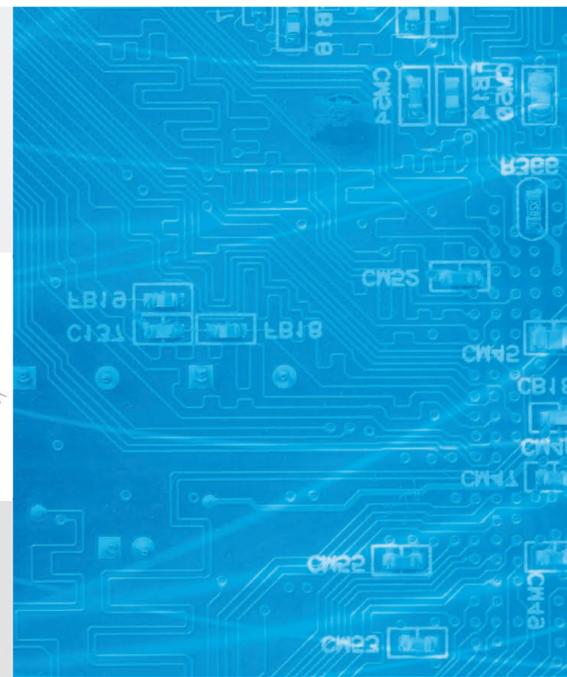
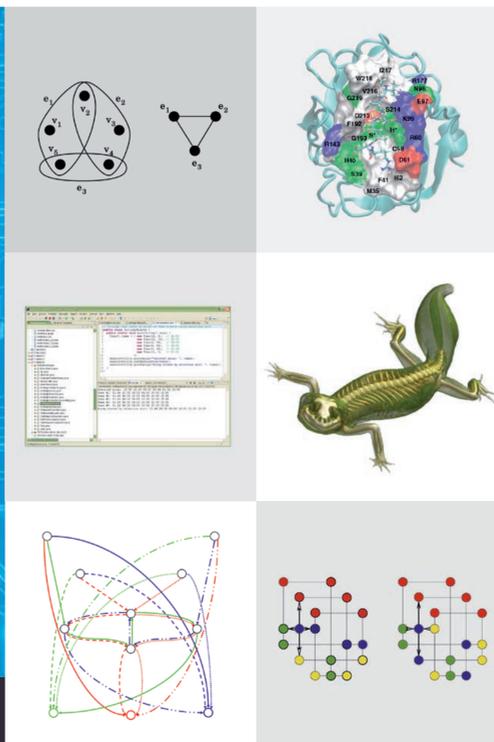
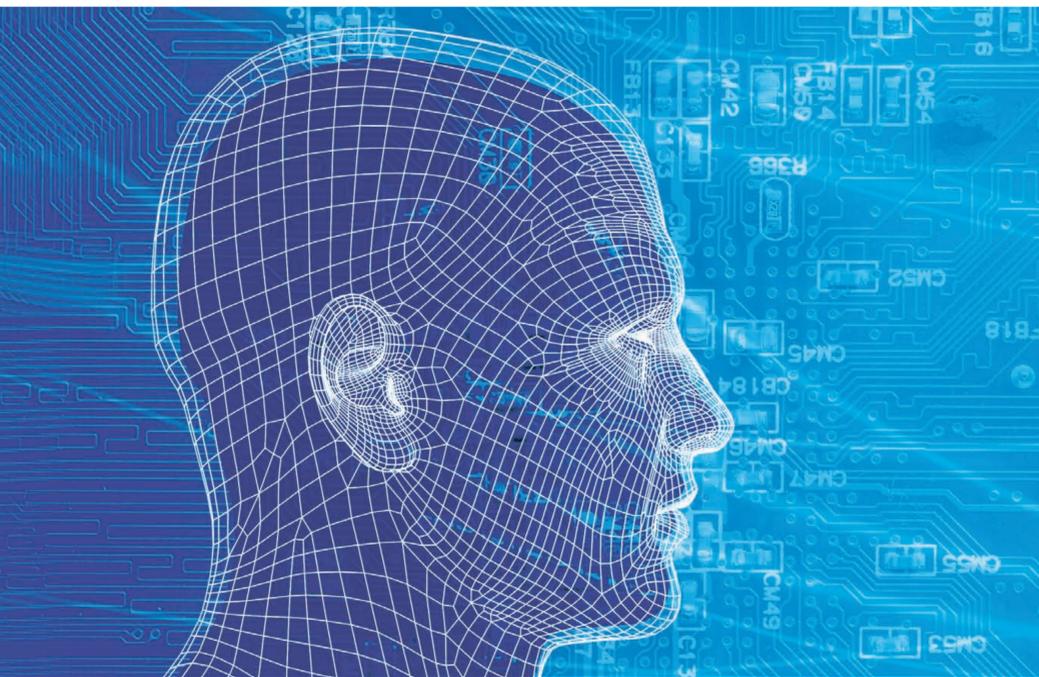


## Research School in Information and Communication Technology



**Research in information and communication technology** paves the way for new applications in a wide range of areas, both directly through the development of more efficient and more reliable computing technology, better user interfaces, and better and more secure communication techniques, and indirectly by providing tools for other scientific disciplines.

The Department of Informatics comprises research groups in **algorithms**, **bioinformatics**, **optimization**, **programming theory**, **secure and reliable communication**, and **visualization**. In each research group, PhD students are trained to approach problems at the frontiers of research, and participate in advancing the state of art. Research evaluations carried out by the Norwegian Research council consistently conclude that the research at the Department of informatics is at an excellent level.

**The research school in ICT** organizes the PhD students in the department. The purpose of the research school is to:

- maintain a stimulating training environment for all PhD students in information and communication technology
- Strengthen the connection between PhD students, faculty members, and the different research groups, facilitating an exchange of ideas and knowledge
- coordinate technical courses, seminars, summer schools, and guest lectures of general interest to all PhD students in the school
- connect the research training activities in the school to other groups at a national and international level
- offer training in teaching, project management, application crafting, organization of events, refereeing, and other academic activities
- improve national and international recognition of the school through joint marketing, coordinated project proposals, and common web pages
- connect the school to other scientific areas, including the Molecular and Computational Biology research school
- provide practical and administrative assistance for foreign or other PhD students



UNIVERSITY OF BERGEN  
Department of Informatics

### › Algorithms

Algorithms and their design and analysis are at the heart of information technology. Significant advances in algorithms are a crucial factor in the data processing underlying such technological developments as internet search engines, graphics applications and bioinformatics. The algorithms group in Bergen is young and rapidly developing. The group keeps the high publication rate at internationally recognized conferences and journals and it is well known internationally. The long-term goal of the group is to establish Bergen as not only the Norwegian center for research into algorithms, data structures and complexity theory, but also as a strong force in the world community.

### › Bioinformatics

In general the research in the bioinformatic group focuses on development of methods and algorithms for analyzing molecular biological data. The group works on analysis of microarray gene expression and proteomic data, on methods for the analysis of sequences with a special focus on transcriptomics, and on development of methods for protein structure analysis and prediction. The group uses methods from algorithms and algorithm analysis, pattern recognition and classification, and statistics to approach problems in molecular biology. The emphasis is on developing methods that contribute to a better understanding of biological and biomedical data.

### › Optimization

The subject of optimization studied in the group is a blend of heuristics and rigor, of theory and experiment. It has applications in almost every branch of science and technology. Methods of solving optimization problems are an essential part of the activities of the group. Knowledge of the capabilities and limitations of these solution techniques leads to a better understanding of their impact on the applications. The group has been rated 'excellent' by the Research Council of Norway.

### › Programming theory

The programming theory group investigates the concepts underlying programming, and how these concepts influence the software process. The activity ranges from theoretical studies via building of support tools to practical software development. Much of this is focussed around algebraic methods, but logic, category theory, and type theory is also used. Some of the activity is directed towards parallel programming.

### › Secure and reliable communication

Coding theory considers methods to protect data against errors that occur during communication or storage of data, thus providing reliability and high transmission rate. Cryptography comprises methods to protect data against unauthorized eavesdropping, change, and other misuses, and also treats methods to construct digital signatures. Computer security is concerned with system weaknesses against malicious attacks on communication and information systems. The areas of coding theory, cryptography and computer security are closely related, and research activities in these subjects are organized in the Selmer Center, which according to the Research Council of Norway is "one of the gems on the Norwegian scientific scene, not just in the context of ICT".

### › Visualization

The UiB visualization group focuses on researching and teaching of new solutions for the efficient and effective visualization of large and complex datasets from

- measurements (e.g., medical imaging modalities or seismic/sonar sensors),
- computational simulation (e.g., computational fluid dynamics), or
- analytic modeling (e.g., differential equations)

for the purpose of data exploration, analysis, and presentation. We employ advanced computer graphics, 3D rendering, and modern graphics hardware to achieve cutting-edge visualization for improved insight into data, leading to knowledge crystallization and improved decision making.