We conduct research and education in scientific fields that deal with randomness and uncertainty. We develop mathematical models which include random components, investigate them theoretically and apply them to solve practical problems. The department provides a unique combination of expertise in topics ranging from theoretical probability, statistics, and optimization to applications in finance, insurance, biomedical sciences, and industry.

**RESEARCH AREAS AND EXCELLENCE**

**MISSION**

Islets of Langerhans (red objects) wrapped in the remains of the exocrine tissue (light-brown objects) observed by optical dark field microscopy in order to automatically estimate the total islet volume in the given sample.

**RESEARCH TOPICS**

- **Statistics**: analysis of complex high-dimensional data, functional data analysis, dynamic models, time series, analysis of extremes, change-point analysis, supervised and unsupervised classification.
- **Biostatistics and Bioinformatics**: analysis of biomedical, genetic and high-dimensional data, design of clinical studies, methods for analysis of data from observational and randomized studies.
- **Stochastic Processes**: point processes, stochastic calculus, random fields.
- **Stochastic Geometry**: random closed sets, spatial and space-time point processes, stereology.
• **Optimization/Operations Research**: asset-liability management, revenue management, simulation, facility planning, scheduling, portfolio optimization, sensitivity and output analysis.

• **Financial & Insurance Mathematics**: risk management, credit scoring, derivatives pricing, rate-making, optimal pricing in insurance, reserving, stress testing.

**PARTNERSHIP AND COLLABORATION**

**WE OFFER**

• Expertise in analysis and modeling of complex data structures, applications of stochastic models in time and/or space, solutions to optimization problems, assessment of financial and insurance products, design and analysis of randomized and observational studies.

• Ability to develop creative designs for scientific and industrial experiments that save resources and increase precision; to apply advanced analytical techniques and models in order to improve decision making in diverse types of practical problems.

**ACADEMIC PARTNERS**

- University of Utah
- University of California, Los Angeles
- Johns Hopkins University
- KU Leuven
- Humboldt-Universität zu Berlin
- Aarhus University
- University of Bergamo
- University of Vienna

**INDUSTRY PARTNERS**

- KBC/ČSOB
- Raiffeisenbank
- Generali/Česká pojišťovna
- Institute for Clinical and Experimental Medicine
- Fred Hutchinson Cancer Research Center
- Motol University Hospital

Estimation of the joint distribution of two biomarkers capturing progress of HIV infection.