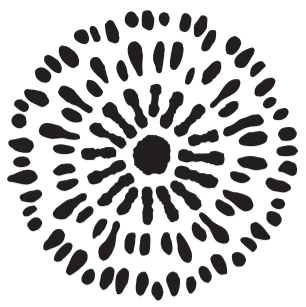




Design: Petri Saarikko, Photography: Johannes Romppanen



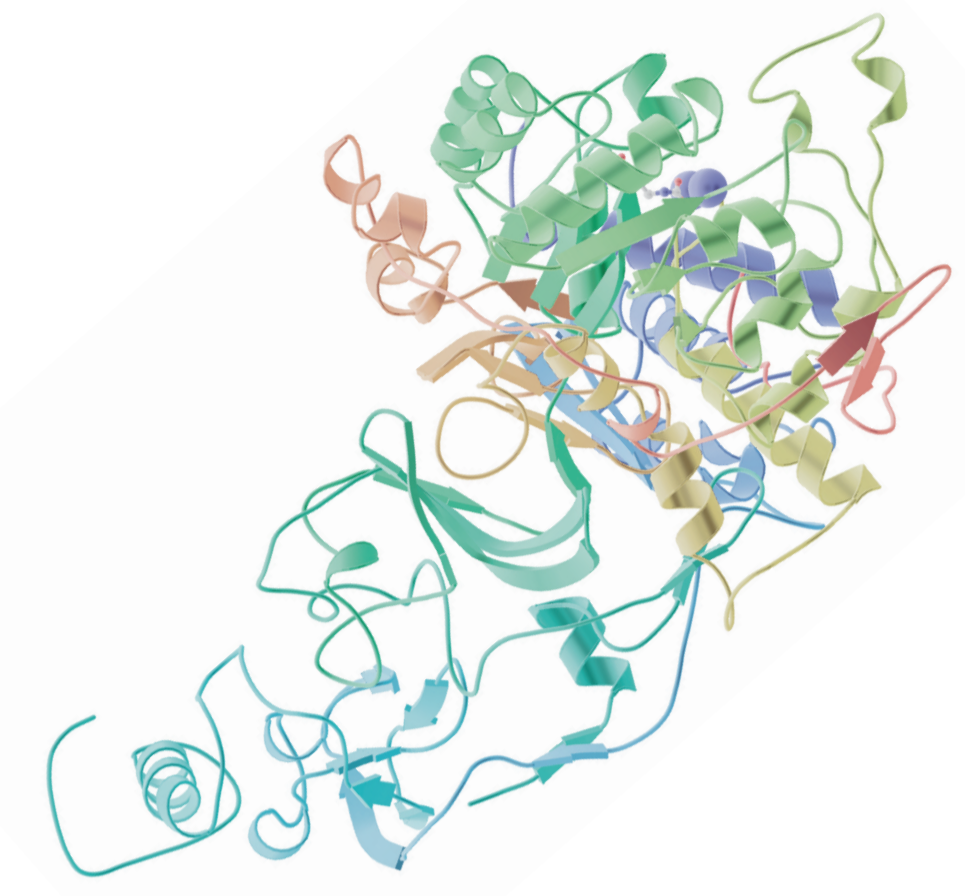
**MBI MASTER'S DEGREE
PROGRAMME IN BIOINFORMATICS**

Applications for 2007-08 are welcomed after beginning of 2007. Further information: www.cs.helsinki.fi/mbi, bioinfo@cs.helsinki.fi





One of the MBI organisers, Professor Liisa Holm is an influential figure in protein bioinformatics. Urease enzyme is one of the protein studied by Professor Holm's group.



MBI
Master's Degree Programme in Bioinformatics (MBI) educates methodologically oriented bioinformatics professionals to work in research and development tasks in biology and medicine. The degree also gives excellent general background for graduate studies in bioinformatics and in other related applied methodological sciences.

Bioinformatics?
Bioinformatics is a new field of science, seeking answers to the questions of life, raised by biology and medicine, with computational means. The analysis of measurement data is of vital importance in the modern research in biology and medicine. Understanding such data requires both robust statistical modelling and computationally feasible methods. Information contained in biological measurements has several special characteristics, e.g. the sequential nature of DNA, RNA, and proteins, which has given rise to a new interdisciplinary field - bioinformatics.

Leading edge research and education in Finland and in Helsinki
The educational system in Finland is well-known for its high-quality. This is exemplified by the facts that Finland continues at the top of OECD PISA reviews in mathematical literacy, outperforming USA, Japan and the rest of Europe. In research, Finland belongs to the top 20 countries of the world, judged by numbers of citations to Finnish research articles.
The Programme is organised jointly by the University of Helsinki (UH) and the Helsinki University of Technology (TKK). At the University of Helsinki, teaching is given in bioinformatics by Department of Computer Science and Department of Mathematics and Statistics, and in biology and medicine by Faculties of Biosciences, Medicine, and Agriculture and Forestry.



Helsinki is the capital of Finland and the greater Helsinki area is a true metropolis of one million inhabitants. It has an international and ambient atmosphere. There are a wide variety of cultural events and all necessary services, yet it is also safe, clean, well organised and close to nature. Helsinki is a major European hub for creativity, research and innovation, and home to international companies such as Nokia, which offer employment for skilled experts.



Why graduate from MBI?
The teaching is given by people working in the cutting edge of bioinformatics research. The organisers are members in three National Centres of Excellence and they are central operators in the CoMBI, the only Finnish graduate school offering PhD level education in bioinformatics.

Professor Esko Ukkonen is a pioneer in biological sequence analysis. His group has developed several methods that belong to the core algorithmics of approximate pattern matching and DNA sequence assembly. The currently standard formulation and algorithmic approach for assembling DNA sequences from short fragments is based on a paper by E. Ukkonen et al. from 1983.

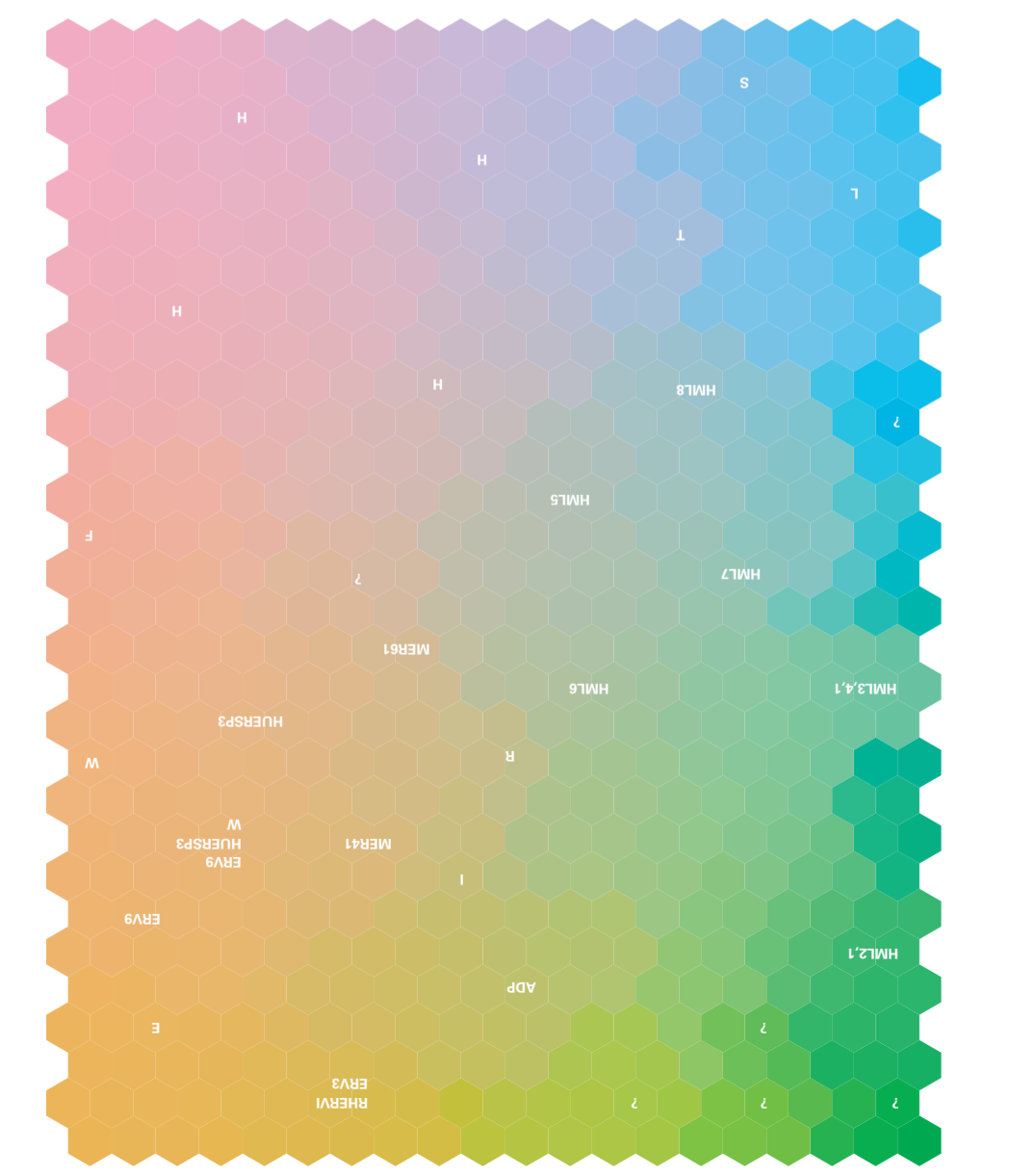
"The main interests of my research group are protein sequence-structure-function relationships and computational analysis of gene regulation. We are developing computational methods to correlate specific sequence motifs with protein function, and to correlate co-regulated gene clusters from microarray experiments with biological processes and biochemical pathways."
- Liisa Holm

Research in data mining started in Finland in the late 1980's when professor Heikki Mannila focused his research efforts into this area, among the first in the world. His group gave the first efficient algorithms for finding association rules. More recently, Heikki Mannila, together with professor Hannu Toivonen, defined the problem of finding episodes from sequences. The definitions and algorithms have turned out to be influential, for example, in medical genetics, where the group has participated in the discovery of genes related to diseases such as asthma and schizophrenia.

Professor Samuel Kaski is an internationally recognized researcher in machine learning and data analysis. "Bioinformatics is a perfect match to researchers interested in machine learning, modeling, or data mining on the one hand, and the fundamental problems in biology on the other. What could be more interesting than being able to make sense of the functioning of a biological cell, given only imperfect measurement data, and with a little help from the vast databases of background data."

The Laboratory of Computer and Information Science of TKK is a renowned research center in machine learning and pattern discovery, with traditions ranging to emeritus professor Kohonen and his Self-Organizing Maps.

Myra Oja, Goran O. Sperer, Jonas Blomberg and Samuel Kaski. Self-organizing map-based discovery and visualization of human endogenous retroviral sequence groups. *International Journal of Neural Systems* Vol. 15, No. 3 (2005) 163-179.



MBI is a two-year MSc programme offered jointly by the University of Helsinki and Helsinki University of Technology in Finland. Adjunct Professor Orit Mannik, head of the Biomedicum Biochip Center of the University of Helsinki, is a main organizer of biology courses in MBI.



MBI offers two degrees: MSc in Bioinformatics and MSc (Tech.) in Bioinformatics. Mathematics, Statistics, or related biological field and Proficiency in English (TOEFL or equivalent) Major subject studies in bioinformatics (30 cr) Minor subject studies (40 cr) in Computer science, Mathematics and statistics, Biology or medicine, Further information: www.cs.helsinki.fi/mbi The programme will start 3 September 2007

What will you learn in MBI?
Master's Degree in Bioinformatics consists of an extensive portion of general methodological studies with a strong emphasis on central bioinformatics problem-sets. Examples of specialisation areas are biological sequences analysis, biomathematics, genomics, computational systems biology, and data mining in genetics. Minor subject studies are carefully tailored to give sufficient background to each major specialisation area.

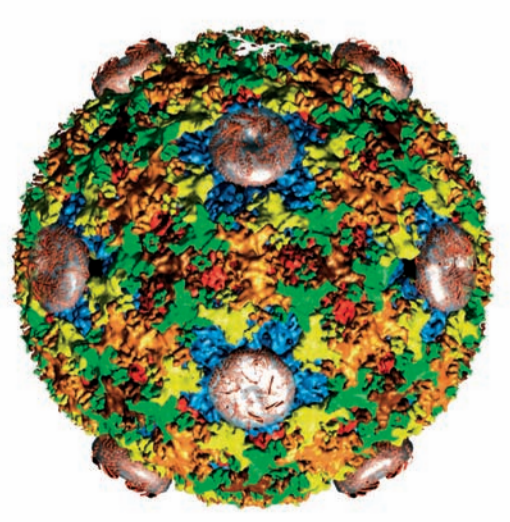
How to apply?
Admission requirements:
• A Bachelor's degree in Computer Science, Mathematics, Statistics, or related biological field
• Proficiency in English (TOEFL or equivalent)
• The programme is aimed at full-time students
• Applications for 2007-08 are welcomed after beginning of 2007
• Further information: www.cs.helsinki.fi/mbi

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3D reconstruction of a segmented icosahedrally-ordered capsomer. The capsomer is shown in brown, orange, green, yellow, blue and red. Figure courtesy of Sarah Butcher and John Truskonos, Institute of Biotechnology, University of Helsinki.

