code, or visually engaging representations. There is more to game design than the pure replication of best practices and industry standard production processes. Game design deserves an analytical approach, thereby allowing the potential fruits to be harvested – not necessarily instantly – but eventually.

From the LudoCraft point of view, the core of game studies consists of three main areas, which interconnect to form a coherent whole:

- **Game design** is about mastering the design and production of 3D multiplayer games based on extensive empirical research on crafting games.
- **Game playing** is a versatile phenomenon consisting of both personal game experiences and multiplayer game communities.
- **Game analysis** focuses on the function, narration and structure of games. Analytical studies reveal phenomena below the surface and offer reflective feedback for design.

The combination of a powerful knowledge network and a flexible and systematic approach yield results with high impact. This allows LudoCraft to establish a deeply rooted sense of a wider world surrounding computer games, without unnecessarily constraining gameplay development. Therefore, we at LudoCraft believe in a holistic design of interaction, content and applications; the necessity of combining artistic vision with technological excellence; the encapsulating power of theory and analysis; and the undiscovered potential of game design.

One of the major principles of LudoCraft is to be experimental in a systematic manner; to explore and to analyse. From interaction design to the exploration of cultural heritage, the aim of LudoCraft is both to develop the best game applications possible, and to use those constructs for experimentation and studying in order to best learn from the work undertaken.

Our experimental research approach involving practical game design and development projects is a challenging and unique way of studying games. Nevertheless, it is empirical experiences and experimental installations which allow the acquisition of the most productive knowledge and competencies concerning game design methods, novel game structures and design implications. Learning from existing games is important, but going one step further will bring the contributions alive. By combining an understanding of games and inspiring new experiments, games research will change the world – forever!
Local societies in the Circumpolar North have experienced intense and rapid changes during the 20th century. These include environmental changes, changes caused by agriculture, forestry, industrial development and infrastructure construction as well as continuing climate change. Political changes have had a considerable impact on northern societies, requiring more independence at the local level. All this has caused and, to some extent, been preceded by socio-economic changes. Indigenous peoples have developed a system of knowledge concerning their natural environment, but also knowledge of how to maintain their identity and culture, while the dominant societies have set the framework and values for their socio-economic and cultural life.

This project studies the changing social conditions in northernmost Europe and compares ways in which different cultures and groups of people adapt to changes. Under study are the Murmansk and Nenets areas in Russia and the Province of Lapland in Finland. The population of these areas is ethnically heterogeneous, consisting of indigenous peoples, the Sámi and Nenets, and immigrant settlers, mainly Finns, Komis and Russians. The project studies the mutual adaptation of these neighbouring cultures in the same environment, the relationships between different livelihoods and the responses of different groups, especially the indigenous peoples, to the socio-ecological changes in northern areas.

A highlight of 2004 was the doctoral dissertation of Anni-Siiri Länsman. She studied encounters between the Sámi people and Finnish tourists in Lapland. In addition, project leader Veli-Pekka Lehtola worked on a research project focusing on the history of Lappish administration. Dr. Tuula Tuisku continued her fieldwork in the autonomous district of Nenetsia, where she made a 3-month fieldtrip. Her research deals with the changing ways of life in the Nenets community. Participants of the project were also involved in several educational efforts, performed scientific expert tasks and contributed to various publications.
A burning desire to know all about plants induced Anna Tammilehto to start biology studies at the University of Oulu. Majoring in plant ecology major, she has indeed learnt a lot about the plant world and is currently planning her thesis.

“I am planning to do the fieldwork for my thesis over the summer and finish my studies during the next academic year. My thesis is part of a project, where we explore the ecology and systematics of two algae through genetic research,” explains Anna.

Projects, for example, require the skills of people with various interests and abilities. In a situation like that, you must be able to reconcile different perspectives.

In the autumn of 2004, Anna started Russian studies, mainly because, in her view, learning a language serves as a counterbalance to her other academic pursuits. “I am hoping to put the language to good use in future. Maybe I could participate in some exchange programme or work in Russia.”

Anna is by no means a stranger to international experience. In addition to an au-pair year in Switzerland, she has also gained integrated work experience at the Kristineberg Marine Biological Research Station in Sweden. While working there, she was involved in a project aiming at exploring the ability of bottom sediments to recover from human-induced environmental effects.

What happens after graduation is still a mystery to Anna. She finds water protection and hydrobiology interesting, but the employment situation in Finland is less than promising. “But I am prepared to travel for work, even abroad, if need be,” says Anna in a contemplative mood.

In addition to her major subject, Anna’s degree also comprises studies in genetics, statistics and hydrobiology. She concludes that working in a multidisciplinary environment is an essential aspect of studies, and that the confluence of disciplines is a practical necessity. “In our world today, work even in a narrow field of specialist information requires a range of knowledge and skills. And the wholesale management of large entities is impossible without the cooperation of experts in many fields. Most community projects, for example, require the skills of people with various interests and abilities. In a situation like that, you must be able to reconcile different perspectives.”

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Multidisciplinary education with an international perspective

Biology studies are conducted chiefly in the laboratory environment, but students also get hands-on experience at the Bothnian Bay and Oulanka research stations. For Anna Tamminen, field courses represent the culmination of studies.
Research conducted at the University of Oulu has a profound effect on the economy and business life of northern Finland. To transform its research results into practical innovations, the university has forged strong cooperation ties with a number of partners, such as the Foundation for Finnish Inventions.

In 2004, the university’s innovation manager received no less than 68 invention proposals from its researchers, more than two thirds of them in the fields of science and technology. Moreover, 22 new research-based inventions were funded by the National Technology Agency of Finland. Most of these innovations are utilized either by companies involved in the actual research or – as products of independent research – the researchers take advantage of them in their own entrepreneurial activities. At the end of the reporting year, the university held nine patents or patent applications in addition to four licensing agreements. Developing these technologies into commercial products, however, takes an average of three years.

**Structural funding from the EU increased**

Structural funds of the EU were increasingly allocated to international cooperation projects. By initiating and leading projects supported by Interreg funding, the university enhanced its prospects of obtaining direct EU funding, thereby laying the groundwork for the next structural funding period. Collaboration with the Luleå University of Technology in particular would be greatly facilitated by the creation of a common Interreg programme area in the Bothnian Arc region. The master’s programmes of the university have functioned as good pilot cases for the new two-cycle degree structure foreseen in the Bologna declaration. One major initiative is the Researcher-Entrepreneur Project, involving the Technical Research Centre of Finland, Oulu Polytechnic and OuluTech plc., which aims at promoting the entrepreneurial skills of researchers.

Funding allocated to university projects increased by 9 percent relative to the previous year, bringing the total up to about 12 million euros. By developing its service process, the university hopes to advance the readiness and will of the various departments to apply for competition-based funding. In addition, measures will be taken to strengthen the university’s long-term commitment to regional development.

**Total expenditure of the University was 206,6 million euros.** There was a growth of 5,1 percent which is largely due to increase of external funding. The largest single expenditure was salaries, which grew with 2,2 per cent.

The external funding grew with 10,2 percent and amounted to 65,7, million euros. The largest portion (69,8, per cent) of the external funding came through government organisations. The most important sources of external funding were the Academy of Finland and National Technology Agency of Finland (Tekes). Domestic companies account for 10 per cent of the external funding.
New avenues of international cooperation opened up to the University of Oulu in 2004. Of greatest impact for teaching was preparation for the implementation of the Bologna declaration. Thus, the different faculties reviewed the structure and contents of their degree programmes in view of the international education market. In research and education, emphasis was placed on joint degrees offered in collaboration with foreign universities as well as on international studies and exchange programmes serving to enhance student employability.

By the provision of international qualifications to its students in collaboration with international institutes of higher education, the University of Oulu seeks to ensure that its students are well prepared for challenging international careers. In our world today, graduates of the University of Oulu face a global employment market.

Having completed its strategy for neighbouring areas in 2004, the university went on to carry out its stated mission. To this end, expertise at partner universities in these areas will be brought to bear on the provision of dual degrees. The thus accumulated knowledge base relating not only to opportunities in North-West Russia, but also elsewhere in northern areas, forms an entity that has a great commercial potential in the world market. Central roles in this undertaking are also played by the University of the Arctic and the Circumpolar University Association.

Modern university education means, among other things, that first degree studies must incorporate an international perspective. Combined with good professional skills, highly esteemed qualities that employers look for include factors such as having studied one’s major subject in a foreign language and participation in student exchange programmes and practical training. Other desirable qualities enhancing students’ employability are the ability to speak foreign languages, an understanding of foreign cultures and multicultural communication skills. Through such versatile competencies, students gain a competitive advantage in the employment market, employers get top notch professionals.

**International teaching and learning**

The past year saw a marked increase in the mobility of researchers and students alike. A record number of students and teachers came in but also went abroad. As a token of this, the number of courses given in English was extended.

Strengths of the University of Oulu are long-term commitment to offering education in English, creative forms of teaching and learning and functional networks and services for both incoming and outgoing students.

During the year under review, planning was set in motion for the launch of six new master’s degree programmes in English, funded through internal resources. Some of these programmes will be implemented as joint degrees involving one or more foreign universities. Finnish and foreign students are eligible to participate in these programmes, which can also be seen as a source of postgraduate students.

A clearly stated objective in the strategy set up by the University of Oulu involves pursuing a more visible position in the international education market, particularly in the university’s areas of strength, during the next three years. In this light, advances made during the year 2004, and especially the degree structure reform, lay a solid foundation for this ambitious effort.

### Outgoing and Incoming Exchange Students by Countries

<table>
<thead>
<tr>
<th>Outgoing</th>
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<th>Incoming</th>
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<tbody>
<tr>
<td>Germany</td>
<td>33</td>
<td>Germany</td>
<td>60</td>
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<td>USA</td>
<td>25</td>
<td>France</td>
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<td>UK</td>
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<td>Austria</td>
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<td>Austria</td>
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<td>Spain</td>
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<td>Italy</td>
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<td>USA</td>
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<td>Sweden</td>
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<tr>
<td>Spain</td>
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<td>Canada</td>
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<td>France</td>
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<td>UK</td>
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<tr>
<td>Canada</td>
<td>12</td>
<td>Poland</td>
<td>12</td>
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<tr>
<td>Iceland</td>
<td>10</td>
<td>Slovakia</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td>91</td>
<td>Others</td>
<td>109</td>
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<tr>
<td><strong>Total</strong></td>
<td>273</td>
<td><strong>Total</strong></td>
<td>343</td>
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The University offers a stimulating learning environment from bachelor to doctoral level and further to continuing education.
For years, the Faculty of Humanities has enjoyed great success in attracting candidates to its programmes. This, along with other indicators, such as exceeding the goal for completed first degrees, attests to the faculty’s position at the forefront of humanities education in Finland. Chief among new challenges during 2004 was the university degree structure reform, carried out in close collaboration with the national working group for curriculum development. As a result, a number of degree programmes are being profoundly reorganized. One new venture is the English Department’s initiative to collaborate in an international master’s programme.

In addition, the faculty reorganized its post-graduate programme by establishing a multi-disciplinary Graduate School for Culture and Communication. Students selected in the first round of application represent the various branches of study within the faculty. Characteristically, students participated extensively in seminars and other forms of education provided by the faculty.

One of the main challenges for the Faculty was the Bologna process and the restructuring of degrees. To ensure adequate national transparency and coordination, this process was carried out in cooperation with other Finnish universities. The new degree structure and curriculum combines some of the basic studies, which were previously taught separately on the different degree programmes which the Faculty offers. This approach has rationalized resource allocation and introduced new dimensions to existing curricula, all to enhance learning. In cooperation with the Faculty of Science, the Faculty’s Kajaani unit has launched a new programme for mathematics teachers. Thus far, the experiences gathered have been very encouraging.

A continued effort to develop the faculty’s doctoral programmes is already producing results. As an example, the goal set by the Ministry of Education for doctoral degrees was exceeded in 2004. Moreover, the Faculty also initiated the planning phase of an international joint degree in education and globalization.
Coupled with a drive to develop teaching and curricula, the Faculty of Science restructured its degree programmes. Particular emphasis was placed on the facilitation of first-year studies, tutor activities and study counselling. Over 700 students started their studies in 2004, 40 of them in the Degree Programme for Information Processing Science offered in the town of Kajaani.

The efficiency of research staff was evidenced not only by the number of international publications, but also by the amount of acquired competition-based research funding. For example, of all funding the University of Oulu received from the Academy of Finland, about half was awarded to researchers in the Faculty of Science.

Consequently, the faculty’s research groups play a prominent role in the university’s research focus areas. Over 50 post-graduates are involved in environment-related research, and international research networks are being planned in collaboration with research partners. Also the departments of Information Processing Science and Geology are planning on establishing joint international master’s programmes.

Moreover, the faculty forged collaboration ties with the Agricultural Research Centre and the Finnish Environment Institute, while the Population Genetics Group, led by Pekka Pamilo, continued its activities as a Centre of Excellence in Research. Also Helena Aksela continued in her position as Professor of the Academy of Finland. In addition, she was the recipient of the prestigious Pentti Kaitera Prize.
Having achieved its best performance in terms of the number of graduates and post graduates, the faculty was able to raise its goals considerably for the period 2007–2009. Current programmes offered cover all the major areas in economics and business administration. In addition, the faculty strives to consolidate its quality system by seeking accreditation through established international standards recognized in the academic field.

National and international contacts are an essential part of our activities. Co-operation with businesses in the Oulu region and with educational partners abroad ensures that the faculty will be able to offer competitive programmes with research and job market relevance. Furthermore, the faculty offers an English language master’s programme in finance and management accounting, and towards the end of the year 2004, it initiated the planning phase of an international joint degree.

Meeting the challenge posed by the imminent shortage of graduate engineers in northern Finnish construction business is one of the main objectives of the Faculty of Technology. For this purpose, a survey was conducted into possibilities of launching a master’s programme in construction engineering. A graduate Conversion Programme in Environmental Technology and a Degree Programme in Environmental Protection Technology continued to be offered in collaboration with the University of Kuopio.

Research infrastructure in the Department of Electrical and Information Engineering improved significantly through new equipment funded by the Academy of Finland and through the new microelectronics and material physics laboratories housed in Tietotalo I. Funding provided by the City of Oulu and the Ministry of Labour allowed the construction of a centre for micro and nanotechnology with clean room facilities. Additionally, the Department of Electrical and Information Engineering initiated cooperation with international partners in information technology.

Researchers in the faculty continued their joint activities with a range of enterprises, research institutes and partners in the public sector. These researchers play a central role in two of the university's research focus areas, namely, information technology and the environment. With its 30 student positions, the Graduate School for Infotech Oulu is pivotal for post-graduate education in IT. External funding sources comprise almost 50 per cent of the faculty’s total revenue.
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Botanical Gardens

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Infotech Oulu
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Language Centre
Library
Laboratory Animal Centre
Learning and Research Services

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